Name:

ADVANCED RESUSCITATION TECHNIQUES

LEARNER GUIDE

v5.5 JULY 2023

Contents

Acknowledgments

SLSA would like to acknowledge all of the volunteers and staff who contributed their time and expertise to development of this resource.

Surf Life Saving Australia
PO Box 7773, Bondi Beach NSW 2026
Ph: (02) 9215 8000
Email: education@slsa.asn.au
Ph: (02) 9215 8000
Web: www.sls.com.au

All resources developed by Surf Life Saving Australia are reviewed on a regular basis and updated as required. Feedback can be supplied in writing to the contact details above.

Version 5.5 July 2023

Course Introduction

The aim of the SLSA Advanced Resuscitation Techniques course is to develop your skills and knowledge to use oxygen, airway management devices and automated external defibrillators during resuscitation, as well as the administration of oxygen to conscious or unconscious victims.

COURSE OUTCOMES

By the end of this course you should be able to:

- respond to an emergency situation
- manage life threatening bleeding using a tourniquet and haemostatic dressing
- perform a primary (DRSABCD) and secondary (vital signs) assessment of a victim
- identify victims suffering from a condition where providing oxygen would be beneficial
- perform advanced resuscitation, including the use of oxygen equipment, oropharyngeal airways and suction
- communicate details of an incident
- complete documentation
- evaluate an incident and your own performance
- identify possible psychological impacts of first aid incidents and how to seek help
- restore equipment ready for use.

You will also develop knowledge and skills to enable you to demonstrate competency in the nationally recognised units of competency:

- HLTAID015 Provide advanced resuscitation and oxygen therapy.
- HLTAID009 Provide cardiopulmonary resuscitation

SLSA AWARD ENTRY REQUIREMENTS

To commence training for the SLSA Advanced Resuscitation Techniques award, you must meet the f ollowing entry requirements:

- be at least 15 years of age on the date of final assessment
- be a financial member of a SLS club.

PREREQUISITES

Participants must hold a current unit of competency HLTAID011 Provide First Aid to enrol into this course.

WHAT YOU NEED TO COMPLETE THIS COURSE

- a trainer/facilitator and assessor
- a copy of this learner guide
- a copy of the SLSA Advanced Resuscitation Techniques Assessment Portfolio
- access to a tourniquet trainer
- access to a wound packing trainer
- access to a CPR resuscitation manikin (adult and infant) in line with ARC guidelines
- access to an airway training manikin suitable for insertion of an oropharyngeal airway
- access to a pulse oximeter
- access to oxygen resuscitation equipment, including an oxygen cylinder
- access to a suction device for training
- access to an oropharyngeal airway
- access to a training defibrillator (AED)
- access to a bag-valve-mask (BVM)
- selection of oxygen masks with tubing, nasal cannula (optional), therapy mask, resuscitation mask with oxygen port
- first aid kit including PPE, thermometer, tourniquets, gauze, haemostatic bandages, bandages
- incident report form
- to be part of a training squad of at least four people or have additional personnel to participate in training scenarios with you.

Topic 1—Advanced Resuscitation and First Aid

FIRST AID

WHAT IS FIRST AID?

First aid is the initial care of the suddenly sick or injured until medical aid arrives or the victim recovers. Medical aid, on the other hand, is professional medical treatment by a doctor, registered nurse or ambulance paramedic.

PRINCIPLES OF FIRST AID

The principles of first aid are to:

- preserve life
- protect the unconscious
- prevent the condition from worsening and to relieve pain
- promote recovery.

As a first responder, you also aim to prevent:

- further damage to yourself, the victim and others
- any harmful intervention.

Rendering first aid should never be undertaken lightly

Remember:

- first—do no harm
- if in doubt—don't
- seek professional medical assistance
- always seek permission to assist unless the victim is unconscious.

THE AUSTRALIAN RESUSCITATION COUNCIL (ARC)

The Australian Resuscitation Council (ARC) is a voluntary coordinating body that represents all major groups involved in the teaching and practice of resuscitation.

AUSTRALIAN RESUSCITATION COUNCIL

The ARC produces guidelines to meet its objectives in fostering uniformity and simplicity in resuscitation techniques and terminology. Guidelines are produced after consideration of all available scientific and published material and are issued only after acceptance by all member organisations. This does not imply, however, that methods other than those recommended are ineffective.

All first aid providers should be familiar with ARC guidelines and be able to access them readily.

Further information about the ARC and their guidelines can be found at www.resus.org.au.

CHAIN OF SURVIVAL

In 1990, the American Heart Association introduced a treatment model for victims of sudden cardiac arrest called the chain of survival. It outlines the chain of events that needs to happen to increase a victim's chances of surviving and recovering from sudden cardiac arrest.

Early recognition and call for help

This first step occurs when someone suspects or determines that the victim is in sudden cardiac arrest and calls for help.

First responders want to reach the victim as quickly as possible and contact emergency services—call triple zero (000).

Early CPR

This second step is about buying time for the victim. Cardiopulmonary resuscitation (CPR) keeps the victim's blood flowing until defibrillation can begin. At this stage, any attempt at CPR is better than no attempt. While a person with current training in CPR is ideal, any attempt by a bystander whether trained or not will contribute to this stage in the chain.

Early defibrillation

This third step is about resetting the heart's rhythm by shocking the victim as quickly as possible with a defibrillator. Studies show that this is the most critical link in the chain of survival.

Post-resuscitation care

This fourth step occurs when medical personnel provide advanced care that can include airway support, medications and hospital treatment.

LEGAL AND SOCIAL ISSUES

WORK HEALTH AND SAFETY

As a first responder, you need to be aware of relevant state/territory regulations, Work Health and Safety (WHS) requirements in the provision of first aid, legislation and policies, codes of practice and issues such as legal responsibility, duty of care and confidentiality.

Currently all states, territories and the commonwealth are responsible for making and enforcing their own WHS laws (see Appendix 1). The model Work Health and Safety (WHS) Act forms the basis of the WHS acts that have been implemented in most jurisdictions across Australia and can be found at www.safeworkaustralia.gov.au.

The standards covering legal responsibility, duty of care, record keeping and confidentiality are relatively consistent throughout Australia. This text provides a general guide only. Specialist legal advice should be sought if you have a specific legal question and/or before lodging or responding to legal action.

The provision of first aid in Australian workplaces, including the standards expected and the identified roles and responsibilities, is covered in state/territory legislation. These laws spell out employer and employee responsibilities regarding provision of first aid.

DUTY OF CARE

Duty of care describes the legal obligation of one person to care for another in a certain way. The common Australian law does not impose an automatic duty on any person to provide first aid. However, people with first aid qualifications do have a duty to provide assistance to people conducting activities in their workplace if it is safe to do so and if they have voluntarily taken on a first aid role e.g., first aid officer, lifesaver. Once you start treating a victim, you take on a duty of care to provide a standard of care within the limits of your first aid training level to ensure your actions do not cause further damage to the victim.

Under WHS legislation, surf lifesaving clubs and their surroundings are workplaces and volunteer lifesavers are workers. A lifesaver on duty and in uniform has a duty to provide care because they are holding themselves out as someone who is ready and able to provide first aid care. However, if they were to be placed in a situation of danger then they would not be expected to act. For example, if the victim was at the bottom of a cliff and the only access was via dangerous climbing then it would be expected that they wait for specialist rescue and medical care. However, if the victim were lying on a beach in a position of safety then it would be expected that the lifesaver would provide care.

People often hesitate to render assistance because they fear that if their actions do not result in a desirable outcome they may be sued. Every state in Australia has Good Samaritan type legislation in place, to help protect individuals who decide in good faith (the intention to help someone without personal gain) to make an offer of assistance to someone else in an emergency.

The law offers protection to people if they:

- act in good faith
- act responsibly
- act without recklessness
- seek advice and assistance whenever possible
- do not hinder someone more qualified from endering assistance
- are not under the influence of alcohol or other recreational substances
- act within the limits of their training and competence.

NOTE

Having a duty of care does not mean that you have an automatic duty to rescue. Safety to the first responder is the primary consideration when attempting a rescue. To learn more about duty to rescue, please refer to the latest edition of the Public Safety and Aquatic Rescue training manual.

NEGLIGENCE

The legal concept of duty of care arises from the laws relating to negligence. Negligence is when someone who owes a duty of care has failed to provide a reasonable standard of care, which results in further injury.

For someone to be considered negligent under the law, four conditions need to be met:

1. That a duty of care exists between one person and another
    a. in the eyes of the law, a duty of care exists in a situation where it is reasonable for one person to be relying on another to look out for their best interests
    b. in a first aid situation, it is reasonable for the person receiving first aid to be relying on the person providing the first aid. When a decision to provide first aid has been made, a duty of care exists.
2. That a person owing another a duty of care acts towards that person only in the same way that any other reasonable person (in the same situation) would do, and in such a way that they are competent to do so ('standard of care')
    a. the legal concept of a 'reasonable' person behaving 'reasonably' is based on the values and expectations held by the general public (the average man/woman on the street) and society in general at that point in time
    b. to determine what is 'reasonable' action, a court would make a decision based on what they thought an average person (of similar knowledge and skill) would currently do in exactly the same type of situation
    c. for someone to be competent in doing a certain thing, they must be properly or sufficiently qualified, or else capable of carrying out that task or role safely and efficiently
    d. a person administering first aid SHOULD NOT do anything that they are not sure about. The person should act responsibly, within their level of competence and follow established policies and guidelines
    e. if a first responder is not sure of something, advice should be sought (from emergency services or medical personnel). The first responder should never be afraid to refer to or hand the victim over to someone who has more knowledge.
3. That an actual duty of care and standard of care has not been met ('breach of duty')
    a. a court of law decides this based on evidence presented in court.
4. That even if it can be shown that duty of care has not been met, for someone to be found negligent it must be proven that someone suffered some type of harm as a direct result.

A court will look at all of the circumstances to determine what is reasonable in any given situation. Upon rendering assistance, a person is under the duty of care to do everything reasonable in the circumstances. A duty of care cannot be evaded by abandoning assistance halfway through.

In the general community, the law does not impose a requirement on people to go to the assistance of anyone if they do not want to. The exception is the Northern Territory where, under statute law, people are required to offer assistance to anyone in need.

Always work within your training, following organisational procedures and manufacturers' instructions for equipment where required.

CONSENT

Unless a victim is unconscious, you must always gain a victim's consent before giving any assistance. Consent can be given in two ways in an emergency situation:

- actual consent—the victim gives you permission to apply first aid
- implied consent—the victim is unconscious, or is a child with life-threatening injuries whose parents are not present.

The doctrine of consent allows a first responder to provide, for instance, airway management or stop life-threatening bleeding in an unconscious victim.

If a victim is a minor, a close relative who is at hand (for example a parent or guardian) may give or withhold consent for the victim, so long as their decision does not obviously threaten the victim's life.

If a victim is a mentally competent adult, with no current mental illness or not under the influence of any mind-altering substances, they have the right to refuse assistance or treatment from anyone. Failure to respect their decision by commencing to provide assistance is illegal and can constitute assault.

When asking for consent to treat and assist a victim, remember that they may have cultural or religious customs that may affect their decision.

CULTURAL AWARENESS AND SENSITIVITY

When looking to assist someone, it is essential that you are aware that they may not come from the same cultural, ethnic or language group as yourself.

Some of the key points that will help in developing the skills to work more effectively with people from other cultures include:

- be aware of the fact that many people in the world are different from you
- don't automatically expect other people to share your values
- be aware of the fact that our own culture influences our understanding of every part of our day-to-day lives
- respect the fact that people are different and respect their right to do things differently
- imagine your own feelings when others do not respect the values that are vital in your own life
- even if in your culture a certain mode of behaviour is frowned upon, it may be quite all right in another culture
- accept the fact that you will never fully understand a culture that is not your own
- do not expect cultural awareness and understanding to come easily
- be prepared to challenge your initial reactions to people from other cultures
- be aware of the fact that your reactions are based on the rules of your own culture
- try to avoid stereotyping and labelling people. Treat people as individuals
- be very aware of the victim's modesty, particularly females, including those who are wearing religious dress.

Certain cultural and religious groups have specific requirements relating to provision of emergency care. For example, Jehovah's Witnesses believe in the refusal of blood products, and a Muslim woman requiring first aid may not provide her consent if only a male stranger is available to provide first aid assistance. In the latter situation, the Muslim woman's need for lifesaving assistance outweighs any other considerations; however, always be conscious of maintaining the modesty of any female (or male) wearing religious dress by exposing only those body parts that are absolutely necessary for the effective delivery of first aid.

Maintaining a victim's modesty should be a paramount consideration when dealing with any victim, regardless of their cultural origins. Sheets and towels can be used to create a visual barrier around a victim to help maintain their modesty, and bystanders can be asked to leave an area to also help achieve this.

Communication is the key. If your victim is unable to communicate with you then it can be helpful to talk to family or friends who are with them.

When talking to a victim, remember to speak clearly and simply. If someone does not understand the language you are speaking, shouting at them does not increase their comprehension. It is important to also remember to adjust your body language for positive visual communication when approaching a victim.

SHOWING RESPECT FOR OTHERS

Harassment is defined as unwelcome and unreciprocated behaviour. Generally it is a comment, conduct or gesture directed towards an individual or group of individuals, which one can perceive as insulting, intimidating, humiliating, malicious, degrading or offensive.

Unlawful harassment is harassment that contravenes anti-discrimination law. In Australia, there are federal and state laws covering discrimination. Depending on where you live, it may be unlawful to harass someone on the basis of:

- age
- disability, impairment, disfigurement, illness, disease, medical history or viral status
- sex, gender, sexuality, transgender or intersex identity
- race, colour, descent, ethnicity, social origin or nationality
- religion, political views or trade union membership
- pregnancy, breastfeeding, caring/family responsibilities or marital status
- occupation, trade or calling.

Where unlawful harassment is found to have occurred, a court may impose penalties that include orders to cease and desist the offending behaviour, redress any wrongs, provide financial compensation, reinstate an employee, alter the terms of a contract or determine that no further action will be taken.

CONFIDENTIALITY

Personal information about the health and condition of a victim is confidential. This information includes details of medical conditions, treatment provided and the results of tests.

Disclosure of personal information to someone other than those directly involved in a victim's care without that person's written consent is unethical and illegal.

Confidentiality is also a duty of care that first responders owe to the people they help. As a first responder, the primary person to whom you will disclose a victim's condition and details is the emergency services personnel or health professional to whom you are transferring care of the victim e.g., paramedic.

National (Commonwealth) laws relating to the confidentiality of victims are:

- **Privacy Act 1988**—personal information except health information
- **Privacy Amendment (Enhancing Privacy Protection) Act 2012**—personal information
- **Health Records Act 2001**—personal information that is health information
- **My Health Records amendment (strengthening privacy) Act 2018**—online health information in the Australian government's digital health record system.

RECORD KEEPING

It is important to keep an accurate record of any first aid assistance provided as per your state's WHS legislation requirements. The details may be very clear following the event and it may seem to be something that you will 'never forget', but over time, you will forget details.

A record documents details of an incident and the provision of resources. It can be as simple as dot points written in a notebook or more formal, as in an incident report form. Regardless of the format, the record should be clear, concise and factual, as it may be used later in a court of law as evidence.

Information that should be contained in the record includes:

- date, time and location of the incident
- victim personal information (name, address, date of birth)
- history of illness/injury
- observations (signs and symptoms at least every 15 minutes)
- fluid intake and output
- your assessment of the illness/injury
- treatments provided and outcomes
- your printed name and signature, with the date you signed.

Whatever the form of record, there are certain points to observe:

- use blue/black permanent ink, not pencil
- never use whiteout or similar products, simply draw a single line through the error, initial it and write the correct information
- make the information as accurate as possible and write legibly.

A copy of your record should be given to whoever takes over care of the victim (e.g., paramedics). Ideally this record should be a photocopy or carbon copy, but if this is not possible, a verbal report will suffice. See Appendix 7 for an example of an incident report form.

Never give away the only written copy of your report—because then you no longer have it to refer to if needed.

All records must be secured and confidential in line with statutory and/or organisational policies. You must not discuss a victim with any person other than a person taking over their care (e.g., paramedic or rescue team) or the police if requested to do so. This does not preclude you making a general report to your supervisor if necessary, but details are private and must remain confidential.

Some of the records you may be required to keep will be legal documents that are required for external purposes. Accuracy and legibility are important for good record keeping.

Accurate records assist with:

- victim management
- coronial and police investigations
- WorkCover and other insurance claims
- data collection for research into drowning prevention and service provision
- organisational improvements.

CURRENCY OF KNOWLEDGE

It is important to maintain both your resuscitation and first aid skills and knowledge. The Australian Resuscitation Council (ARC) recommends that resuscitation skills including CPR be refreshed annually and first aid skills refreshed every 3 years. This is covered by the SLSA skills maintenance requirements, however the regular skills maintenance check run by SLS clubs are not sufficient to count as a refresher for this unit. Some industries require reassessment at more frequent intervals.

FIVE (5) RIGHTS OF OXYGEN ADMINISTRATION

The use of oxygen therapy in first aid is consistent with administration of medications. In administering oxygen, the First Aider should be aware of the five rights of medication safety. These are applicable to any drug administered to a patient.

- **Right drug –** Double check the label and bottle,
- **Right patient –** Make sure the victim being administered oxygen is the victim requiring oxygen,
- **Right dose –** Ensure sufficient flow for the victim's needs, 8-15 L/min for first aid situations,
- **Right time –** Follow first aid protocols, control bleeding first and manage for shock. Use of oxygen is supplemental,
- **Right route –** Ensure the oxygen is delivered using the correct method. For resuscitation use a Resuscitation Mask, for breathing casualty use a Therapy Mask or holding the tube. Use correct size for the victim (adult/child).

OWN SKILLS AND LIMITATIONS

You should take care to undertake only those first aid or resuscitation activities that are within your limits and the limits of what you have been trained for.

During an emergency, ask yourself things like:

- Am I strong enough to move this victim without injuring them or myself?
- Am I confident in this treatment protocol? (if in doubt, don't)
- Am I qualified for this treatment protocol?
- Do I need help to do this?

After an emergency, ask yourself:

- Was what I did in this situation the most appropriate action?
- Was there anything I could have done better?
- Did I do anything that I should not have done?
- What did I do well?

Then:

- Check your responses with qualified health or emergency service personnel.
- If you don't feel confident about your responses, undertake further first aid and emergency management training.

DEBRIEFING

- It is important to consider having a debrief after any first aid incident. Debriefing gives you a chance to look at how you responded to an incident, identify what worked well, and discuss ways to improve future performance as well as reduce critical incident stress. Rescue teams and many workplaces have standard debriefing procedures. A member of the public can have their own debriefing simply by talking to someone about what happened—this could include family and friends or their general practitioner.

COUNSELLING AND STRESS MANAGEMENT

People who respond to an emergency often encounter potentially stressful events. Sometimes an event can be so traumatic or overwhelming that the responders may experience significant stress reactions. These reactions are a form of critical incident stress.

Sometimes the stress reactions appear immediately after the incident. Sometimes they may appear a few hours or a few days later. In some cases, weeks or months may pass before stress reactions appear.

First responders in the workplace need to know how they can access counselling and/or support services, where they will be helped to:

- identify their own internal reactions to critical incidents
- identify what they did right
- identify clear achievable positive outcomes
- be supported in areas they find emotionally or practically difficult.

It is important that you can recognise the signs and symptoms of critical incident stress, and know where to seek or refer assistance to manage it.

Where you and other first responders can go for further assistance:

- telephone counselling services such as Lifeline (free call 13 11 14)
- your family doctor
- local community centres
- private psychologists/psychiatrists
- priests or ministers of religion
- senior members of your organisation
- many companies and organisations have an employee assistance program that will have trained people who can either assist you themselves or connect you with someone who can.

Humour is often used to relieve stress—it is not intended to be callous or disrespectful, but can sometimes help a person relax. There are no hard and fast rules for managing stress as every person is different.

Further information regarding stress management after a critical incident can be found any time in volume one of the *Guidelines for Safer Surf Clubs* within the SLSA Members Area. Following is a table showing common signs and symptoms of critical incident stress.

- Chest pain
- Chills
- Difficulty breathing
- Dizziness
- Elevated blood pressure
- Fainting
- Fatigue
- Grinding of teeth
- Headaches
- Muscle tremors
- Nausea
- Profuse sweating
- Rapid heart rate
- Shock symptoms
- Thirst
- Twitches
- Visual difficulties
- Vomiting
- Weakness
- Agitation
- Anxiety
- Apprehension
- Denial
- Depression
- Emotional shock
- Fear
- Feeling
- Grief
- Guilt
- Inappropriate emotional response
- Intense anger
- Irritability
- Loss of emotional control
- Overwhelmed
- Severe panic (rare)
- Uncertainty
- Familiar objects or people
- Blaming someone
- Confusion
- Constant recollection
- Difficulty identifying familiar objects or people
- Disturbed thinking
- Heightened or
- Hypervigilance
- Increased or decreased awareness of surroundings
- Intrusive images
- Loss of time/place/person orientation
- Lowered alertness
- Memory problems
- Nightmares
- Poor abstract thinking
- Poor attention
- Poor concentration
- Poor decisions
- Poor problem solving
- Reliving experience
- Complaints
- Alcohol consumption
- Antisocial acts
- Change in activity
- Change in sexual functioning
- Change in speech patterns
- Change in usual communications
- Emotional outburst
- Erratic movements
- Hyperalert to environment
- Inability to rest
- Loss or increase of appetite
- Non-specific bodily complaints
- Pacing
- Startle reflex intensified
- Suspicion
- Withdrawal

Table 1.1—Signs and symptoms of critical incident stress

STANDARD OPERATING PROCEDURES (SOPS)

Written instructions for specific tasks that outline the safest and preferred method for undertaking that task are known as standard operating procedures (SOPs). They should identify potential hazards associated with the task, the potential risk posed by these hazards and any precautions necessary to minimise the possible risk. Refer to your jurisdictional SOPs relating to First Aid and Advanced Resuscitation

INFECTION CONTROL

UNIVERSAL INFECTION CONTROL PRECAUTIONS

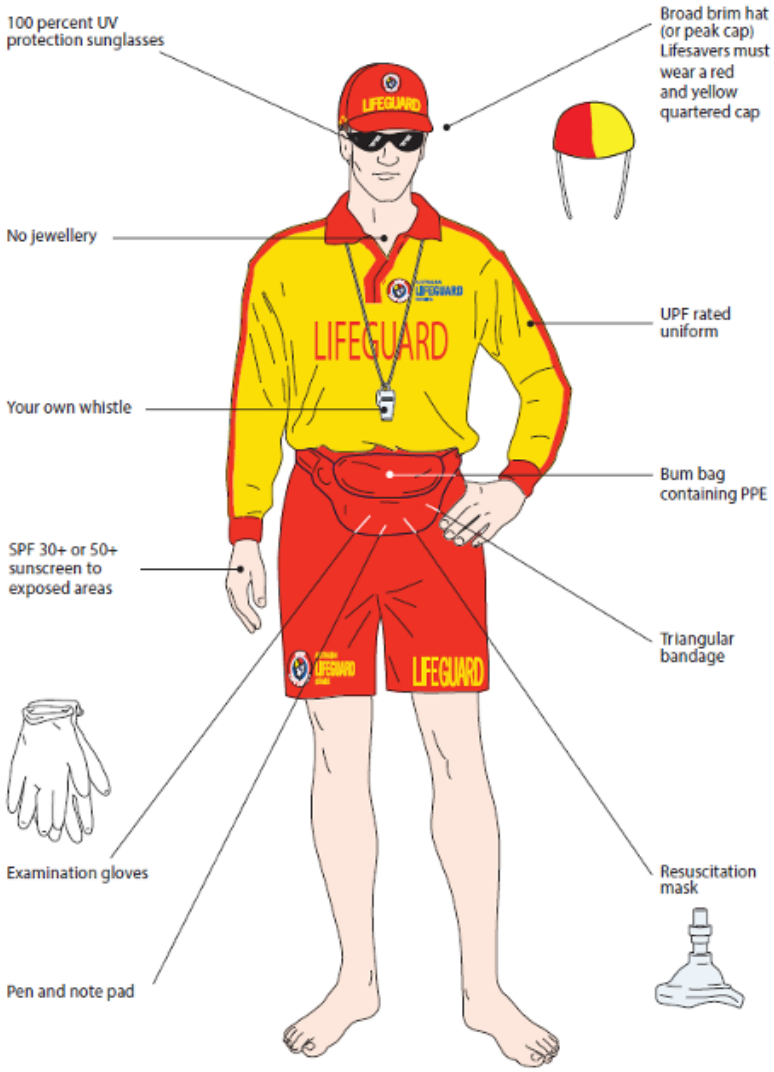
Universal precautions (also commonly called standard precautions) are the basis of an approach to infection control that treats all human blood and materials as potentially infectious and include:

- engineering controls
- administrative controls, which include workplace practices
- personal protective equipment (PPE).

Engineering controls refers to methods of isolating or removing hazards from the workplace. Examples of engineering controls include needleless injection systems and bacterial filters.

Work practice controls refer to practical techniques that reduce the likelihood of exposure by changing the way a task is performed. Common first aid workplace practice controls include:

- providing biohazard and sharps disposal containers
- avoiding contact with objects that may be contaminated
- washing your hands thoroughly with soap and water before and after administering first aid, even if gloves have been worn
- covering exposed cuts and grazes with waterproof dressings
- avoiding eating, drinking and other hand-to-mouth contact while administering first aid.



Personal protective equipment (PPE) includes gloves, masks, aprons and safety glasses. The purpose of PPE is to prevent blood and body fluids from reaching the first responder's skin, mucous membranes or personal clothing. PPE must create an effective barrier between the exposed first responder and any blood or other body fluids.

EMERGENCY ACTION PLAN (EAP)

Many variables exist when dealing with emergencies. Knowing when to do what in a first aid situation, despite the number of possible variables, is the key to giving the victim or victims the best chance of a full recovery.

In any first aid situation, the first responder must have an action plan. The plan of action for first responders is known as the emergency action plan (EAP). The steps in the EAP are listed below.

1. Pause and plan
2. Call for emergency assistance
3. Primary assessment
    a. DRSABCD
    b. assess level of consciousness
4. Secondary assessment
    a. management of injuries
    b. vital signs survey
    c. history
    d. body check
    e. treatment
5. Ongoing management.

PAUSE AND PLAN

The safety of rescuers is the first priority in any emergency situation—so care in approaching the scene is critical. The aim of pause and plan is to remind the first responder to remain calm, and to stop and think.

You will need to assess the emergency site and implement the following steps:

- identify hazards
- assess risks
- identify potential causes of injuries
- identify likely type and severity of injuries
- choose the most appropriate responses and resources.

Always be on the alert for any potential danger.

Any time you are called to an incident, consider the following questions.

- Is the area safe?
- you may not be able to approach victims if the hazards present a risk to your safety.
- Do you have the appropriate first aid kit and equipment to manage the incident?
- as a first responder trained in advanced resuscitation techniques, you should also consider bringing oxygen equipment and a defibrillator with you when responding to an incident.
- How long could you be out in the elements?
- Do you have a radio or mobile phone?
- Are you likely to need assistance?
- Do you need to call 000 before you attend the incident?

Through an understanding of your environment and the injuries you are likely to encounter you should already have answered most of these questions. The couple of seconds it takes to pause and plan will save you minutes down the track.

NOTE

Communication throughout the whole resuscitation process is vital.

Everyone involved needs to know what is happening, and who is doing what.

Talk to each other.

CALL FOR EMERGENCY ASSISTANCE

It is essential that emergency services are contacted as soon as possible and it is important to confirm that emergency services have been notified. This should not be delayed until the primary assessment has been completed, but can happen at any stage during the primary assessment.

In an emergency, call Triple Zero (000) for attendance by police, fire or ambulance. This number can be dialled from any fixed or mobile phone, pay phones and certain Voice over Internet Protocol (VoIP) services. You can also call the international standard emergency number 112 from digital mobile phones which will direct you to the Australian 000 call service.

If you or a bystander are deaf or have a speech or hearing impairment, use a teletypewriter (TTY) to call 106 and connect with the Australian 106 Text Emergency Relay Service.

The four Ps (Position, Problem, People and Progress) can be used to remember the information that will need to be supplied to an emergency services operator or, when working as part of a first responder organisation such as surf lifesaving, via radio to your communications centre.

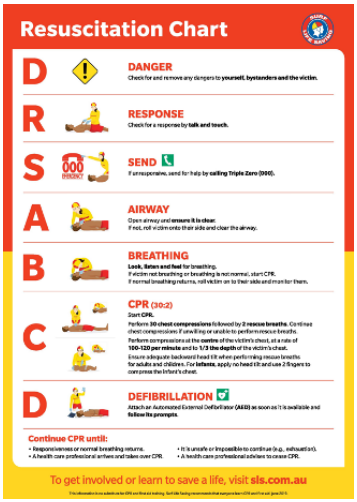
The Emergency+ app is a free app developed by Australia's emergency services and their government and industry partners. The app uses a smart phone's GPS functionality to help a first responder provide critical location (position) details.

Emergency phone numbers (Australia)

PRIMARY ASSESSMENT

WHAT IS A PRIMARY ASSESSMENT?

A primary assessment is the initial assessment of the scene and the victim. It is also a quick way for you to find out if a victim has any life-threatening injuries or conditions.



The DRSABCD primary assessment procedure helps you methodically identify each life-threatening injury/ condition and deal with it in order of priority.

Follow the DRSABCD procedure to assess and treat a victim.

DANGER

Make sure that there is no danger to yourself before bystanders, and then check there is no further danger to the victim. You are the most important person.

RESPONSE

Assess the responsiveness of the victim by talk and touch.

SEND FOR HELP

Call for emergency assistance (000, 112, 106, Emergency+ app) and send for an automated external defibrillator (AED) if the victim is unresponsive.

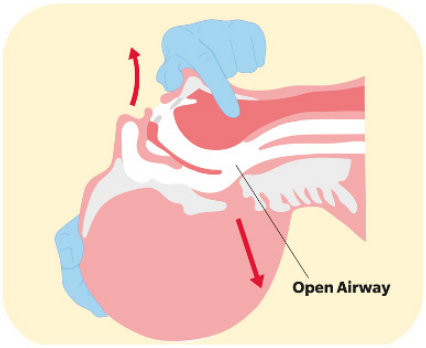
AIRWAY

The airway must be clear and then opened before breathing is checked for.

To see if the airway is clear, open the mouth and look for any fluid or matter that obstructs the airway. If there is:

- roll the victim onto their side
- open the mouth and turn the head slightly downwards
- Fluid should drain
- Once clear, check for any other blockages

N.B well fitted dentures can be left in place



To open the airway, ensure the soft tissue is pulled off the back of the throat. Achieve this by moving the lower jaw forward, away from the back of the throat. Two suggested methods are:

- **Head Tilt - Chin Lift** - One hand is placed on the forehead or the top of the head. The other hand is used to provide Chin Lift. Place the thumb over the chin below the lip and supporting the tip of the jaw with the middle finger and the index finger lying along the jaw line. The jaw is held open slightly and pulled away from the chest. The head (NOT the neck) is tilted backwards.
- **Head Tilt – Jaw thrust:** The rescuer applies pressure behind the angles of the lower jawbone to gently thrust the jaw upwards away from the chest. The head is tilted backwards.

N.B. If a spinal injury is suspected try to minimise head tilt but airway take precedence.

BREATHING

Check if the victim is breathing by looking, listening and feeling for signs of normal breathing over a ten (10) second period. An open airway must be maintained while this is done. If the victim is breathing, they are to be moved into the lateral position and monitored. If the victim is unconscious and not breathing normally, commence CPR.

CARDIOPULMONARY RESUSCITATION (CPR)

A CPR cycle is the administration of two rescue breaths after every 30 compressions. Basic CPR skills are essential to ensure the best outcome for a victim; these skills should not be neglected in favour of using other resuscitation devices.

THE KEY ELEMENTS IN PERFORMING CPR

Compressions

- Position – centre of chest
- Depth of Compression – 1/3 depth of the chest
- Release - Full Release off Chest
- Rate – 100-120 per minute

Breathing

- Open the airway:
  - Adults – Backwards head tilt with Chin lift/Jaw thrust
  - Children – Slight backwards head tilt with Chin lift/Jaw thrust
  - Infants – head in neutral position with Chin lift/Jaw thrust
- Appropriate volume of air to see chest rise and fall
- Breath in should take approx. 1 second

Timing

- 30 Compressions to 2 Breaths
- 5-6 cycles in 2 minutes

Refer to ANZCOR Guideline 9.3.2 – Resuscitation of the Drowning Victim for specific drowning protocols.

Performing rescue breaths using exhaled air during resuscitation will provide the victim with approximately 16 per cent oxygen in each breath. Using an oxygen resuscitation device such as a bag-valve-mask can provide up to 95 per cent oxygen with each compression of the airbag when connected to a medical oxygen cylinder. The benefit of supplemental medical grade oxygen during CPR is invaluable and should be used during CPR whenever equipment and a trained operator are available.

As a first responder trained in advanced resuscitation techniques, other first responders may look to you for guidance. You will need to be confident in your resuscitation skills to be able to provide direction. You may also be required to instruct bystanders in assisting with CPR to allow you to access and use the additional equipment in which you have been trained

OVERVIEW							
BODY TYPE	**COMPRESSION: RESCUE BREATHS**	**CYCLES* PER 2 MINUTES**	**DEPTH OF COMPRESSION**	**COMPRESSIONS PER MINUTE**	**NUMBER OF HANDS**	**LOCATION OF COMPRESSION**	**HEAD TILT**
Adult	30:2	5	1/3 depth of chest	100–120	2 hands	centre of chest	backwards
Child	30:2	5	1/3 depth of chest	100–120	1–2 hands	centre of chest	slight head tilt backwards
Infant	30:2	5	1/3 depth of chest	100–120	2 fingers/ thumbs	centre of chest	neutral head position – support jaw

Table 1.3—CPR overview

Always place an obviously pregnant woman on her left side, unless prevented by injuries. This position reduces stress on the inferior vena cava, the abdominal vessel taking blood back to the heart. Improving the blood flow back to the heart improves venous return and can improve cardiac output and blood pressure of the woman and her foetus.

You should cease CPR when:

- the victim responds or begins breathing normally
- it is impossible to continue e.g., exhaustion
- you need to remove yourself or the victim from danger
- a defibrillator prompts you to not touch the victim
- a health care professional arrives and takes over CPR
- a health care professional directs that CPR be ceased.

Defibrillation

Defibrillation should be administered as soon as possible and when safe to do so. When working in a team, a first responder who is trained in the use of a defibrillator should be the operator. The operator of the defibrillator must take control of the team performing resuscitation as they will be responsible for the delivery of the shock and ensuring the safety of the team.

Group activity 1.1: Jaw thrust and CPR.

You may have learned how to perform jaw thrust in previous first aid training. This technique is preferred when using a bag-valve-mask device during CPR. Practise jaw thrust on a partner or a resuscitation manikin while performing two minutes of single person CPR.

SECONDARY ASSESSMENT

WHAT IS A SECONDARY ASSESSMENT (VISUAL AND VERBAL)?

The secondary assessment is a systematic means of monitoring vitals and finding other conditions that were not apparent during the primary assessment. Secondary assessment is a head-to-toe check, looking and feeling for anything abnormal, while closely observing the victim for any responses. It also involves asking the victim questions to determine the potential cause of any injury or illness and assess their level of pain. The secondary assessment should not be undertaken if life-threatening conditions are still present.

Before conducting a secondary assessment, always:

- introduce yourself to the victim and ask their name
- explain your intentions to the victim
- seek consent to treat the victim
- consider and respect the victim's privacy and any cultural differences
- check if the victim needs to be moved away from danger or for comfort.

MANAGEMENT OF INJURIES

After completing the primary assessment and having identified that the victim is breathing, the first responder can begin managing other injuries. It is important to remember that CPR must not be interrupted to treat other injuries.

Priorities after management of life-threatening bleeding are:

1. Manage airway and breathing
2. Manage any major burns
3. Treat the victim for shock
4. Stabilise any fractures
5. Treat any other injuries.

The victim should be moved or assisted into the most comfortable position for their condition. They should also be moved to protect them from any danger or make their surroundings more comfortable—¬moved out of the wind, rain or sun.

The first responder should now consider what further assistance or equipment may be needed to treat the victim, and call 000 if necessary and not already done.

NOTE

A key issue in managing a victim is treating shock. Beyond treating the cause of shock (e.g., a major bleed), the introduction of oxygen to provide therapy at this stage is the single most effective treatment available to a first responder.

VITAL SIGNS

Once the injuries have been attended to, the first responder should proceed to monitor and record the victim's vital signs.

Vital signs are essential for not only establishing how well or sick the victim is, but for monitoring trends in their condition and assessing the effectiveness of the treatment. This is particularly important if there is likely to be a delay in emergency personnel response, because this ongoing record will assist them in further management of the victim.

There are five vital observations that should be written down against the time and the name of the victim if possible. These observations are:

- pulse
- respiration
- temperature
- skin appearance
- oxygen saturation

The first set of these, once taken and recorded, becomes the 'baseline observation'. Changes in the victim's condition are measured against this baseline.

NORMAL HEART/PULSE RATES		
VICTIM	**AGE**	**BEATS PER MINUTE**
Newborns	< 1 year	110–160
Infants and toddlers	2–4 years	95–140
Children	5–12 years	80–120
Adults	> 12 years	60–100

Table 1.4—Normal heart/pulse rates

PULSE

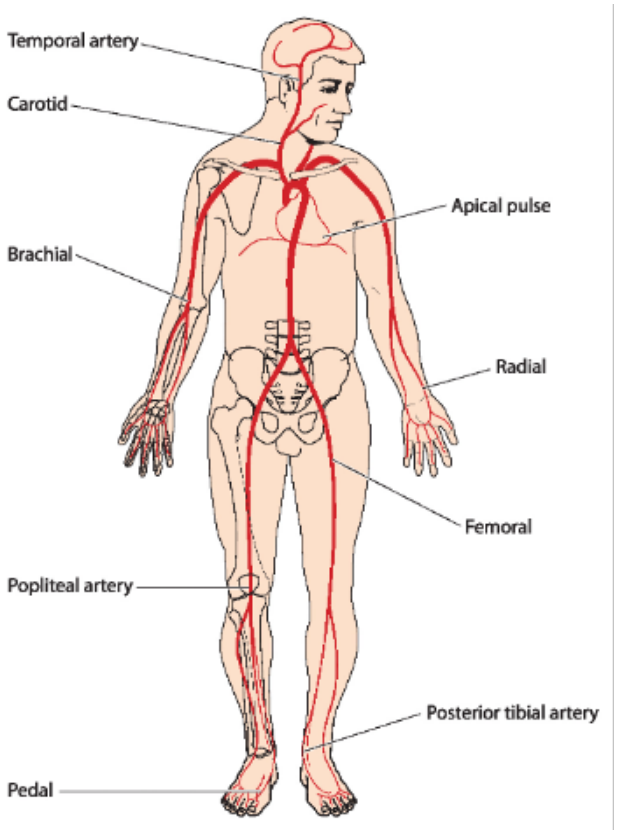
Pulse is the pressure wave of circulating blood on the walls of an artery. When a first responder checks a pulse, they are feeling an artery pulsating with each contraction of the heart.

The characteristics of the pulse are:

- **rate**—the number of beats in a given time, usually 1 minute
- **rhythm**—whether the pulse has evenly spaced beats or the beats are irregular. Irregular beats may have their own pattern, e.g., two beats close together, then a longer pause, then two more beats. Patterns of irregularity are significant and can provide medical personnel with key information
- **volume**—the strength of the pulse (weak or strong).

The major sites to feel the pulse are the:

- carotid artery in the neck
- radial artery at the wrist
- brachial artery just above the elbow (mainly used for infants)
- femoral artery in the groin.



Major arteries in the body

RESPIRATION

Respiration is the process of inhaling and exhaling (breathing in and breathing out) air. Normal respiration is quiet, steady in rate and does not require conscious effort. The first responder must assess a victim's respiration characteristics to establish a baseline, then regularly reassess them to detect any change in the victim's condition.

The characteristics of respiration are:

- **Rate**—How many breaths per minute?
- **Rhythm**—Is the breathing regular or irregular?
- **Sounds**—Is there gasping, gurgling, wheezing or snoring?

Any respiration abnormalities should be identified, recorded and responded to. Some examples of abnormalities include:

- **apnoea**—temporary cessation of breathing, especially during sleep
- **dyspnoea**—difficult or laboured breathing
- **hyperventilation**—rapid and deep breathing
- **hypoventilation**—slow and shallow breathing
- **noisy breathing**.

A victim's respiration rate should be counted for 1 minute, without the victim being aware that their breathing is being monitored, and without compromising treatment.

NORMAL BREATHING RATES		
VICTIM	**AGE**	**BEATS PER MINUTE**
Newborns	< 1 year	30–40
Infants and toddlers	2–4 years	25–30
Children	5–12 years	20–25
Adults	> 12 years	12–20

Table 1.5—Normal breathing rates

NOTE

Do NOT tell the victim you are checking their breathing. This may unconsciously alter their breathing.

A breath is air that is inhaled and exhaled during breathing.

TEMPERATURE

People often use a thermometer to measure their body temperature when feeling ill.

A normal temperature ranges from 36-37 oC. A fever is a higher than normal temperature and may indicate an infection or an illness. Body functions are impaired if the body temperature is too hot or too cold.

The thermometer measures the internal temperature of the body. There are also a variety of thermometer types. We recommend using a digital thermometer.

Temperatures can be taken a variety of different ways that have different levels of accuracy and may be better suited to different age groups.

There are five different ways to take someone's temperature:

- oral—under the tongue
- axillary—under the arm
- tympanic—in the ear
- temporal—on the forehead
- rectal—in the anus.

See Appendix 6 for ways to use a digital thermometer.

SKIN APPEARANCE

Regarding skin appearance, you should always check:

- Temperature—is the skin warm or cool to the touch?
- Condition—is the skin dry or wet?
- Colour—check the colour of the skin in the mouth and lips. Is it red, pink, pale or blue? (Checking the lining of the mouth and lips allows a quick assessment of victims from all ethnic backgrounds).

ADULT	NORMAL	ABNORMAL
Pulse—rate, rhythm, volume	60–100 beats per minute	<60 or >100 beats per minute
Breathing—normal, abnormal	12–20 breaths per minute	<12 or >20 breaths per minute
Skin (colour and temperature)	Warm and normal colour	Cool or hot, pale, moist, flushed/red, blue/cyanosed
Conscious state	Alert and orientated	Drowsy or unconscious
Oxygen saturation (if available)	Greater than 94 percent	Respiratory distress: Mild: 92-94 percent Moderate: 88-92 percent Severe: less than 88 percent

Table 1.6—Summary of normal and abnormal signs

OXYGEN SATURATION

Refers to the amount of oxygen in your blood. The easiest way to measure it is by using a pulse oximeter which will give you a percentage score. A 'normal' reading is 95% to 100%. Below 92%, most patients will benefit from additional oxygen. There are some medical conditions such as chronic obstructive pulmonary disease (COPD) where their 'normal' reading may be less.

While a pulse oximeter is the easiest way to measure saturation, other signs and symptoms should also be taken into account such as: bluish discoloration of skin and lips, shortness of breath, confusion, difficulty breathing.

Group activity 1.2: Vital signs

In pairs, assess your partner's vital signs—pulse, respiration and temperature.

ALTERED LEVEL OF CONSCIOUSNESS

Consciousness reflects a person's responsiveness to stimuli. Consciousness ranges from full awareness/responsiveness and orientation in time and place, to unresponsiveness, being unaware of surroundings and unresponsive to stimulation. It is important to determine a victim's level of consciousness, as this will determine the care needed for the victim.

A victim who is unconscious or who has an altered level of consciousness, may have a potentially life-threatening condition. The brain is the controlling organ of the body and regulates all body functions. Any injury serious enough to alter the consciousness of the victim may have caused damage to the brain.

CAUSES OF ALTERED CONSCIOUSNESS

The acronym AEIOU TIPS is useful for recalling the causes of alterations in the state of consciousness.

This stands for:

A Alcohol
E Epilepsy
I Insulin overdose or underdose (diabetes)
O Overdose (drugs, poisons, toxins)
U Uraemia (renal failure)
T Trauma
I Infection
P Psychiatric conditions (e.g., catatonic states)
S Stroke, shock

ASSESSMENT OF CONSCIOUSNESS LEVEL

An altered or decreased level of consciousness can reveal itself in several ways. It can range from mild confusion to complete loss of consciousness. A victim with altered level of consciousness (ALOC) may have slurred speech, may open only their eyes when instructed to, or may respond only to painful stimuli and not verbal commands. In its mildest form, the victim may simply not be able to remember their name, where they are or what day it is.

The AVPU scale outlines four general levels of consciousness from alert to unconscious.

Alert victims can tell you their name and are oriented to time and place.

A Alert—eyes open, speech clear, moving, orientated
V Voice—responds to voice, eyes open at request, clear responses to questions, moving, remains awake/alert
P Pain—responds purposefully, eyes open to pain stimulus, victim withdraws from pain stimulus, comprehensible or non-comprehensible verbal noises
U Unconscious—does not meet above criteria, need to maintain victim airway

TREATMENT OF ALTERED LEVEL OF CONSCIOUSNESS

Poor perfusion, shock and/or lack of oxygen result in changes in consciousness level and may lead to brain damage.

Altered level of consciousness (ALOC) due to poor cerebral perfusion is a serious and time-critical presentation. Any partial or complete loss of consciousness should be assessed by a medical professional.

Where possible the underlying cause for ALOC should be specifically managed. Victims who are unconscious have diminished ability to protect themselves from airway compromise and environmental hazards.

The potential for spinal injury must be considered in all victims with ALOC. Assume that an unconscious victim has a spinal injury until proven otherwise, therefore, be very careful when rolling and moving the victim.

Treatment of an unconscious victim, or a victim with altered level of consciousness, will depend on the primary cause. The core treatment principles are as follows:

- DRSABCD—maintenance of an open airway is a priority
- send someone to call 000 for an ambulance and any rescue services required
- manage any injuries appropriately
- assess the scene for likely causes of unconscious/altered consciousness but do not leave the victim.

An obstructed airway from the victim's tongue, vomitus or other matter, is a real risk for any unconscious victim who is lying on their back. To manage this risk, it is necessary to place the victim in a position that will allow for drainage of any fluid from the airway and that will mechanically facilitate the maintenance of an open airway. This position is the lateral position, (or recovery/coma position). Visible material can be remved by using the rescuer's fingers.

If you are on your own, have no phone access and the victim is breathing, place the victim in the lateral position, and then quickly go to get help.

Do not leave the victim in this position for longer than 30 minutes. Ideally, after this time has elapsed they should be positioned on their side – unless the extent of their injuries prevents further movement or endangers the victim.

Lateral position

HISTORY

A history is relevant information about a victim's previous injury/illness and their present symptoms. You can obtain a victim's history by:

- observing the scene
- listening to what is said by the victim and bystanders
- asking questions.

The acronym SAMPLE can help you remember appropriate questions and record important information:

S signs and symptoms (what can you see and how does the victim feel?)
A allergies
M medication
P previous medical history (look for a MedicAlert® bracelet or necklace, or a Mediband® wristband or a tattoo)
L last oral intake
E event (what happened?)

If the victim is unconscious or has an altered level of consciousness, there may be companions or bystanders who have witnessed the incident and who can be asked for information about what happened. You can make the victim feel less anxious by remaining calm, speaking clearly and simply, reassuring the victim and referring to them by name.

BODY CHECK

The body check is a systematic check of the victim to assist you to determine whether the victim has any further problems and what further management procedures you should undertake.

Use your senses to look, listen, feel and smell whilst you examine the victim. A body check may be done in the following order:

1. Neck, up over the head and down across the face
2. Shoulders, front of the chest including ribs, abdomen and pelvis
3. Front and back of upper limbs
4. Front and back of lower limbs
5. Back (if possible). Do not move the victim if a spinal injury is suspected.

ONGOING MANAGEMENT

After completing treatment of injuries and illnesses identified during the primary and secondary assessments, the first responder will need to decide if referral to hospital or other medical aid is required, and call 000 for an ambulance if necessary. Once the decision has been made to refer the victim to medical aid, ongoing monitoring and management of the victim's condition is important and part of your duty of care. Documentation must be completed and, where possible, a copy given to the ambulance paramedics.

Ongoing monitoring and management while waiting for medical assistance should include:

- reassessing the victim's vital signs at regular intervals
- continuing to identify actual or potential problems and plan appropriate care
- notifying the ambulance service of any change to the victim's status as appropriate
- victim handover to ambulance personnel.

Who should be sent to hospital?

Anyone to whom any of the following applies should be sent to hospital. Anyone who:

- has lost consciousness, even for a brief period
- has required either initial rescue breathing or CPR
- may have a secondary condition, such as a heart attack or a neck injury
- has a persistent cough or an abnormal skin colour
- may have inhaled any amount of fluid or gas
- has been placed on oxygen.

If none of the previous conditions apply, but the first responder has doubts about the victim's state of health, the victim should be advised to seek medical advice as soon as possible.

VICTIM HANDOVER

If an ambulance has been called, the first responder should remain with the victim until the ambulance paramedics accept responsibility for them. As part of your handover you should provide a summary of known victim details, the incident and treatment provided. Documentation must be completed and if requested, a copy given to the ambulance paramedics.

Capabilities of emergency management services

Key requirements to understand when liaising with emergency service agencies include:

- their capability and capacity
- their response time for arrival at site
- their on-site resources to support response
- clear communication of worksite emergency response plans to emergency agencies
- how you can help them optimise the effectiveness of their services when responding to emergencies.

Assessment task 1: Written questions

Complete Assessment Task 1—Topic 1 written questions in your assessment portfolio.

Topic 2—Management of Life-Threatening Bleeding

WHAT IS LIFE-THREATENING EXTERNAL BLEEDING?

Life-threatening external bleeding can be identified as any visible bleeding that is not able to be controlled by application of direct pressure, blood seeping through applied bandage(s) quickly or blood pumping from a wound.

Additional signs and symptoms of life-threatening external bleeding include:

- visible blood from wound,
- weak, rapid pulse,
- pale, cool, moist skin,
- pallor, sweating,
- restlessness,
- rapid, gasped breathing,
- nausea,
- thirst,
- faintness, dizziness or confusion,
- loss of consciousness.

Formally the ARC Guideline, the *ANZCOR Guideline 9.1.1 – First Aid For Management of Bleeding* describes the protocols for management of life-threatening external bleeding.

The Guideline states that '*In life threatening bleeding, control of bleeding takes priority over airway and breathing interventions.*'

Bleeding should be managed as severe, life threatening bleeding in the following situations:

- amputated or partially amputated limb above wrist or ankle
- shark attack, propeller cuts or similar major trauma to any part of the body
- bleeding not controlled by local pressure
- bleeding with signs of shock (pale and sweaty plus pulse rate >100, or capillary refill >2 sec and/or decreased level of consciousness).

MANAGEMENT OF LIFE THREATENING EXTERNAL BLEEDING

The ANZCOR Guideline describes the following general management principles:

- management of all bleeding begins with application of pressure on or around the wound
- if there is severe, life threatening bleeding from a limb, not controlled by pressure, apply an arterial tourniquet above the bleeding point
- if there is severe, life threatening bleeding from a wound site not suitable for tourniquet, or from a limb when a tourniquet is not available or has failed to stop the bleeding, apply a haemostatic dressing.

TOURNIQUET

As described in the ANZCOR Guideline, tourniquets should only be used for life-threatening bleeding from a limb, where bleeding cannot be controlled by direct pressure.

A tourniquet should not be applied over a joint or wound and must not be covered up by any bandage or clothing.

Application.

- apply in accordance with manufacturer's instructions, or 5 centimetres above the bleeding point
- tighten until the bleeding stops
- if bleeding does not stop, check its position and application. Ideally, do not place over clothing or wetsuits
- if bleeding continues, apply a second tourniquet (if available) to the limb above the first.

If a correctly applied tourniquet has failed to control the bleeding, the application of a haemostatic dressing in conjunction with the tourniquet should be considered. A tourniquet should be left in situ once applied. Tourniquets can be painful and cause more pain than the wound itself, however a tourniquet is being applied to save the victim's life.

The First Aider must note the time of a tourniquet application and report this to medical personnel as part of the victim handover.

Group activity 2.1: Application of tourniquet

In pairs, use the tourniquet trainer to manage life-threatening external bleeding by applying a tourniquet.

HAEMOSTATIC DRESSING

For any severe life-threatening bleed where external direct pressure or a tourniquet is not working or not appropriate (typically junctional areas - groin, armpits, neck) the wound needs to be packed to create pressure on the blood vessel that is bleeding.

Application.

Applying direct pressure to the wound is critical. Pack the wound with gauze/bandages. This will cause pain to conscious victims. Wound packing material should never be packed so deep that the first aider loses track of it. Do not pack chest or abdomen areas.

- wear gloves and glasses
- try to identify the blood vessel that is bleeding
- take a length of gauze (or bandage/material) and push one end into the wound and apply pressure onto the bleeding vessel
- maintaining the pressure, push more of the gauze into the wound
- keep packing while maintain pressure
- once wound is filled, maintain pressure on the packing until the paramedics arrive.

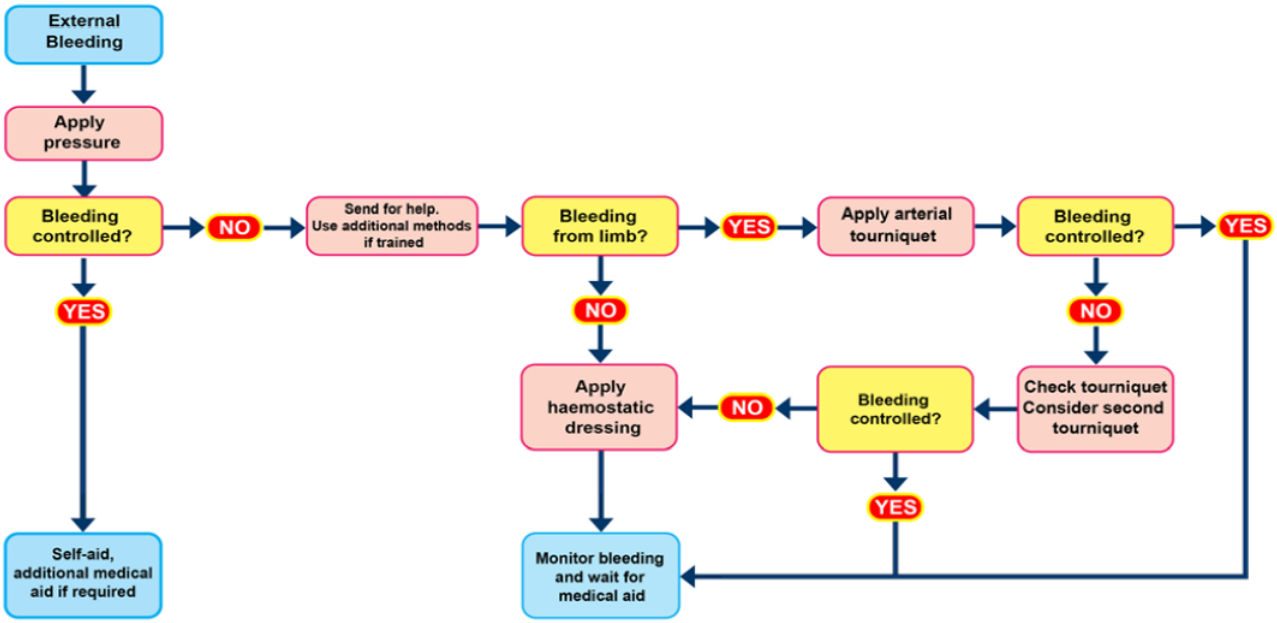
Haemostatic dressings may be used instead of gauze and will help reduce bleeding quicker but has not yet been shown to reduce mortality. When using haemostatic dressings inform the paramedics that it has been applied and send the haemostatic dressing packaging with the victim to hospital.

Group activity 2.2: Wound packing and haemostatic dressing

In pairs, use the wound packing trainer to manage life-threatening external bleeding by packing he wound and applying pressure with a simulated haemostatic bandage.

MANAGING BLEEDING FLOWCHART.

(Source: ANZCOR Guideline 9.1.1 – First Aid For Management of Bleeding)



In all cases of life-threatening bleeding, the victim requires urgent transfer to hospital.

Assessment task 1: Written questions

Complete Assessment Task 1—Topic 2 written questions in assessment portfolio.

Topic 3—Advanced Resuscitation and Oxygen Administration

OXYGEN

WHAT IS OXYGEN?

Oxygen is an invisible, odourless and tasteless gas that makes up 21 per cent of the atmosphere. Nearly all living things, including humans, need oxygen to survive. Oxygen is essential for the production of cellular energy.

When the body does not receive enough oxygen, cells start to die and the body functions slow down. It is essential to be able to recognise breathing difficulties and to provide immediate first aid,

Why use supplemental oxygen?

Perfusion is the body's ability to deliver oxygen and nutrients to the cells and remove waste products. Supplemental oxygen is used as therapy for a breathing victim who does not appear to be adequately perfused or is not maintaining sufficient oxygen levels (e.g., someone with asthma or exposed to smoke). It is also used to assist in the resuscitation of a non-breathing victim for the purpose of relieving hypoxia and preventing cell and tissue damage.

Qualified personnel may safely administer oxygen to any victim who is not adequately perfused. Victims likely to benefit from oxygen include those with the following conditions, signs or symptoms:

- unconsciousness
- shock
- blood loss
- chest pain
- shortness of breath, including asthma
- severe pain
- injuries after resuscitation
- circulatory distress
- no response.

RESPIRATORY SYSTEM

The respiratory system supplies the body with a constant supply of oxygen. Knowledge and understanding of the respiratory system is necessary for effective resuscitation.

The respiratory system consists of upper and lower airways.

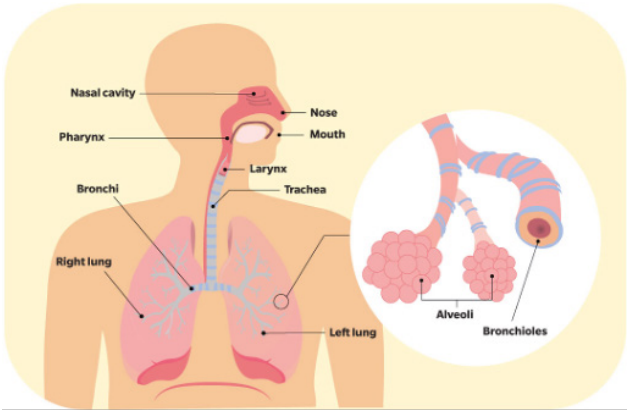
UPPER AIRWAYS

The upper airways include the nostrils, nasal cavity, mouth, pharynx (throat) and larynx (voice box).

The throat is a common passageway for food and air. It starts from the cavity at the back of the mouth and nose then continues to the separate trachea and oesophagus.

The upper respiratory tract is the most common location for an airway obstruction.

LOWER AIRWAYS



Respiratory system

The lower airways include the trachea, bronchi, bronchioles and alveoli.

The trachea (windpipe), allows air to pass to and from the lungs. It is in the front of the throat and begins at the larynx and vocal cords, extending down to the lungs. The oesophagus is behind the trachea and carries food and liquids to the stomach (or back from the stomach to the throat during vomiting or regurgitation).

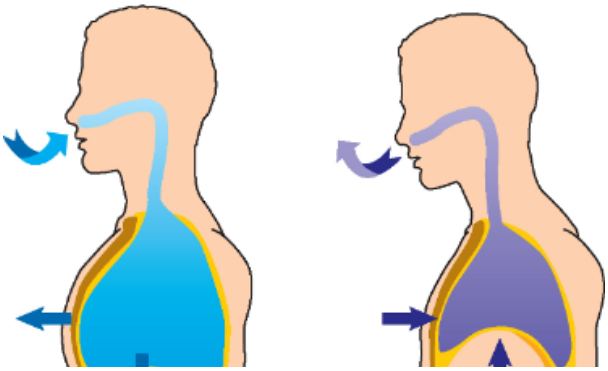
The trachea divides into two to enter the right and left lungs. The two bronchi then divide into progressively smaller bronchioles and, finally, alveoli (terminal air sacs). The trachea and bronchi are kept open by C-shaped rings of strong connective tissue (cartilage), making them semi-rigid tubes (rather like vacuum tubing used to clean out swimming pools). These rings hold the trachea and bronchi open, allowing airflow to and from the lungs.

The lungs fill most of the chest cavity, which is separated from the abdomen by a large sheet of muscle, the diaphragm. The lungs are spongy, elastic organs consisting of the bronchial tree, alveoli and blood vessels.

When we breathe in, air containing oxygen moves into the lungs down to the alveoli. The alveoli are surrounded by tiny blood vessels (capillaries). The interface between those two structures is known as the respiratory membrane, and it allows the exchange (diffusion) of gases.

Oxygen diffuses from the alveoli into the blood in the capillaries, while carbon dioxide diffuses from the blood to the alveoli. Carbon dioxide is a waste product of metabolism (burning of the body's energy systems) and is expelled as we breathe out.

BREATHING



Breathing is the process of air moving into and out of the lungs. Inhalation is the act of breathing air into the lungs, and exhalation is the act of breathing air out of the lungs. It is most often an involuntary muscular action caused by the contraction of the muscles that lifts the ribs while the diaphragm is pulled down and flattened. This combined action increases the size of the chest cavity and sucks air into the lungs. When the muscles used for inhalation relax, the elastic recoil of the lung tissues pushes air out of the lungs.

The air we breathe in contains approximately 21 per cent oxygen. About five per cent of this is taken up by the blood, so the air we breathe out contains 16 per cent oxygen.

On average, an adult takes 12–15 breaths per minute, and the normal range is from 10–20 breaths per minute. The average amount of air taken in one breath is about half a litre, and is called the tidal volume. In children and infants, the breathing rate is faster and the tidal volume is smaller.

The breathing control centre is located at the base of the brain in the brainstem. It acts like a metronome (timing mechanism), sending out regular impulses that control the rate and depth of breathing (both inhalation and exhalation). The breathing control centre must have a good supply of oxygen, otherwise it will become damaged, fail to function properly and breathing will stop.

PULSE OXIMETRY

Pulse oximetry is a technique used to estimate the oxygen content of blood. A pulse oximeter uses two different coloured LED lights to shine light through tissue, and uses the ratio of absorption of the light to calculate the percentage of haemoglobin molecules that have oxygen attached to them.

Pulse oximeter

A pulse oximeter probe is usually attached to a victim's fingertip, and uses a soft clip. It does not hurt at all. The probe is connected to a machine that contains the computer that runs the device, and a screen for displaying the values, expressed as a percentage. Many pulse oximeters can also determine and display the pulse rate.

A healthy person's oxygen saturation is between 95 and 100 per cent. An oxygen saturation less than 90 per cent when breathing air indicates significant hypoxia. Checking the oxygen saturation helps identify victims who need oxygen therapy. In general, oxygen therapy should be provided to victims with oxygen saturations less than 92 per cent.

If the oxygen saturation is 92 per cent or greater, it may still be appropriate to provide oxygen therapy, particularly for conditions such as major trauma, septic shock or anaphylaxis.

If a pulse oximeter is available, you should check the oxygen saturation. An improvement in the oxygen saturation when oxygen is applied indicates the therapy is working. Do not remove the oxygen therapy if the oxygen saturation has returned to normal, as it is likely just to go back to where it started.

Factors that may affect the accuracy of the reading.

Certain conditions may provide incorrect readings. Do not rely on just the pulse oximeter when making decisions but take into account other signs and symptoms, vital signs, patient history and what happened. Conditions that may affect the reading:

- shivering/shaking
- hypothermia
- false nails/nail varnish
- poor perfusion to the finger
- using an adult model on a child
- excess ambient light

Group activity 3.1: Pulse oximeter

In pairs, apply and use the pulse oximeter to take and record observations

ABNORMAL BREATHING

It is important for first responders to be able to recognise if a person is not breathing normally, as this can be sign of airway obstruction.

RESPIRATORY NOISES

Respiratory distress may be accompanied by noises. Noises can include coughing, wheezing, stridor or wet, gurgling noises. A victim in severe respiratory distress may make no sound at all.

Cough

A sudden expulsion of air from the lungs (with a characteristic noise) may be associated with mild airway obstructions, or inflammation of the upper and/or lower airways.

Wheeze

A whistling sound when breathing in or out is most commonly encountered by first responders treating victims with asthma, and may also be associated with other chronic obstructive pulmonary diseases.

Stridor

A louder or harsher sound than a wheeze that is similar to a squeak and typically heard when a victim breathes in may be associated with a partial airway obstruction.

Gurgling

A broken irregular sound similar to moving water may be associated with fluid or mucus in the upper or lower airways.

No sound

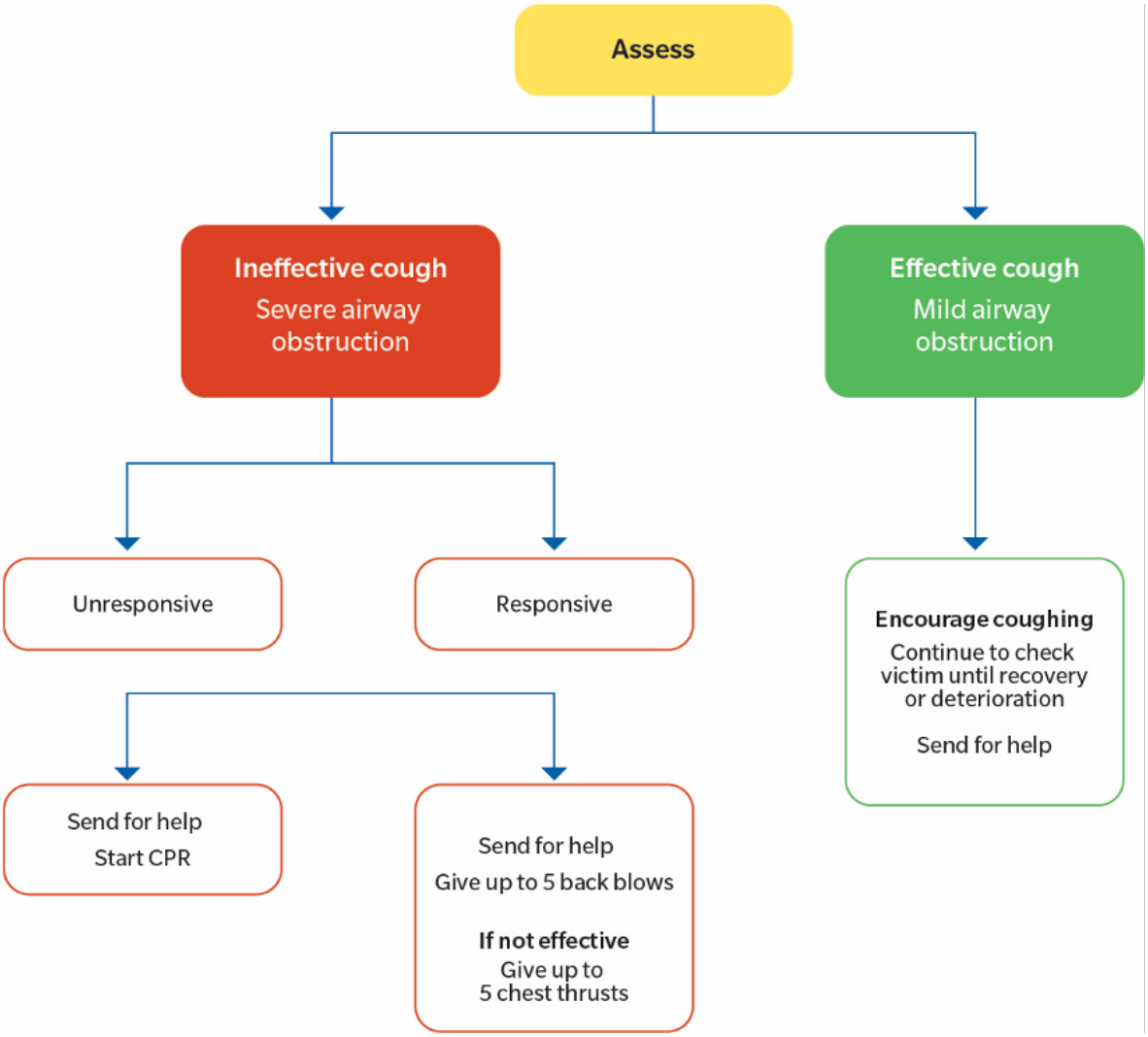
No vocal sound, even with a victim showing an effort to breathe. A victim with a complete airway obstruction or very severe asthma may not make any sound. The effort to breathe may also involve the use of accessory muscles.

AIRWAY OBSTRUCTIONS

An airway obstruction (blockage) can be either partial or total. The more the airway is blocked, the more the victim is in danger of losing consciousness. Causes of airway obstructions include swelling of the throat tissues (allergies), choking (an object or vomit lodged in the airway) and body position (e.g., if the head is in a slumped position).

Following is an algorithm for the management of foreign body airway obstruction.

ALGORITHM FOR THE MANAGEMENT OF FOREIGN BODY AIRWAY OBSTRUCTION



Source: Adapted from ANZCOR Guideline 4 January 2016.
Page 7. Figure 4: Management of Foreign Body Airway Obstruction (Choking) Algorithm

MEDICAL OXYGEN CYLINDERS

Medical oxygen cylinders are white or cream all over. They are clearly labelled as medical oxygen. Cylinders made before 2009 are black metal with white shoulders.

Cylinder capacity may vary between manufacturers.

Medical oxygen cylinder examples

The most commonly used medical oxygen cylinders are:

- **C size cylinders**
  - 440–490 L of available oxygen
- **D size cylinders**
  - 1600 L of available oxygen
- **Special cylinders**
  - approximately 200 L of available oxygen.

Smaller cylinders such as C size cylinders have two index holes on the cylinder stem, called a pin index, for correct location of the regulator onto the cylinder. These index holes prevent non-medical oxygen regulators being used in error. Engage the cylinder onto the two protruding pins on the regulator's inlet face.

Portable oxygen resuscitators commonly use the C size cylinder.

OPERATIONAL TIME

A full C cylinder (440–490 L) will have the following approximate operational times:

- 50 minutes, with continuous use of oxygen therapy at 8 L per minute
- 30 minutes, with continuous use of an airbag (and oxygen) at 14–15 L per minute.

CARE OF OXYGEN CYLINDERS

Oxygen cylinders may be stored upright or on their side using an appropriate securing system, and:

- in a cool, dry, ventilated area below 45°C
- away from busy traffic areas
- clear from sand and dust contamination
- away from oil or grease
- in a designated no-smoking area; not near naked flames
- with no pressure showing on the gauge uncovered.

When the cylinder is almost empty (¼ or less full), close the valve, remove it from the oxygen equipment, mark the cylinder as 'empty' or 'MT' and store it away from full cylinders. Empty cylinders should be returned for refilling without delay. Cylinders that are half full or less can be used for training.

STORING OXYGEN EQUIPMENT

Oxygen cylinders deliver oxygen under high pressure to inflate the lungs of victims who are not breathing.

They come with safety data sheets (SDS) containing information on how the oxygen should be stored and how to avoid dangers associated with medical grade oxygen.

Oxygen units should be kept clean and free of sand, debris and foreign materials to ensure correct operation. Equipment must be checked before and after each use.

OXYGEN EQUIPMENT SHOULD BE STORED:

- in a cool but accessible place, as heat causes rubber and plastic components to deteriorate
- away from busy traffic areas that can increase the risk of sand and dust contamination
- away from oil or grease, as these substances can cause fire when in contact with high-pressure oxygen
- in a ventilated space, as any leakage in an enclosed space could cause an increased concentration of oxygen, which could be dangerous in the event of a fire
- uncovered, as any leakage of a covered unit could cause an increased concentration of oxygen in the unit
- without any pressure in the system—turn off the cylinder then drain oxygen from the system by operating the delivery system
- in a location designated as a no-smoking area and not near naked flames—leaking oxygen can fuel a fire.

SAFETY PRECAUTIONS

DO NOT:

- drop, drag, roll or slide cylinders
  - if fractured, the pressure released will turn the cylinder into a high-powered missile
- use oxygen near artificial heat sources
- allow smoking near oxygen equipment
- use oxygen if there is any danger of fire or open flames
- allow petroleum-based grease or oil to come in contact with supply devices on the cylinder.

You should only open an oxygen cylinder when it is attached to a regulator.

RESUSCITATION KITS

APPROVAL STANDARDS

All oxygen resuscitation kits must meet Australian standards. To check that your equipment meets Australian standards, look for the Standards Australia logo on your equipment or packaging.

RESUSCITATION KITS AND THEIR COMPONENTS

It is important for those trained in the use of oxygen resuscitation units to ensure that they are familiar with the components and operation of the resuscitation kit(s) in use at their location.

Oxygen resuscitation kit components example

There are many different configurations of resuscitation kits. Different kits will have different components, depending on the organisation's preference.

COMPONENTS OF RESUSCITATION KITS

1. Protective case

This case houses all the relevant equipment. It may be a soft bag, a hard-plastic case, or a metal case for oxy-viva. In oxy-vivas, it incorporates the oxygen cylinder itself.

2. Medical oxygen cylinder

A medical oxygen cylinder is usually made of spun aluminium or cast metal. It holds the gas known as medical oxygen. Features may include:

a. plastic dust seal
which covers the oxygen outlet and index pinholes

b. heat warning tag
which indicates if the cylinder has been subjected to heat

c. cylinder thumbscrew
which allows the operator to turn on the oxygen

d. oxygen outlet
which is the opening for oxygen to be delivered to the regulator

e. locating (index) pinholes
which are the distinctive size holes for positioning, aligning and attaching the regulator to the cylinder if required

f. information label
which shows information about contents, size, maker, supplier of cylinder and hazard rating.

Medical oxygen cylinder characteristics example

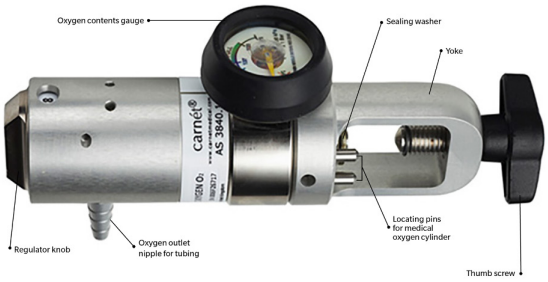
3. Cylinder cradle

A cylinder cradle provides support for the oxygen cylinder in an oxy-viva unit. Some kits have strapping to hold cylinders in place.

4. External cylinder connection (oxy-viva)

An external cylinder connection allows larger oxygen cylinders to be attached. It is important to remember that when an external cylinder is in use, a small cylinder or the yoke plug should be firmly in place to prevent oxygen leaking. This connection is not found on all units.

5. Regulator unit



Regulator unit components example

A regulator unit regulates the oxygen flow. Common components of a regulator are:

a. thumbscrew
which secures and maintains the regulator in position

b. yoke
which is the connection for the oxygen cylinder stem. In some instances, it is part of the case (oxy-viva); otherwise, it may be attached as part of the regulator

c. locating pins (index)
which are the distinctive size pins positioned in the yoke, so that the operator can locate the oxygen cylinder correctly

d. sealing washer (Bodok)
which fits in the yoke to prevent leakage from the cylinder joint

e. cylinder keywheel/spanner
which is used to open or close the cylinder valve

f. contents gauge
which indicates the amount of oxygen in the cylinder

g. oxygen outlet nipple
which is a connection point onto which tubing fits to allow delivery of oxygen from the regulator to the bag-valve-mask resuscitator

h. regulator knob
which allows the oxygen flow to be adjusted.

6. Tubing

Depending on the kit, there will be either one or two tubes, usually clear or green in colour.

7. Oropharyngeal (OP) airways

Oropharyngeal airways help maintain an open airway.

8. Airbag

An airbag is used for inflating a victim's lungs by squeezing it, which supplies oxygen from a reservoir bag or the atmosphere.

9. Reservoir bag

A reservoir bag attaches to the airbag and stores oxygen to ensure that maximum oxygen is delivered to the victim.

10. Resuscitation masks

Each kit should contain at least one adult and one child-sized resuscitation mask.

11. Pocket masks

A pocket mask may be used instead of a resuscitation mask. They feature:

a. pocket mask case
which is protection for a pocket mask

b. elastic strap
which holds the mask securely onto the victim's face

c. mouthpiece
which is the opening to allow rescue breaths to be administered.

12. Victim filter (optional)

A victim filter is inserted between the resuscitation mask and the victim valve assembly. This filter stops any vomit, blood or saliva from entering and clogging the victim valve assembly during resuscitation. An N95 filter placed on the resuscitation mask will help reduce the amount of airborne virus particles. The victim filter is single-use only.

13. Therapy masks

Each kit should contain at least one adult and one child-sized therapy mask. These masks may be the therapy type or the non-rebreather type of mask.

14. Non-permanent marker

A non-permanent marker is used to mark the volume of oxygen in the cylinder.

15. Gloves

Gloves are used for personal protection against communicable diseases.

16. Pen and paper

Pen and paper are used for taking notes and recording the victim's progress.

17. Sealing washer (Bodok)

Each kit should contain spares (and case) if required for the yoke of a regulator unit.

The equipment listed below may also be part of an oxygen resuscitation kit:

- suction tubing for use with suction unit
- suction catheter, which helps the operator to remove fluids from the victim's mouth
- automatic oxygen-powered resuscitator.

Oxygen resuscitation kit components example

Group activity 3.2:
Resuscitation kit components

In pairs or small groups, take turns at naming all the pieces of equipment in your resuscitation kit. Once you and your partner are confident that you can remember all the items, remove an item or two without your partner watching, and then have them review the kit and identify the missing item(s). As some equipment may vary slightly, you may need to check with your trainer if the components listed below are applicable.

- ○ protective case
- ○ airbag
- ○ reservoir bag
- ○ contents gauge
- ○ control valve(s)
- ○ cylinder key wheel
- ○ cylinder yoke
- ○ resuscitation masks (adult and child)
- ○ masks—therapy or non-rebreather (adult and child)
- ○ medical oxygen cylinder
- ○ gloves
- ○ OP airways (oropharyngeal airways)
- ○ regulator
- ○ sealing washer
- ○ thumbscrew
- ○ tubing
- ○ marker
- ○ pen/pencil and paper

PRE-USE CHECKS OF OXYGEN EQUIPMENT

Before using any oxygen equipment (including masks, OP airways and suction equipment), it should be routinely checked for faults and defects in accordance with the manufacturer's instructions, industry standards and regulatory requirements. The following checks should be made.

- Before a cylinder is fitted to the oxygen equipment, remove the protective plastic wrapping and check the heat warning tag—reject any cylinders with melted or deformed tags.
- Where applicable, check that the sealing washer is present and is not damaged or dirty. Replace missing or damaged sealing washers, otherwise the equipment is inoperable and cannot be used.
- Where applicable, the cylinder must be inserted into the yoke. This is achieved by ensuring that the locating pins on the yoke are aligned to the locating pinholes on the cylinder valve. Then tighten the thumbscrew.
- Check the contents of the cylinder by using the cylinder key wheel to slowly open the cylinder valve until the gauge reaches a steady point. This slow build-up of pressure saves damage to the regulator and gauge, which can occur from a sudden rush of pressure. Open the cylinder valves fully and then turn the key wheel back half a turn to prevent locking. The gauge should register 'full'. This may be indicated by the word 'full' or a green mark on the cylinder. Reject a cylinder is less than half full.
- Close the cylinder valve and then drain oxygen from the system by operating the delivery system (where the unit has two, ensure both are operated) and check that the needle on the contents gauge falls to zero.
- Mark the cylinder with the contents, time and date of inspection.
- Check the oxygen tubing for cracks or other damage—ensure that the open end will fit easily to both therapy masks, as well as the oxygen connection point (inlet nipple) of the airbag.
- Check the flow of oxygen from the cylinder through the tubing.
- Check that there is no odour from the oxygen being expelled from the tubing.
- Check therapy masks for cleanliness and serviceability (should be in a sealed bag).
- Check the condition of the resuscitation mask cuffs for fit, perishing or cracks.
- Check the airbag.
- Ensure that a minimum of four adult size oropharyngeal airways are present and sealed in their original packaging.
- Check in the protective case for:
  - a non-permanent marker for marking the amount of oxygen in the cylinder
  - pens and paper for keeping records
  - gloves for personal protection during emergency care
  - spare sealing washers (Bodok) where applicable to replace defective or missing seals
  - suction devices
  - additional oxygen equipment, such as automatic oxygen-powered resuscitators.

Group activity 3.3: Routine equipment checks

In pairs or small groups, take turns checking that the oxygen equipment and ancillary items used at your club/service are available and serviceable. Have your partner test you by following the process outlined previously.

AFTER-USE CHECK

Most airbags and masks are single-use and disposable.

Any mask should be thrown away if it is soiled with blood, vomit or copious saliva.

If not soiled, reusable silicon airbag and mask should be disassembled, cleaned, disinfected, reassembled and tested in sequence as per the manufacturer's instructions.

EQUIPMENT MAINTENANCE

GENERAL CARE

Steps to ensure that oxygen equipment is maintained correctly:

- equipment should be kept clean and free of sand and foreign materials
- to ensure its correct operation, equipment must be checked before starting operational duties (e.g., patrol) each day and after any use (including training sessions)
- whenever the oxygen equipment shows defects that may cause it to operate incorrectly, it must be taken out of service immediately and replaced or repaired by the manufacturer.

CARE AFTER USE

Whenever oxygen equipment has been used:

- prepare it again for immediate use—check regularly; turn cylinder on and off again to check contents, then release the pressure
- discard oxygen equipment components marked for single-use, i.e., oxygen masks
- replace disposable components that have been used
- clean and sterilise non-disposable components that have been used
- wipe regulator carefully with a damp cloth
- where applicable, check that the seal (bodok) between the regulator housing and the cylinder yoke is in the correct position.

SERVICING EQUIPMENT

The oxygen equipment should be serviced at least every 12 months, or according to the manufacturer's instructions. The equipment technical inspection tag/sticker should be affixed to the equipment. The date and equipment reference number should be clearly identified on the tag/label.

MAJOR FAULTS

A major fault is any fault that cannot be repaired through basic maintenance (e.g., cleaning and replacement of spare or missing parts that are routinely stocked in a first aid room) and that affects the safety or ability to use the equipment properly. Equipment with a major fault must be immediately removed from service and replaced or repaired by the manufacturer. All major faults should be logged in the appropriate organisational logs.

OXYGEN FOR A BREATHING VICTIM

OXYGEN THERAPY

Oxygen therapy is the administration of oxygen to a conscious or unconscious breathing victim who is injured, showing signs of shock or who is having breathing difficulties. It increases the level of oxygen in the victim's bloodstream, thus reducing hypoxia. It also has the potential to calm the victim and relieve dyspnoea (sensation of difficult breathing).

Oxygen therapy can be delivered to a victim using one the following oxygen masks connected to an oxygen cylinder:

- a therapy mask
- a non-rebreather mask (therapy mask system with a reservoir bag attached)
- a nasal cannula.

Oxygen therapy must be administered at an appropriate flow rate to assure the wellbeing of a victim. Therefore, it is important to monitor the victim throughout the procedure.

Ensure you maintain awareness of the five rights when administering oxygen in a first aid situation:

- right drug
- right victim
- right dose
- right time
- right route.

CONDITIONS WHERE OXYGEN CAN BE USED IN FIRST AID SITUATIONS

Providing supplemental oxygen in certain first aid situations can be beneficial to victims. Use a pulse oximeter to measure a victim's oxygen saturation. Victims with an oxygen saturation below 92% should be placed on oxygen. A victim who is showing signs of cyanosis (blueing of the skin), shock, decompression illness or a situation suggesting carbon monoxide poisoning should be placed on oxygen irrespective of their oxygen saturation level.

Conditions where oxygen is recommended include :

- CPR
- severe bleeding
- burns
- shock
- asthma
- anaphylaxis
- drowning
- decompression illness
- poisoning

Also refer to ANZCOR Guideline 9.2.10 – The Use of Oxygen in Emergencies.

OXYGEN THERAPY EQUIPMENT AND ADMINISTRATION

Therapy mask

The therapy mask can deliver up to 60 per cent oxygen depending on the flow rate and the speed and depth of the victim's breathing. Exhaled air is vented through the holes on each side of the mask. Therapy masks are single-use only.

As a general guide a flow rate of 8–15 litres per minute (L/min) should ensure adequate oxygen delivery to the victim. A flow rate under 8 L/min, with quick breaths, may not be enough to fully 'flush' out the carbon dioxide in the therapy mask and therefore may have a negative effect on breathing.

When oxygen is being administered and there is more than one victim, a new mask must be used for each victim to ensure that the victims are not placed at risk of cross infection.

Oxygen therapy mask

A full C cylinder (440–490 L) will operate for approximately 50 minutes, with continuous use of oxygen therapy at 8 L/min.

ADMINISTERING OXYGEN WITH A THERAPY MASK

When administering oxygen with a therapy mask:

- check oxygen equipment before use
- choose the appropriate size therapy mask (large or small face)
- place the equipment so that the operator can reach it easily and see the contents gauge
- connect the therapy mask to the oxygen unit
- turn the oxygen regulator to a flow rate of 8–15 L/min turn on the oxygen, which allows the oxygen to flow through the mask. You should be able to feel and hear it coming through the mask. A flow rate of 8 L/min will deliver 45 per cent oxygen
- introduce the therapy mask to the victim explaining the benefits and effects of oxygen therapy
- hold the mask to the victim's face, gradually adjusting the elastic around the victim's head and pinching the soft metal nose band
- check that the mask is firmly applied, and that the victim is comfortable
- monitor the victim's breathing
- monitor the victim's oxygen saturation and record the findings.

If a conscious victim does not want the therapy mask on their face, they can hold the mask in front of their face. Alternatively, the tubing can be removed from the mask and the oxygen flow from the tube can be directed very closely towards the victim's mouth and nose to help minimise any distress.

Place unconscious victims in the lateral position.

NON-REBREATHER MASK

A non-rebreather mask is similar to a therapy mask, with multiple one-way valves in the side ports. These valves prevent room air from entering the mask but allow exhaled air to leave the mask. It has a reservoir bag that has a one-way valve that prevents exhaled air from entering the reservoir. This allows larger concentrations of oxygen to collect in the reservoir bag for the victim to inhale. It is designed to deliver oxygen concentration of 60–90 per cent with an oxygen flow rate at a minimum of 10 L/min up to a maximum of 15 L/min.

Non-rebreather mask

The bag must be inflated to some degree at all times. If the bag becomes completely deflated (e.g. the oxygen cylinder empties, tube becomes kinked etc.) the air supply to the victim can be compromised and the mask must be removed.

ADMINISTERING OXYGEN WITH A NON-REBREATHER MASK

When administering oxygen with a non-rebreather mask:

- check oxygen equipment before use
- choose the appropriate size non-rebreather mask (large or small face)
- place the equipment so that the operator can reach it easily and see the contents gauge
- attach oxygen to the oxygen connection point (inlet nipple) on the reservoir bag
- turn the oxygen regulator to a flow rate of 10–15 L/min for the bag to inflate
- turn on the oxygen (the reservoir bag will inflate)
- introduce the non-rebreather mask to the victim explaining the benefits and effects of oxygen therapy. A flow rate of 10 L/min will deliver 65 per cent oxygen
- hold the mask to the victim's face, gradually adjusting the elastic around the victim's head, and pinching the soft metal nose band
- check that the mask is firmly applied, and that the victim is comfortable
- monitor the airbag and ensure that it remains inflated
- monitor the victim's breathing
- monitor the victim's oxygen saturation and record the findings.

TWO-PRONGED NASAL CANNULA

Two-pronged nasal cannula

The two-pronged nasal cannula is made from plastic tubing with two plastic tips that sit at the base of the nostrils. It is designed to deliver oxygen concentration of 30–40 per cent with an oxygen flow rate of up to 6 L/min.

Do not use higher flow rates as this will not increase the delivered oxygen concentration, but will cause irritation of the nasal mucosa.

The nasal cannula is a useful means of oxygen delivery when low to moderate oxygen concentrations are required. It is mainly used for chronic obstructive pulmonary disease (COPD) victims who are feeling slightly short of breath. Anyone who has acute shortness of breath needs high concentrations of oxygen, which would be delivered using a therapy mask rather than a nasal cannula.

The oxygen unit should be capable of delivering low flow rates if any type of nasal cannula is being used.

ADMINISTERING OXYGEN WITH A TWO-PRONGED NASAL CANNULA

When administering oxygen with a two-pronged nasal cannula:

- check oxygen equipment before use
- place the equipment so that the operator can reach it easily and see the contents gauge
- connect the nasal cannula to the oxygen unit
- turn the oxygen regulator to a flow rate of 1–6 L/min
- turn on the oxygen, which allows the oxygen to flow through the nasal cannula
- introduce the nasal cannula to the victim explaining the benefits and effects of oxygen therapy
- insert the prongs of the nasal cannula into the victim's nostrils and loop the tubing around each ear
- tighten the tubing with the sliding adjuster underneath the victim's chin
- check that the cannula is not irritating the nostrils
- monitor the victim's breathing
- continue until the victim's breathing rate stabilises.

OXYGEN FOR A NON-BREATHING VICTIM

Oxygen may be given to a non-breathing victim via:

- a pocket or resuscitation mask, with the oxygen being delivered directly into the mask (mouth-to-mask resuscitation)
- a hand-powered, bag-valve-mask system with a reservoir bag attached and connected to an oxygen cylinder.

CPR with oxygen should be continued until paramedics arrive, the victim recovers, the first responder needs to remove themselves and/or the victim from danger, or the first responder is too exhausted to continue.

It is strongly recommended that disposable resuscitation masks and airbags be used in all kits. This minimises the risk of equipment failure and the risk of cross-infection between victims.

MOUTH-TO-MASK RESUSCITATION WITH OXYGEN

Mouth-to-mask resuscitation

Several different face masks are approved for use in mouth-to-mask resuscitation. Some of these have oxygen ports that allow the oxygen therapy tubing to be connected. Do not confuse a cuff re-inflation valve with an oxygen port.

Adding medical oxygen from a cylinder during mouth-to-mask resuscitation can increase the oxygen volume received by a victim from 16 per cent up to 50 per cent. It is recommended that 15 L/min be used if there is enough oxygen available for the time resuscitation is expected to last. If not, the flow of 8 L/min is acceptable.

A full C cylinder (440–490 L) will operate for approximately 30 minutes, with continuous use of airbag (and oxygen) at 15 L/min.

The following process is common to all types of face masks:

- pre-operational check to confirm that all components are present, clean and connected properly, that the unit operates as designed and is free of distortion
- post-operational check to inspect the equipment, clean and disinfect it, reassemble and test ready for use (if not single-use or disposable).

For a first responders' own safety, it is strongly recommended that they wear protective gloves and use a resuscitation mask with a filter when performing resuscitation and using an OP airway. Safety glasses are also recommended.

BAG-VALVE-MASK RESUSCITATION

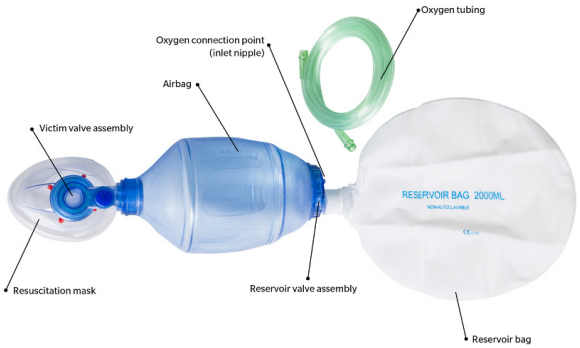
Bag-valve-mask (BVM) resuscitation systems allow an increased concentration of up to 95 per cent oxygen to be delivered to the victim, consistently and efficiently. Another advantage of BVM systems is that there may be less fatigue for first responders. Bag-valve-mask resuscitation systems may be used with or without oxygen. When used without oxygen, the reservoir bag is not attached. The inlet valve enables oxygen to be drawn into the airbag whether or not the reservoir bag is attached. It is recommended that 15 L/min be used if there is enough oxygen available for the time resuscitation is expected to last. If not, the flow of 8 L/min is acceptable.

COMPONENTS OF BVM RESUSCITATORS

Components of bag-valve-mask resuscitators vary between manufacturers, and between models from the same manufacturer. For example, some manufacturers supply single-use-only airbags—these must be discarded following use, and replaced with a new unit. First responders must become familiar with the resuscitation equipment used at their location.

Disposable bag-valve units are contained in a sealed bag, which should be visually checked for damage as part of routine inspections. The unit then needs to be checked fully when taken out of the protective bag immediately prior to use.

The following are common parts among manufacturers that may be assembled differently:



Two-pronged nasal cannula

1. Resuscitation mask

A resuscitation mask can be used for mouth-to-mask resuscitation.

2. Victim filter

A victim filter is inserted between the resuscitation mask and the victim valve assembly. It provides a barrier to protect the equipment from contamination.

3. Victim valve assembly

Connects the airbag to the resuscitation mask.
Many models feature:

a. a one-way victim valve (patient valve) that allows air to flow into the victim's lungs from the airbag when the victim inhales and limits airflow back into the airbag when the victim exhales

b. the exhalation valve—a silicone membrane that moves when a victim exhales and diverts their exhaled air away from the airbag. It is also known as a rear valve or non-rebreathing valve

c. a pressure relief valve—prevents accidental over-pressurisation of the lungs. This should be open during CPR.

4. Airbag (squeeze bag)

The airbag can be used with or without the reservoir bag attached.

A one-way air-intake valve allows air to enter the airbag and prevents leakage of air back towards the reservoir bag when the airbag is squeezed.

5. Oxygen connection point (inlet nipple)

The oxygen nipple is the connection point for the oxygen tubing. Oxygen is directed into the reservoir bag then drawn into the airbag when the it is released after being squeezed.

6. Reservoir valve assembly

a. a one-way inlet valve allows air to enter the airbag if oxygen flow is inadequate, and prevents oxygen being lost to the atmosphere

b. a one-way outlet valve allows oxygen to overflow if pressure is excessive in the reservoir bag.

7. Reservoir bag

The reservoir bag attaches to the reservoir valve assembly. It:

a. allows the airbag to fill with 100 per cent oxygen without the need to draw in diluting atmospheric air (through the one-way inlet valve), which would reduce the concentration of delivered oxygen

b. is filled when the oxygen tubing is connected to the connection point (inlet nipple) and the oxygen is flowing.

BAG-VALVE-MASK CHECKS

To ensure the bag-valve-mask is ready for use, perform the following checks where applicable to the unit:

- check the bag-valve-mask for leaks and direction of airflow by:
  - blocking the victim valve assembly with the thumb or hand and compressing the airbag under reasonable pressure
  - checking that air does not leak out of the airbag or the victim valve assembly
  - releasing the thumb or hand, the airbag should compress and refill rapidly
- check the function of the disc membrane of the exhalation valve by:
  - placing the reservoir bag over the exhalation valve and inflating it fully by squeezing the airbag
  - squeezing the reservoir bag gently. The disc membrane will lift
- check the one-way outlet valve of the reservoir assembly by:
- inflating the reservoir bag as described above and connecting it to the reservoir valve assembly

- compressing the reservoir bag rapidly and watching the overflow membrane in one-way outlet valve lift

- check the air-intake valve of the airbag and one-way inlet valve of the reservoir valve assembly by:
  - inflating the reservoir bag as described above and connecting it to the reservoir valve assembly
  - repeatedly compressing the airbag. The reservoir bag will empty and the airbag will draw in air through the membranes.

NOTE

Configuration of bag-valve-mask resuscitators varies slightly by manufacturer. Some disposable units may have fixed components.

Group activity 3.4: Bag-valve-mask checks

In pairs or small groups, take turns checking that the valves of the bag-valve-mask are operational and all components are serviceable. Have your partner test you by following the processes previously outlined.

ADMINISTERING BAG-VALVE-MASK (BVM) RESUSCITATION

CPR with a bag-valve-mask system is best worked with three people. The first person performs compressions, the second person maintains the airway and seal with the resuscitation mask and the third person operates the bag-valve-mask and oxygen. This allows a changeover of operators when required, which will minimise fatigue, particularly for the first-person performing compressions. When using the bag, the operator must compress the bag at both the correct speed and for the correct length of time.

SETTING UP THE BVM

When setting up the BVM:

- check for danger (e.g., never use oxygen near open flames, cigarettes)
- the oxygen operator needs to inform other first responders about who they are and their qualifications to operate oxygen equipment
- the operator sets up the oxygen equipment clear of the victim, any defibrillation units and other first responders, but in a position where the gauge is clearly visible
- immediately on opening the case, a suitably sized resuscitation mask is passed to the rescue breathing operator to change to the mouth-to-mask resuscitation method. If mouth-to-mask resuscitation is in progress, however, the airbag can be fitted directly to the mask (after an operational check)
- the operator should quickly check:
  - the correct operation of the victim valve assembly
  - the valve to the reservoir bag
  - the connection to the oxygen supply
- the oxygen is then turned on to 14–15 L/min to allow inflation of the reservoir bag
- when the reservoir bag is inflated, compress the airbag to expel any air from the unit. This should then leave the airbag with 100 per cent oxygen
- tell the other operator that the BVM device is ready for use, when the reservoir bag is inflated again.

OPERATING THE BVM DEVICE WITH THREE FIRST RESPONDERS

When it is determined that CPR is needed and oxygen equipment is available:

- ensure that an ambulance has been called (000)
- first responder one starts CPR
- first responder two sets up oxygen equipment
- first responder three places the mask onto the victim's face (narrow part over bridge of nose), checking that the mask has a good seal and that jaw thrust is maintained.
- first responder two squeezes the bag for approximately 1 second to cause adequate rise of the chest
- first responders two and three watch for the chest to rise with each inflation and fall as air exits the lungs

Operating the BVM device

- the airbag should be released and allowed to refill ready for the next ventilation
- first responder one continues compressions after two ventilations
- first responder three continues to maintain the airway with the backwards head tilt and ensures a proper seal between the mask and the victim's face and monitor the airway in case of any regurgitation
- first responder one indicates readiness or need to change approximately every 2 minutes, to minimise fatigue.
- change over smoothly with minimal interference to the resuscitation action.

NOTE

If at any time, a first responder is not happy with the functioning of the oxygen equipment, the equipment must be removed immediately and rescue breathing should continue by either the mouth-to-mask, mouth-to-mouth or mouth-to-nose method.

OPERATING THE BVM DEVICE WITH TWO FIRST RESPONDERS

The bag-valve-mask can be used with oxygen by two first responders. The most important aspect of a two-person resuscitation is maximising effective chest compressions, followed by maintaining the airway and sealing the mask properly.

This is best achieved by the following:

- when the BVM and oxygen unit are ready for use, first responder two secures the mask in place and continues to maintain the airway and head tilt
- first responder one is then responsible for both compressions and rescue breathing using the BVM, stopping compressions to deliver two full rescue breaths by squeezing and releasing the airbag as part of the normal CPR cycle of 30:2 compressions to breaths.

NOTE

The rise and fall of the chest should be watched at all times during this procedure.
If the oxygen bottle is depleted during resuscitation, continue to use the bag-valve-mask and remove the reservoir bag.

OPERATING THE BVM DEVICE WITH ONE FIRST RESPONDER

You can still use supplemental oxygen during one-person resuscitation. It is recommended, however, that you do not try to use a BVM as you will not be able to maintain a sufficient seal with the mask or head tilt.

If you are on your own, discard the BVM and simply place the end of the oxygen tube on the oxygen connection point (inlet nipple) of the mask, or through the opening of the mask, depending on which type of mask you have, and continue with normal CPR.

OPERATING THE BVM DEVICE ON CHILDREN

- If oxygen equipment is being used on a child, a paediatric bag-valve-mask device (if available) should be used and compressed with one hand. Bag-valve-mask devices not specifically manufactured for the exclusive use on infants should not be used on infants. When the child's chest is seen to rise, stop compression of the airbag.

COMPLICATIONS WITH THE USE OF A BVM DEVICE AND SUITABLE STRATEGIES TO MINIMISE THESE

Manual resuscitators have no built-in tidal volume control—the amount of air used to force-inflate the lungs during each breath depends entirely on how much the operator squeezes the airbag and how good the mask seal is. This may lead to the risk of various complications. Complications are related to over-inflating or over-pressurising the victim, which can cause:

- air to inflate the stomach (called gastric insufflation)
- lung injury from over-stretching (called volutrauma)
- lung injury from over-pressurisation (called barotrauma).

Always follow the manufacturer's instructions and guidelines specific to the device you are using, concentrate and control what you are doing.

Group activity 3.5: CPR with oxygen
In teams of three, practise performing CPR using a bag-valve-mask device.

Assessment task 1: Written questions
Complete Assessment Task 1—Topic 3 written questions 3.1–3.21 in assessment portfolio.

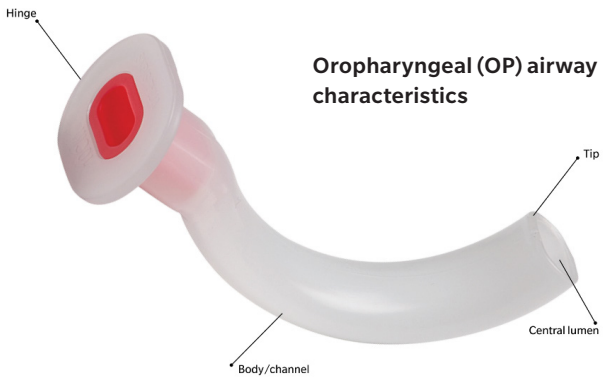
OROPHARYNGEAL (OP) AIRWAYS

Different size oropharyngeal (OP) airways

Oropharyngeal (OP) airways are curved plastic devices that help keep the airway clear in the unconscious victim by depressing the tongue and keeping the teeth and lips apart. The OP airway by itself does not replace correct airway management practices and should be considered only as a tool to assist in the management of a victim's airway. A correctly inserted OP airway will greatly facilitate the maintenance of a clear airway.

CHARACTERISTICS

OP airways are plastic devices characterised by a rigid flange and a hollow curved tube. The OP airways have a flange (top flattened end) that, when properly inserted, rests against the victim's teeth. This flange does not interfere with an adequate seal from a face mask.



Oropharyngeal (OP) airway characteristics

Inside the OP airway, and protruding slightly past the flange, is a coloured bite block, which may on occasions fall out or be cracked or missing in defective OP airways. The bite block prevents a recovering victim biting down hard and obstructing their airway. There have been recorded events where an OP airway minus the bite block has been bitten through by a victim having a spasm during recovery. OP airways come in a range of sizes allowing for insertion into different-sized victims. The smallest OP airways are approximately 5 cm long and the larger OP airways are over 10 cm long.

Do not use the bite block colour for size recognition as different manufacturers use various colours for different sizes. An OP airway should always be measured.

CARE OF OP AIRWAYS

OP airways must be kept in their original packaging. They should be easily accessible in a first aid kit, resuscitation kit and first aid rooms. OP airways packaging should be checked regularly to ensure that it has not been opened and is still intact. If deformities such as cracks and scratches exist, it should be immediately removed from service and replaced.

After use on a victim, a contaminated OP airway should be disposed of in a safe manner, preferably in a clinical-waste bag provided by attending ambulance or medical personnel. If this is not possible, the contaminated OP airway should be placed in a clinical-waste bag and stored in a safe place until proper disposal can be organised.

CHOOSING THE APPROPRIATE SIZE OP AIRWAY

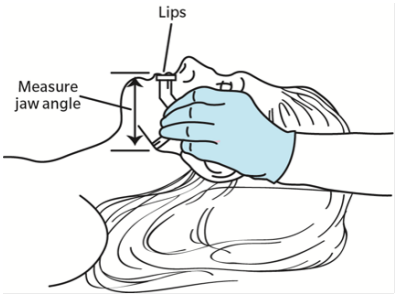
To choose an OP airway of the correct size, place the airway against the side of the victim's face. The flange (top flattened end) of the airway will extend just past the centre of the victim's lips. The curve of the airway is then run sideways along the victim's jaw. The correct size OP airway is the one that closely reaches the angle of the victim's jaw.

WHEN TO INSERT AN OP AIRWAY

The use of an OP airway is optional. There must be a valid airway before an OP is inserted.

When inserting an OP, the first responder must not interrupt CPR. There is a 15 second window while chest compressions are being performed to measure and insert the OP. If longer is needed, measure and select the correct OP, give breaths, then insert the OP.

An OP airway can be inserted while the unconscious victim is on their back or when on their side if they have been rolled over to drain fluids. If insertion is occurring during CPR there is no need to stop compressions for the airway to be inserted. It is better to manage a victim's airway without the OP airway, than to stop CPR.



Different size oropharyngeal (OP) airways

IMPORTANT

OP airways should not be used if:

- the victim is conscious or semiconscious—insertion of an OP airway into a conscious victim may induce vomiting or gagging
- an airway adjunct of the correct size is not available
- there is a large amount of vomit or fluid in the victim's mouth
- There is any solid material in the victim's mouth.

PRECAUTIONS TO TAKE WHEN INSERTING AN OP AIRWAY

When inserting an OP airway:

- ensure the victim's mouth is free of vomit and broken teeth
- ensure that there is adequate head tilt prior to insertion of the OP airway
- ensure that the OP airway does not push the tongue backwards and block the victim's airway
- do not force the OP airway into the mouth; the airway should slide in easily
- ensure that the victim's lips (both top and bottom) are not caught between the teeth and the OP airway.

INSERTING AN OP AIRWAY

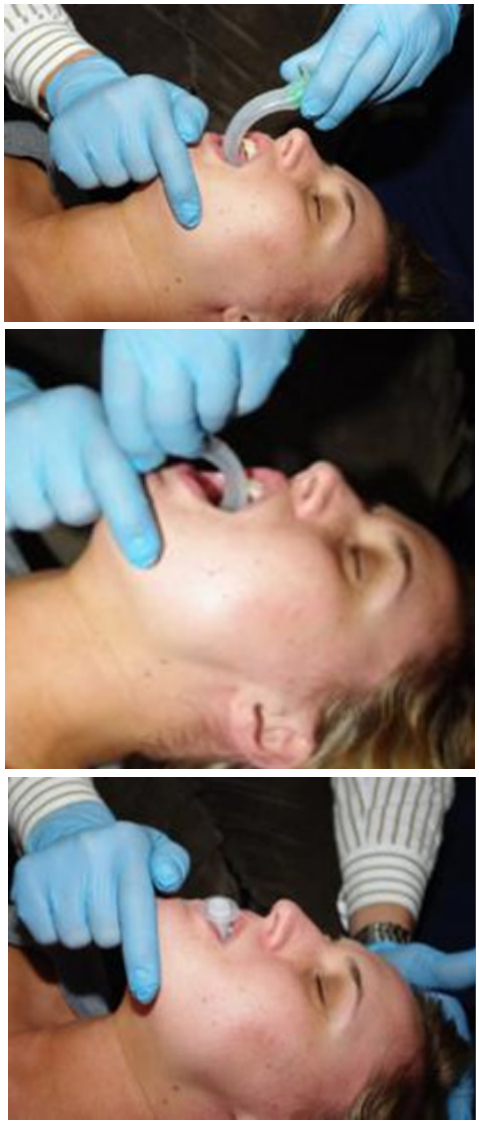
OP airways are inserted using the rotation method. This method is not recommended for infants or children under the age of eight because the roof of the mouth is still soft and easy to damage. SLSA does not teach members the methods of OP airway insertion into infants and children, therefore members should not attempt to insert an OP airway into children under the age of 8 years.

Inserted oropharyngeal (OP) airway

These are the steps in the rotation method.

- Tilt the victim's head backwards; open the victim's mouth with one hand using jaw support or jaw thrust, if necessary.
- Visually check the victim's airway, and manually clear it, if necessary.
- Measure and choose an OP airway of the correct size.
- Remove the OP airway from the packet.
- Lubricate the OP using moisture from the lips of the victim, or water.
- Hold the OP airway by the flange. With the tip pointing towards the roof of the victim's mouth.
- Insert the OP airway to approximately one-third of its length.
- When one-third of the airway is inside the mouth, rotate it 180 degrees until the tip points downwards, at the same time sliding it over the victim's tongue in one smooth movement into the back of the pharynx until the flange is touching the lips.

The OP airway should slip easily into place. If it is difficult, stop, reposition the victim's lower jaw and tongue before trying again. Never force an OP airway into position, as this may damage the victim's mouth, teeth and upper airway and could cause additional airway obstruction.



Inserting an OP airway

NOTE

Do NOT attempt to rotate the OP airway on removal. It is unnecessary and may cause damage to the mouth and throat.

REMOVING AN OP AIRWAY

If the victim shows any signs of rejecting an OP airway, remove it immediately. In many cases, the victim may spit it out. An OP airway can be removed easily by sliding it out of the mouth following its natural curve.

Group activity 3.6:
Inserting and removing an OP airway

In pairs, practise choosing the correct size OP airway for your partner. Practice inserting and removing an OP airway into a victim's airway on an appropriate training manikin.

Assessment task 1: Written questions

Complete Assessment Task 1—Topic 3 written questions 2.22–2.25 in assessment portfolio.

Topic 4—Advanced Resuscitation and Suction

Opening and clearing the upper airway of foreign material is the first lifesaving measure taken when breathing is disrupted. Suction devices help to safely remove secretions from a victim's mouth and upper airway. They should be used only in an unconscious victim or a semiconscious victim who cannot cough or swallow.

Suctioning is a skill that will require practice to become proficient. Regular checking and cleaning of the suction device will ensure that you remain familiar with the device(s) used by your club/service.

SUCTION DEVICES

Suction devices come in three types:

Suction devices		
Manual (hand-operated)	Oxygen-powered (vacuum bottle)	Battery- (or electric-) powered
		

Table 3.1 Suction devices

NOTE

Oxygen-powered suction consumes considerable oxygen (20–40 L per minute). It is essential that the oxygen flow is turned off immediately after use.

COMPONENTS OF SUCTION DEVICES

While there are many variations to suction devices based on the type and the manufacturer, there are four components that are common to most suction devices. These are:

1. Suction catheter

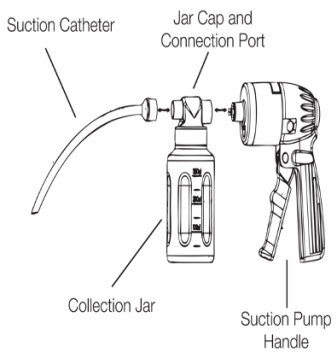
A suction catheter is a plastic tube that is inserted into the victim's mouth to suction out any foreign material. Suction catheters are single-use only and should be disposed of in clinical-waste containers.

2. Collection jar

Fluids and foreign material suctioned from the victim are collected in the jar. Collection jars are usually single-use with the jar being disposed of along with its contents in clinical-waste containers.

3. Jar cap and connection port

The jar cap and connection port keep the contents in the collection jar and include the fittings to connect the suction catheter to the device that provides the suction power.



Manual suction device components example

4. Suction device

This is the device that provides the suction power. It is the suction pump handle in manual devices, oxygen equipment in oxygen-powered devices or the electric pump in a battery- or electric-powered device.

Other components that some suction devices include are:

- **Pump body**
  This is the housing of the pumping mechanism.
- **Pump trigger**
  This is the device that provides the power. It is the suction pump trigger in manual devices, oxygen equipment in oxygen-powered devices or the electric pump in battery- or electric-powered devices.
- **Variable suction rate knob**

This knob allows a variation in suction strength.

NOTE

SLSA currently approves the use of manual suction devices only during surf lifesaving operations.

PRE-USE CHECK

Before using any suction device:

- ensure that the device is clean and that all components are available, including:
  - suction catheter
  - collection jar
  - collection jar cap
  - suction tubing (if required)
  - suction device
- operate the manual suction device (or turn suction on for powered devices)
- test for suction against thumb or finger by placing it over the vacuum port (port should stick to the thumb or finger).

When you are finished, turn the suction device off (powered devices only) and return it to its storage case in its original position.

Group activity 4.1: Suction equipment

Look at the suction equipment that your club/service has available for use or the equipment you have been provided to train with. Identify the following components:

- suction catheter
- collection jar
- jar cap and connection port
- suction device
- vacuum port.

If you cannot identify all the components, check with your trainer. Your device may not have these exact components, but will have something that performs the same function. Test the function of your suction device by performing the checks described above.

ADMINISTERING A SUCTION DEVICE

When administering a suction device, you should follow these steps.

1. Put on protective gloves (and safety glasses if available).
2. Check the suction device for correct operation.
3. Select the catheter and remove it from the sealed packaging leaving a contact point with the wrapper.
4. Connect the suction catheter to the connection port (or tubing for powered suction devices).
5. Completely remove catheter from wrapper (turn on the suction source for powered devices).
6. Measure the maximum length of insertion by placing the tip of the catheter at the corner of the jaw and measuring to the centre of the lips. Mark this point with a finger (this will ensure that you insert the catheter no further than the victim's back teeth).
7. Open the victim's mouth and insert the catheter into the lower cheek of the victim (in the lateral position) ensuring that the catheter is inserted no further than the point marked by your finger.
8. Rotate the catheter within the victim's lower cheek, ensuring that the action is smooth and gentle to prevent damage.
9. Use the suction device repeatedly to remove excess fluid (saliva, blood, stomach content) from the mouth while monitoring the victim:
   - operate suction for no longer than 15 seconds before a 5-second break if using manual suction devices.
   - operate suction for only 5 seconds before a 5-second break if using powered devices.
10. Ensure that only two-thirds of the collection jar is filled.
11. Turn off suction on the completion of the procedure (if using powered suction).
12. Dispose of the catheter in the appropriate manner.

Measuring insertion length from corner of the jaw to centre of lips

Inserting the catheter no further than length marked by fingers or back teeth

LENGTH OF TIME TO APPLY SUCTION

Prolonged suction should be avoided as this can stimulate the vagus nerve in the back of the throat and cause bradycardia (slow pulse). For this reason, manual suction should be applied for only 15 seconds at a time with a break for at least 5 seconds in between operations. Due to their constant suctioning action, powered suctioning devices should be used for only 5 seconds before a 5-second break.

Group activity 4.2: Administering suction

In pairs or groups of three, practise assembling your suction equipment and sizing the insertion distance on your partner. If an appropriate training manikin is available, practise performing suction.

To ensure infection-free training, do not place the suction catheter in your own mouth or that of your partner(s).

TROUBLESHOOTING

There are many reasons why suction equipment can fail or not operate correctly.

If experiencing problems, check the following.

- Is the suction tubing blocked?
- Is the seal missing or perished?
- Is the unit not turned on?
- Is the oxygen supply exhausted (for oxygen-powered units)?
- Is the battery flat (if battery-powered unit)?

POST-USE MAINTENANCE

After using a suction device:

- dispose of disposable collection jars and catheters in a suitable manner
- re-usable collection jars can be flushed with clean, cold water and rinsed with antiseptic solution
- ensure that all unit components are disassembled and thoroughly cleaned as per ARC guidelines.

Assessment task 1: Written questions

Complete Assessment Task 1—Topic 4 written questions in assessment portfolio.

Topic 5—Advanced Resuscitation and Defibrillation

WHAT IS DEFIBRILLATION?

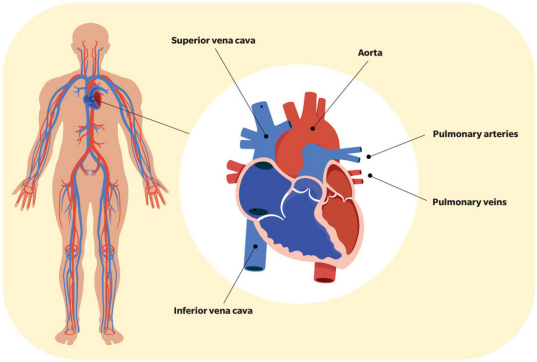
Defibrillation is the delivery of an electrical current to the heart to correct an ineffective irregular heartbeat.

The defibrillation process uses electricity to contract (depolarise) the entire heart muscle at one time. Following this, resting (repolarisation) of the whole heart muscle occurs.

Effectively the process stops the heart. Once repolarisation has occurred, it is hoped that the heart's normal electrical activity will resume.

CARDIOPULMONARY SYSTEM

The cardiopulmonary system comprises the cardiovascular (circulatory) system and the respiratory system, and their functions. It is responsible for pumping and channelling blood and oxygen to and from the body. It is primarily located in the thoracic cavity of the body.



Circulatory system

CARDIOVASCULAR SYSTEM

The cardiovascular (circulatory) system consists of the heart and blood vessels—arteries, veins and capillaries.

The delivery of oxygen to the body can be threatened by the following cardiovascular conditions:

- blood loss caused by severe bleeding (internal or external)
- impaired circulation
- failure of the heart to pump adequately, e.g., heart attack, or dysrhythmia (irregular heartbeat).

BLOOD VESSELS

Arteries

Arteries circulate blood at a high pressure, so their walls are thick and muscular. Major arteries are located deep within the body tissue. Arterial blood is bright red due to its oxygen content. Serious blood loss can occur rapidly when someone is bleeding from an artery because of their high pressure, which causes the escaping blood to spurt in time with the heartbeat. Large arterial bleeding is unlikely to stop by itself.

Veins

Veins circulate blood at a low pressure, so the walls are thinner. Veins contain valves that prevent the backflow of blood. Many veins are located close to the skin, such as those visible on the feet, hands and forearms. Venous blood is dark red, due to its low oxygen content. Blood escaping from veins flows out of the body unlike arteries that spurt.

Capillaries

Capillaries are the smallest blood vessels. Capillary networks link the ends of the smallest arteries with the smallest veins. Capillaries allow oxygen and nutrients to reach every cell in the body and carbon dioxide to be removed. Bright red blood escaping from capillaries oozes out and is normally associated with abrasions and scalp wounds.

With the exception of the fingernails, toenails and hair, injury to any part of the body will cause damage to blood vessels, and result in some degree of bleeding (from minor bruising to severe life-threatening bleeding).

THE HEART

Normal heart function is essential to oxygenate blood and pump it throughout the body for the organs and all parts of the body to receive adequate oxygen.

The heart is a strong muscular pump, about the size of its owner's clenched fist. Approximately two-thirds of the heart is located behind and mostly to the left of the sternum (breastbone).

It has four chambers:

- two atria, which receive blood to pump to the ventricles
- two ventricles—the right ventricle pumps blood to the lungs and the left ventricle pumps blood to the body.

The heart contains several valves that are designed to ensure that the blood flows in one direction.

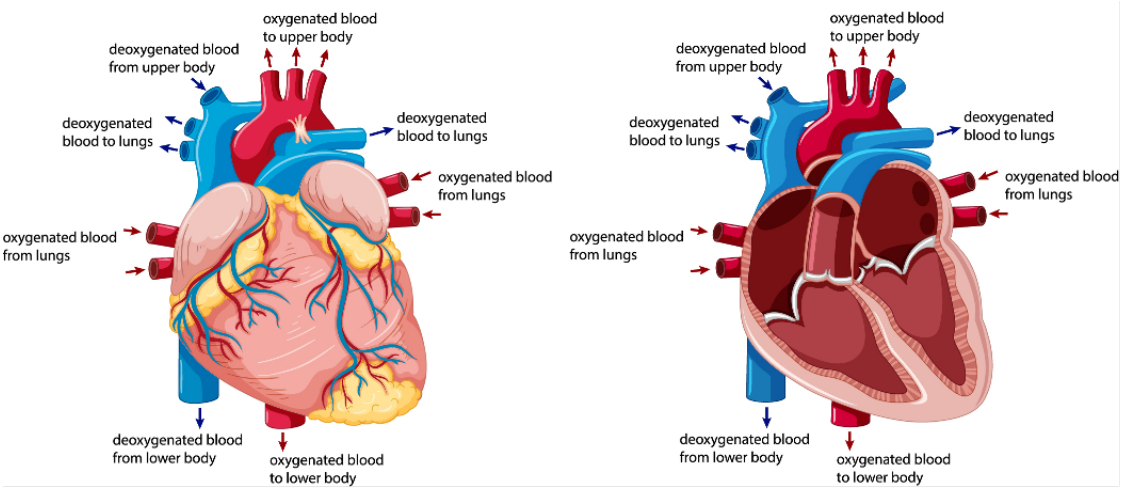
Oxygen-rich blood passes from the lungs to the left side of the heart. It is then pumped to all the different parts of the body where oxygen is delivered to the body cells.

Oxygen-depleted blood is returned to the right side of the heart and pumped to the lungs where it again becomes oxygenated. The blood then travels back to the left side of the heart, ready to make another journey around the body.

Just like any other muscle in the body, the heart also requires blood supply.

The heart's muscular contraction pumps blood through the lungs and around the body. The coordinated and rhythmic contraction of all of the cardiac muscle cells for this purpose is controlled by the heart's electrical system.

The heart has two actions, mechanical and electrical. An electrical stimulus causes a mechanical reaction, which results in a coordinated pumping action leading to effective circulation.



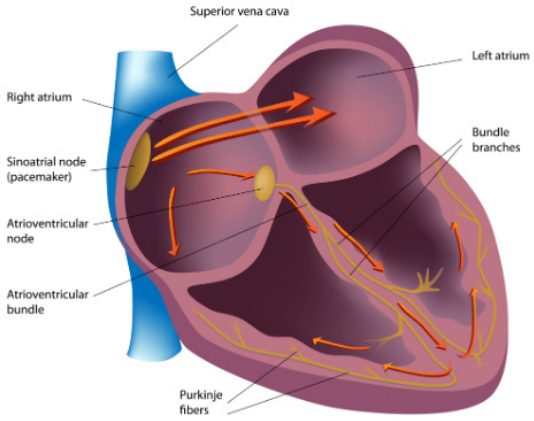
Blood flow of the human heart

ELECTRICAL ACTION

In a normal heart, electrical impulses travel a well-defined pathway:

- sinoatrial (SA) node
- atrioventricular (AV) node
- right and left bundle branches
- conduction pathways (Purkinje fibres).

This electrical conduction pathway synchronises the atria and ventricles to contract and relax in a coordinated motion necessary to pump blood efficiently. When the heart stops or contracts in an unsynchronised way, it fails to pump blood and oxygen is not supplied to the body. The brain is highly susceptible to lack of oxygen and damage may occur if blood supply is not restored within 3 to 5 minutes.



Cardiac conduction system

CARDIAC RHYTHM AND ARRHYTHMIAS

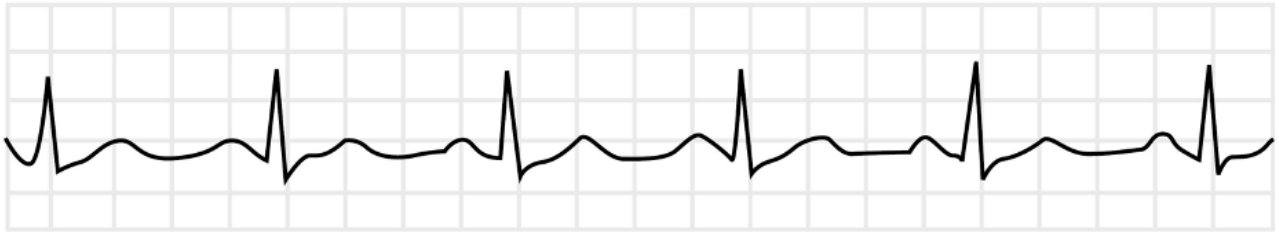
The electrical impulse passing through heart muscle can be mapped on a graph called an electrocardiogram (ECG). When a victim's heart is under stress or injured, changes in the electrical activity can be seen on an ECG.

An automated external defibrillator (AED) measures the electrical activity in a victim's heart through electrodes placed on their chest. It recognises life-threatening abnormal rhythms (arrhythmias) on behalf of the first responder, such as ventricular fibrillation (VF) and pulseless ventricular tachycardia (VT).

For your information, normal sinus rhythm and some common arrhythmias are shown below.

SINUS RHYTHM

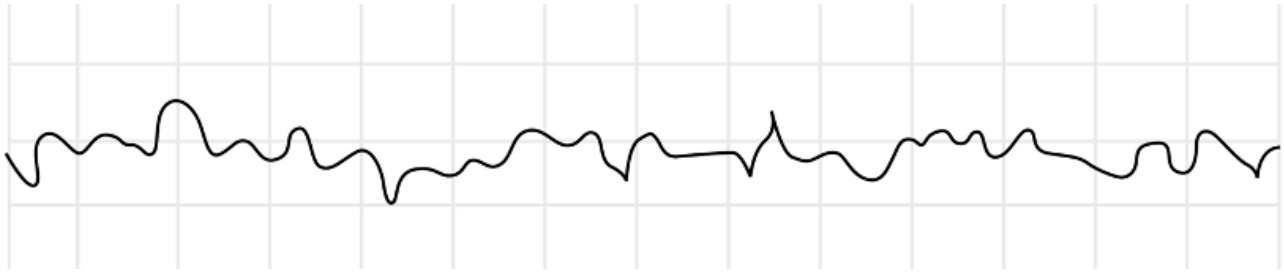
The normal rhythm of a healthy heart is called sinus rhythm. An AED will not recommend a shock if it detects this rhythm in a victim. A victim can have an electrical sinus rhythm but still not have a pulse. In these cases, even if no shock is recommended, continue CPR if the victim is not breathing and unconscious. The medical term for normal electrical rhythm but no pulse is 'electro-mechanical dissociation'.



ECG of a sinus rhythm

VENTRICULAR FIBRILLATION (VF)

Ventricular fibrillation (VF) is a life-threatening heart arrhythmia that is characterised by chaotic electrical and mechanical heart activity that produces a quivering action rather than coordinated contractions. It is most commonly associated with coronary artery disease and heart attack (myocardial infarction). Electrical shock, poisoning and drowning can also cause VF. If an AED detects a VF pulse rate, it will recommend a shock.

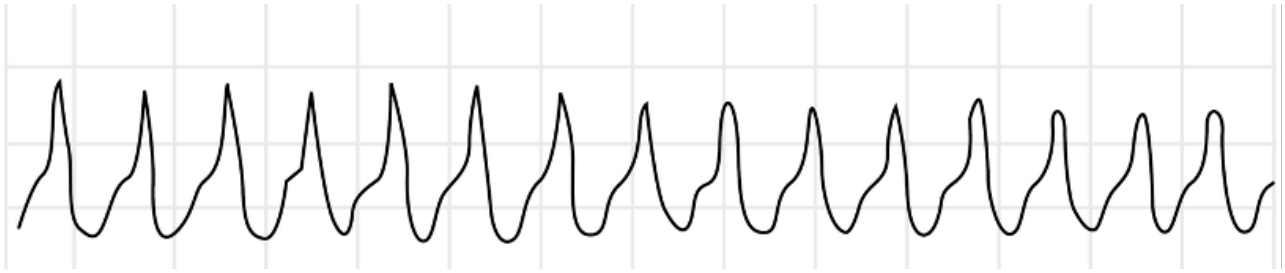


ECG of ventricular fibrillation (VF)

VENTRICULAR TACHYCARDIA (VT)

Ventricular tachycardia occurs when the ventricles beat faster than the rhythm generated by the heart's SA node. The rate will vary; however, it is always faster than 100 beats per minute (bpm) and generally slower than 200 bpm.

Ventricular tachycardia can be life-threatening as it may degenerate into pulseless ventricular tachycardia, which inhibits effective distribution of oxygenated blood throughout the body, leading to hypoxia and organ damage, or possibly death. Minor cases may spontaneously revert to normal sinus rhythm without treatment. If an AED detects a VF pulse rate, it will recommend a shock.



ECG of ventricular tachycardia (VT)

ASYSTOLE

Asystole refers to the absence of electrical activity in the heart. CPR is the only treatment. An AED will not recommend a shock if asystole is detected.

ECG showing asystole

AED SHOCK ADVICE	
Cardiac rhythm recognised	**AED shock advised**
Sinus rhythm	No
Ventricular tachycardia (VT)	Yes
Ventricular fibrillation (VF)	Yes
Asystole	No

Table 4.1—AED shock advice

DEFIBRILLATORS

An automatic external defibrillator (AED) is a portable device able to recognise and deliver an electric shock to restore an abnormal heart rhythm (VT or VF) to its normal rhythm.

An AED is to be attached only to victims who are unconscious and not breathing. However, an AED should be on standby in all first aid situations where there is a possibility the victim may go into cardiac arrest.

USE OF DEFIBRILLATORS ON CHILDREN

Standard adult AEDs and pads are suitable for use in children older than 8 years. Ideally, for children under 8 years and infants, paediatric pads and an AED with a paediatric capability should be used. If the AED does not have a paediatric mode or paediatric pads, then the standard adult AED and pads can still be used.

AED example

PUBLIC ACCESS DEFIBRILLATION

Defibrillation technology and training has reached a level in society where it is making an extremely positive impact in the chain of survival. AEDs are easy for members of the public to use and are widely available through public access defibrillation programs in public places such as airports, train stations, stadiums and shopping malls. There are several mobile applications available to help you locate them in your area.

While AEDs may be used by members of the public, the best outcomes for a victim will be achieved when they are used by first aid trained personnel. Accordingly, when working in a team situation, a team member with specific training in the use of an AED (such as this Advanced Resuscitation Techniques) should operate it.

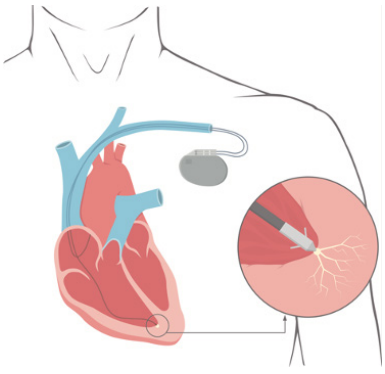
AED OPERATOR RESPONSIBILITIES

It is the responsibility of the AED operator to apply and operate the AED and ensure the safety of bystanders and other first responders. To do this, the AED operator must take control of a resuscitation team, directing team members and bystanders as required to ensure the safe operation of the AED.

Defibrillation skills should be practised on a regular basis and skills should be refreshed annually to maintain currency.

IMPLANTED DEFIBRILLATOR (PACEMAKER)

Victims can have implanted defibrillation devices under the skin that use electrical impulses to treat arrhythmias (abnormal heart rhythms). Pacemakers are often implanted to treat bradycardia



Implanted defibrillator (pacemaker)

(slow heart rates, usually 30-40 beats per minute). Other implantable defibrillators may be inserted under the skin to treat VT and VF or a combination of bradycardia, VT and VF.

Internal defibrillation devices sometimes fail to keep the heart in a normal rhythm when a victim is unconscious and not breathing normally. Do not wait for the device to activate before applying external electrode pads as it may never do so.

The presence of an implanted defibrillation device should not stop first responders from providing CPR and external defibrillation when necessary. There is no risk to first responders if an implanted defibrillation device is activated during CPR, as the electric current used by the device is very small and the shock is delivered within the heart itself.

Position external electrode pads at least 8 cm from a pacemaker to avoid damaging it or causing internal burns.

DEFIBRILLATION SAFETY

All defibrillation units must meet Australian standards, and in some instances, be approved for use by an organisation.

First responders must operate the defibrillator safely and in line with the manufacturer's instructions, as well as create a safe working environment before defibrillation occurs.

There are three areas of danger directly related to the defibrillation process:

- **contact**
  no person or conductive material is to be in direct or indirect contact with the victim at the time of defibrillation
- **conduction**
  there should be no conductive items near the victim, such as:
  - water/rain (ensure that you are clear of the incoming waves/tides if in a beach environment)
  - metal e.g., jewellery and medication patches
  - moisture on the chest e.g., vomit, blood or perspiration
- **explosion**
  - do not defibrillate if there is a chance of explosion due to the presence of gases, fumes or flammable substances
  - oxygen units should be moved away during defibrillation and the flow of oxygen from face masks directed away from the chest.

DEFIBRILLATOR COMPONENTS AND ACCESSORIES

A portable defibrillator of the type commonly used by first responders consists of a case containing the base unit with single-use, self-adhesive electrode pads. In addition to the AED, the following accessories should be kept with the unit (either in the same case if possible or in a case attached to the unit):

- resuscitation masks (adult)
- gloves
- razor/shears
- gauze wipes (or similar)
- spare battery (if applicable to AED)
- spare electrode pads
- blanket
- pen and paper
- chamois or towel.

PRE-OPERATIONAL CHECKS

All modern AEDs will have a self-check mechanism to ensure that they are operational. This check usually includes ensuring that there is a sufficient level of charge in the battery and that all electronic components are functioning correctly. You should make yourself familiar with the unit used by your club/service, including what is included in the automatic self-check and how you can ensure that the unit has passed the self-check.

At the start of a patrol shift, you should check the following:

- that the AED has passed the self-check
- that the electrode pads are in date (this will be marked on the outside of the packaging) and that their packaging has not been damaged
- that all additional equipment as listed above, or required by your state or service, is included and in an operational condition.

MAJOR FAULTS

A major fault is any fault that cannot be repaired through basic maintenance (e.g., cleaning and replacement of spare or missing parts that are routinely stocked in a first aid room) and affects the safety or ability to use the equipment properly. Equipment with a major fault must be immediately removed from service and replaced or repaired by the manufacturer. All major faults should be logged in the appropriate organisational logs.

STORAGE

You should store a defibrillator in an easily accessible place. Do not store it in direct sunlight or in damp conditions.

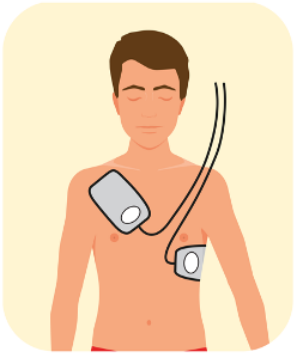
APPLYING ELECTRODE PADS

PREPARING THE VICTIM

The following points will help ensure effective adherence of electrode pads to a victim's skin:

- expose the victim's chest (remove undergarments if applicable)
- if the victim is very hairy, trim their hair with scissors/a razor in the locations where pads will be placed
- dry the victim's skin if necessary to remove any water or moisture
- remove any metal jewellery and medication patches
- ensure that the victim is not lying on any conductive materials e.g., metal grates, wet surfaces.

POSITIONING

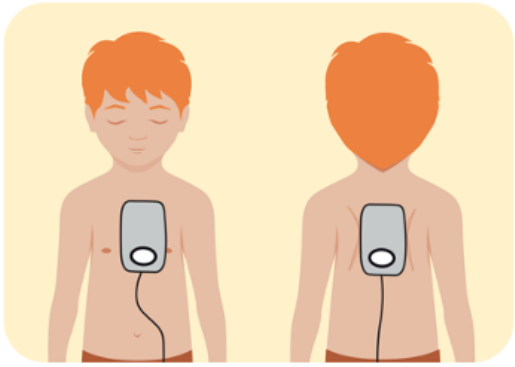


AED example

Correct positioning of the electrode pads is essential for successful defibrillation to take place. The optimal position is usually indicated on the electrode pads or on the packaging they come in.

Typical pad placement in adults and children is the anterior-lateral position—one pad slightly below the collar bone on the victim's right chest and one pad on the victim's left side below the arm pit.

If the victim has an implanted pacemaker or defibrillator, make sure the pads are positioned at least 8 cm away from it.



AED example

Paediatric pads are placed in the same way as the adult pads and come with a diagram of where on the chest they should be placed. Standard adult pads can be used for used for children under 8 years if paediatric pads are not available. If the pads are too large, use the front-back position: one pad placed on the upper back (between the shoulder blades) and the other on the front chest, if possible slightly to the left.

Apply the pads with a smooth rolling action to prevent air bubbles.

Once applied, pads should not be repositioned or removed unless prompted by the AED.

NOTE:

CPR should still be continued and not be disrupted while the AED is being setup and the pads applied.

OPERATING A DEFIBRILLATOR

There are three main steps for operating an AED:

- turn the machine on
- apply the pads
- respond to the prompts.

Different AED machines have different protocols for shock delivery. Some have set joule settings, others have variable joule settings and some even measure impedance and calculate the joules needed.

RESPOND TO PROMPTS

AED prompts may vary, depending on the make and model, but they are usually similar to those examples shown below.

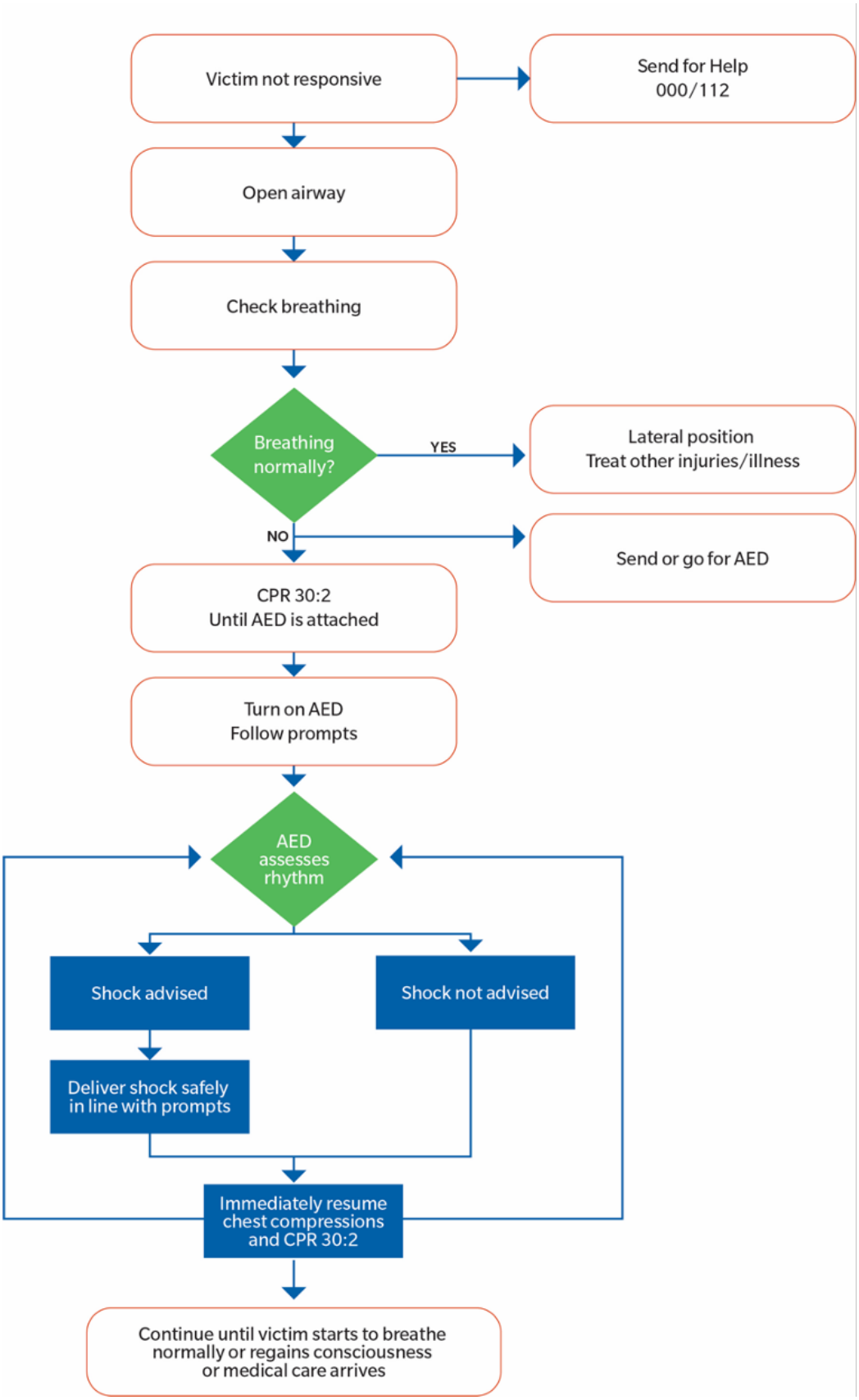
COMMAND	ACTION
'Press on'	Turn on defibrillator.
'Attach pads'	Attach electrode pads to victim.
'Analysing'	Do not touch the victim.
'Charging'	Stand clear. Check again for conductive materials
'Stand clear', 'Do not touch the victim'	Stand clear.
'Shock advised', 'Press to shock', 'Push flashing button'	Warn team members then push the shock button if safe to do so.
'No shock advised', 'If needed continue CPR'	Continue CPR if needed.
'Poor pad connection'	Attach pads firmly to bare skin.
'Motion detected'	Stop motion.

Table 4.2—AED prompts

These are the important shock delivery protocols to remember:

- Respond to all prompts within safety constraints.
- Make sure all personnel are clear of the victim during analysis and before delivering a shock.
- Currently, all electrode pads are single victim use only.
- Do not remove electrodes after a victim shows signs of recovery.
  Keep them in place to allow prompt action should the victim's condition deteriorate.

AED ALGORITHM



Group activity 5.1:
Applying and operating an AED

In groups of three, practise performing two-person CPR with the third person arriving and operating the AED. Rotate the roles until each person in the group has performed the role of AED operator.

Make sure that you:

- introduce yourself to the CPR operators
- inform them that you have an AED and they should continue CPR while you set it up
- prepare the victim's chest
- simulate remove clothing
- simulate shaving hair
- simulate removal of metal jewellery
- simulate removal of medication patches
- apply pads to the victim in correct positions using a rolling motion while CPR is ongoing
- follow the prompts of the AED
- ensure that all first responders and bystanders are clear of the victim
- deliver the shock as indicated by the training AED
- direct the team to continue CPR as required.

POST-DEFIBRILLATION VICTIM CARE

If the defibrillation has not been successful and when the standard protocol is exhausted:

- leave the pads on the victim
- continue CPR until relieved or unable to continue
- care for family and friends of the victim.

If the defibrillation has been successful:

- leave the pads on the victim
- check for breathing
- if they are breathing, check for a response
- if they are not responding, place them in the lateral position
- if they are responding, reassure and make them comfortable
- if they are not breathing or if they stop breathing, continue CPR.

After any resuscitation attempt:

- take part in a debrief
- be alert for signs and symptoms of critical incident stress, and know where to seek or refer assistance to manage it.

EQUIPMENT MAINTENANCE

POST-DEFIBRILLATION MAINTENANCE

After every use, the defibrillator should be disassembled, cleaned of sand and debris, reassembled and tested as per the manufacturer's instructions. Single-use items should be disposed of and replaced from stores in the first aid room (e.g., electrode pads, gloves, razors). All other equipment should be cleaned and disinfected before being replaced in the defibrillator kit.

ONGOING MAINTENANCE

A defibrillator needs ongoing maintenance. You should:

- check regularly (minimum weekly)
- check that the date of the electrode pads is current, and that they are still sealed
- check that the indicator light is flashing rhythmically
- check if the defibrillator 'chirps'. If so, press the information button (if the machine has one) and follow the prompts, for example:
  - battery is low—replace
  - pads are faulty – replace
- deal with other minor faults as per manufacturer's guidelines
- report and document major faults as per your club/service SOPs
- confirm that the defibrillator has passed the self-check.

Assessment task 1: Written questions

Complete Assessment Task 1—Topic 5 written questions in assessment portfolio.

Practice scenarios:

Throughout the course, you will individually have practised using oxygen equipment, oropharyngeal airways, suction and an AED. Resuscitating a victim using all the equipment available will provide the greatest chance of success.

Your trainer or facilitator will set you some scenarios to practise using the equipment individually and as a part of a team. Ensure that you debrief after each scenario to understand what was done well and what could be improved.

Assessment Information

There are five assessment tasks to be completed for the SLSA Advanced Resuscitation Techniques award. Below is a summary of the assessment tasks required to demonstrate competence in this course.

This section is for information only. All evidence should be collected in your SLSA Advanced Resuscitation Techniques Assessment Portfolio, which contains further information on the five assessment tasks.

Task 1: Theory questions

Task 2: Practical scenario—CPR on an infant

Task 3: Practical scenario—airway management and oxygen use on an adult

Task 4: Practical scenario—full resuscitation on an adult

Task 5: Practical scenario—management of life-threatening bleeding

Appendices

APPENDIX 1—STATE AND TERRITORY LEGISLATION

This summary is provided as a guide only. It must not be taken or used as a prescriptive account of the relevant legislation in each of the states/territories. You should always seek the advice of the relevant government departments in each state/territory.

WORK HEALTH AND SAFETY

- **Commonwealth (national)**
  - Work Health & Safety Act 2011 (Cth)
  - Work Health & Safety Regulations 2011 (Cth)
- **Australian Capital Territory**
  - Work Health & Safety Act 2011
  - Work Health & Safety Regulation 2011
- **New South Wales**
  - Work Health & Safety Act 2011
  - Work Health & Safety Regulation 2017
- **Northern Territory**
  - Work Health & Safety (National Uniform Legislation) Act 2011
  - Work Health & Safety (National Uniform Legislation) Regulation 2011
- **Queensland**
  - Work Health & Safety Act 2011
  - Work Health & Safety Regulations 2011
- **South Australia**
  - Work Health and Safety Act 2012
  - Work Health and Safety Regulations 2012
- **Tasmania**
  - Work Health and Safety Act 2012
  - Work Health and Safety Regulations 2012
- **Victoria**
  - Occupational Health and Safety Act 2004
  - Occupational Health and Safety Regulations 2017
- **Western Australia**
  - Work Health and Safety Act 2020
  - Occupational Safety and Health Regulations 1996

CIVIL LIABILITY

- **Australian Capital Territory**
  - Civil Wrongs Act 2002
- **New South Wales**
  - Civil Liability Act 2002 No22
  - Civil Liability Regulations 2014
- **Northern Territory**
  - Personal Injuries (Liabilities and Damages) Act
- **Queensland**
  - Law Reform Act 1995 (Medical practitioners and nurses)
  - Civil Liability Act 2003
- **South Australia**
  - Civil Liabilities Act 1936
- **Tasmania**
  - Civil Liability Act 2002
- **Victoria**
  - Wrongs Act 1958
- **Western Australia**
  - Civil Liability Act 2002

ASSISTING WITH MEDICATION

- **Australian Capital Territory**
  - Medicines, Poisons and Therapeutic Goods Act 2008
- **New South Wales**
  - Poisons and Therapeutic Goods Act 1966
  - Poisons and Therapeutic Regulation 2008
- **Northern Territory**
  - Medicines, Poisons and Therapeutic Goods Act
  - Medicines, Poisons and Therapeutic Goods Regulations
- **Queensland**
  - Health (Drugs and Poisons). Regulation 1996
- **South Australia**
  - Controlled Substances Act 1984
  - Controlled Substances (Poisons) Regulation 2011
- **Tasmania**
  - Poisons Act 1971
  - Poisons Regulation 2018
- **Victoria**
  - Drugs, Poisons and Controlled Substances Act 1981
  - Drugs, Poisons and Controlled Substances. Regulations 2017
- **Western Australia**
  - Medicines and Poisons Act 2014

Appendix 2—Glasgow coma scale

The Glasgow coma scale (GCS) is the most widely used scoring system used in quantifying level of consciousness following traumatic brain injury. It is used primarily because it is simple, has a relatively high degree of interobserver reliability and because it correlates well with outcome following severe brain injury.

It is easy to use, particularly if a form is used with a table similar to the one below. One determines the best eye opening response, the best verbal response and the best motor response. The score represents the sum of the numeric scores of each of the categories.

Other factors that alter the victim's level of consciousness interfere with the scale's ability to accurately reflect the severity of a traumatic brain injury. So, shock, hypoxemia, drug use, alcohol intoxication and metabolic disturbances may alter the GCS independently of the brain injury. Obviously, a patient with a spinal cord injury will make the motor scale invalid, and severe orbital trauma may make eye opening impossible to assess. The GCS also has limited utility in children, particularly those less than 36 months. Despite these limitations, it is quite useful and is far and away the most widely used scoring system used today to assess victims with traumatic brain injury.

INFANT	SCORE	CHILD/ADULT	SCORE
Eye opening			
Spontaneously	4	Spontaneously	4
Reacts to speech	3	Reacts to speech	3
Reacts to pain	2	Reacts to pain	2
No response	1	No response	1
Verbal response			
Babbles, follows objects	5	Oriented	5
Irritable, cries	4	Confused	4
Cries to pain	3	Inappropriate words	3
Moans and grunts	2	Incomprehensible	2
No response	1	No response	1
Motor response			
Spontaneous	6	Obeys commands	6
Localises pain	5	Localises pain	5
Withdraws from pain	4	Withdraws from pain	4
Flexion response	3	Flexion response	3
Extension response	2	Extension response	2
No response	1	No response	1
Total infant		**Total child/adult**	

Appendix 3—Respiratory status assessment

COMPONENTS	NORMAL	RESPIRATORY DISTRESS
Conscious state	Alert	Altered (V, P or U on the AVPU scale)
General appearance	Calm and quiet	Distressed, anxious, struggling to breathe, exhausted
Speech	Clear, steady and fluent	Difficult, short sentences or phrases, unable to speak
Ventilatory rate	10–20	Greater than 20 or less than 10
Ventilatory rhythm	Regular, even cycles	No respiratory pause, prolonged expiratory phase
Ventilatory effort	Minimal with little chest/ abdominal movement	Marked chest movement, in-drawing of muscles between ribs, use of neck muscles to breathe
Skin	Normal colour	Pale, sweaty Cyanosis (blue colour in the lips or fingernails) is a late and serious sign
Pulse rate	60–100	Elevated heart rate or slow heart rate is a late and serious sign
Breath sounds	Usually quiet	Noisy cough, stridor, expiratory and/or inspiratory wheeze Advanced stages may have inspiratory wheeze There may be no breath sounds at all if severe
Oxygen saturation (if available)	Greater than 94 per cent	Mild: 92–94 per cent Moderate: 88–92 per cent Severe: less than 88 per cent

This table represents a progression from normal to severe respiratory status.
These criteria need to be taken in context with:

- the victim's presenting problem
- the victim's prescribed medication
- repeated observations and the trends shown
- response to management.

Appendix 4—Perfusion status assessment

Perfusion is the ability of the cardiovascular system to provide tissues with an adequate blood supply to meet their functional demands at that time and to effectively remove the associated metabolic wastes.

First aid observations for perfusion include:

- skin—colour, temperature, moisture
- pulse—rate, radial pulse
- blood pressure
- conscious state.

PERFUSION—CRITERIA (ADULT)		
Indicators	**Poor perfusion—two or more of the below**	**Good perfusion**
Radial pulse	Not palpable	Palpable
Pulse rate	<60 or >110	60–110
Blood pressure	<100 mm/Hg	>100 mm/Hg
Skin	Pale, cold, clammy	Normal colour, warm, dry
Level of consciousness	Altered (V, P or U on the AVPU Scale)	Alert
Oxygen saturation (if available)	Greater than 94 per cent	Mild: 92–94 per cent Moderate: 88–92 per cent Severe: less than 88 per cent

These criteria need to be taken in context with:

- the victim's presenting problem
- the victim's prescribed medication
- repeated observations and the trends shown
- response to management.
- Other factors may affect the interpretation of the observations made. For example:
- the environment, both cold and warm ambient temperature may affect skin signs
- anxiety may affect pulse rate
- the many causes of altered consciousness or unconsciousness (i.e., other than poor cerebral perfusion—respiratory hypoxia, head injuries, hypoglycaemia, drug overdose etc.).

Appendix 5—Emergency management services

If an ambulance has been called, the first responder should remain with the victim until they can perform a handover to the paramedics. You should be aware of the standard ambulance response times to your club/service.

Key requirements to understand when liaising with emergency agencies include:

- their capability and capacity
- their response time for arrival at site
- their on-site resources to support response
- clear communication of worksite emergency response plans to emergency agencies
- how you can help them optimise the effectiveness of their services when responding to emergencies.

Contact any of the following emergency services or allied services in any emergency.

INITIAL RESPONSE	RECOVERY
Fire and rescue service Contact for any situation involving fire, flammable or chemical/hazardous materials, accidents and entrapments.	State and local government agencies Area health services Church and welfare agencies, e.g., St Vincent De Paul, Salvation Army, Samaritans Red Cross Service clubs St John Ambulance service Lifeline
Police Contact for any situation. In metropolitan areas, this includes the police rescue squad, which is responsible for vehicle and/or cliff/height rescues. Police are generally in charge of any situation to which they are called, except when fire, flammable or chemical/hazardous materials are involved (in which case the fire service is in command).	
Ambulance Contact for any situation involving injury or illness.	
State emergency services (SES) These are salaried and volunteer personnel—natural disasters and emergencies (where police are involved, the SES are under the direction of the police). In some rural areas, the SES is responsible for vehicle and/or cliff/height rescues.	
Utility authorities (power, gas, water) Contact for any situation where there is danger related to the service they provide, such as disconnection/removal of electrical danger.	
Local government authority Contact for issues related to roads, municipal utilities and lifesaving services at certain beaches and council swimming pools.	
Surf Life Saving Australia These are volunteer lifesaving patrol services on Australian beaches	
Coastal/sea rescue These are different organisations across different locations in Australia, generally all volunteers. They oversee the monitoring of coastal ocean and large inland waterways/radio channels as well as rescue services.	

Appendix 6—Digital thermometers

To use a digital thermometer, first press the button to turn it on.

There are several types of digital thermometers.

- **To use an oral digital thermometer:**
  - place under the tongue
  - wait until the digital thermometer beeps.

Remember not to take an oral temperature right after eating or drinking something because it will alter the results.

- **To use an axillary digital thermometer:**
  - place under the armpit with the tip in the deepest crease
  - fold the arm down over the thermometer
  - wait until the digital thermometer beeps.

Axillary method

- **To use a tympanic digital thermometer:**
  - pull top of earlobe up and back
  - place tip (covered with probe cover) in ear canal opening
  - press button until it beeps
  - repeat in other ear
  - be sure you are pointing the probe into the ear canal opening and not at the wall of the ear, as this can result in incorrect results.

Keep in mind that earwax or a small, curved ear canal can also interfere with the accuracy of results.

Tympanic method

- **To use a temporal digital thermometer:**
  - press button down and sweep probe across forehead.

These thermometers use an infrared scanner to measure the temperature of the temporal artery in the forehead.

Temporal method

Cleaning Clean a digital thermometer by following the manufacturer's instructions.

SURF LIFE SAVING

INCIDENT REPORT LOG

Name of Club or Service: _____

State: _____ Local Government Area: _____

Details of Incident

Date: ____/____/____ **Time:** _____am / pm

Location of Incident: _____

Name of Victim: _____

Age: _____ **DOB:** ____/____/____ **M / F :** _____

Address: _____ **Postcode:** _____

Venue conditions at time of Incident: (if relevant)

Wind conditions:	☐ Calm	☐ Slight	☐ Moderate
Weather conditions:	☐ Fine	☐ Overcast	☐ Rain
Sea conditions:	☐ Small	☐ Medium	☐ Large
Water surface:	☐ No chop	☐ Avge chop	☐ Large chop
Wave type:	☐ Surging	☐ Spilling	☐ Plunging
Rip type:	☐ Permanent	☐ Fixed	☐ Flash ☐ Travelling

Please fill in the below relating to the victim:

Type of incident: (may cross more than one)
- ☐ Major First Aid ☐ Minor F.A.
- ☐ Major Rescue ☐ Search and Res
- ☐ Member Injury ☐ Employee Injury
- ☐ Minor Sting ☐ Major Sting
- ☐ Drowning ☐ Complaint
- ☐ Other _____

Victim is:
- ☐ Public ☐ SLS Club Member
- ☐ Employee ☐ Other _____

Nationality (victim)
- ☐ Australian
- ☐ Other _____
- ☐ Tourist ☐ Immigrant ☐ Unknown

Type of activity at time of incident:
- ☐ Swimming / wading ☐ Body board
- ☐ Walking playing near water
- ☐ Riding other craft
- ☐ Rock Fishing ☐ Other fishing
- ☐ Using a motorised water craft (Rec)
- ☐ Water skiing
- ☐ SCUBA / skin diving
- ☐ Wind / kite surfing ☐ Sailing
- ☐ Rock walking
- ☐ Suspected suicide
- ☐ Patrolling in - ☐ IRB ☐ PWC
- ☐ Beach ☐ 4WD ☐ IRB/ORB
- ☐ Attempting a rescue
- ☐ Training for (please be very specific)

_____
- ☐ Carnival Official doing _____
- ☐ Competition in _____
- ☐ Driver ☐ Crew ☐ Patient
- ☐ Surf Boat Crew Position: _____
- ☐ Administrative ☐ Fundraising
- ☐ Water safety
- ☐ Junior activities
- ☐ Other club activity _____
- ☐ Other _____

Experience in activity
- ☐ 3 years or greater ☐ 1-3 Years
- ☐ 1 year or less ☐ No experience
- ☐ Unknown

Other contributing factors:
- ☐ Negotiating the break
- ☐ Returning to shore
- ☐ Dumped ☐ Shore break
- ☐ Lost control of own craft
- ☐ Other person lost control of craft
- ☐ Freak wave ☐ Sand bank
- ☐ Pot hole ☐ Slippery rocks
- ☐ Suspected Alcohol ☐ Suspect Drugs
- ☐ Rip type _____ ☐ Shark/ Croc
- ☐ Slip/ trip/ fall ☐ Assault
- ☐ Collision with _____
- ☐ Mechanical Malfunction _____
- ☐ Other _____

Description of incident and cause:

_____

_____

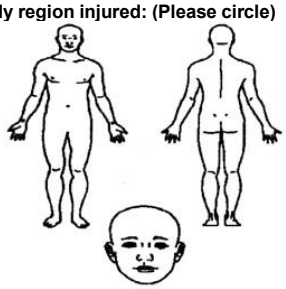
_____

_____

_____

Nature of injury
- ☐ Marine Sting, type _____
- ☐ Abrasion / graze ☐ Blisters
- ☐ Open wound / laceration / cut
- ☐ Bruise / contusion
- ☐ Inflammation / swelling
- ☐ Fracture (including suspected)
- ☐ Dislocation / subluxation
- ☐ Sprain ☐ Strain
- ☐ Overuse injury ☐ Concussion
- ☐ Cardiac problem
- ☐ Respiratory problem
- ☐ Asthma
- ☐ Loss of consciousness
- ☐ Heat stroke / Heat exhaustion
- ☐ Hypothermia ☐ Sunburn
- ☐ Suspected spinal
- ☐ Other _____

Body region injured: (Please circle)



Description _____

Initial treatment:
- ☐ None given – not required
- ☐ None given – patient refused
- ☐ None given – referred elsewhere
- ☐ RICE ☐ ICE
- ☐ Cleaned
- ☐ Dressed (incl. Bandage)
- ☐ Sling / Splint
- ☐ Spinal collar
- ☐ Massage / Stretching
- ☐ Strapping/Taping only
- ☐ Stitches
- ☐ Medication
- ☐ Prescription written

CPR/ Defib / Oxygen
(Please fill in other side of form)
- ☐ CPR
- ☐ Oxygen therapy
- ☐ Oxygen airbag
- ☐ Defibrillation (Defib)
- ☐ Other _____

Location of incident:
- ☐ In water ☐ On Beach
- ☐ On rocks/cliff ☐ Other _____

and…
- ☐ In flags
- ☐ Outside but near flags (within 50m)
- ☐ <1km from patrolled area
- ☐ 1 to 5 km from patrolled area
- ☐ > 5 km from patrolled area

Who first sighted the rescue/ incident?
e.g. public _____

Who conducted the rescue/ incident?
e.g. lifesaver _____

Main language spoken:
_____ **Or** ☐ English
☐ Non English speaking ☐ Don't know

Referral:
- ☐ No referral
- ☐ Medical Practitioner
- ☐ Physiotherapist
- ☐ Ambulance transport to _____
- ☐ Hospital ☐ Xray
- ☐ Peer Counselling
- ☐ Professional Counselling

Other services:
- ☐ Fire/ Rescue ☐ Police
- ☐ JRB/ ORB ☐ Helicopter
- ☐ Investigation required
- ☐ Worker Compensation required (fill in State form requirements)
- ☐ Other _____

Treating person:
- ☐ Medical Practitioner ☐ Nurse
- ☐ Ambulance ☐ Physiotherapist
- ☐ Chiropractor ☐ First Aid Officer
- ☐ Lifesaving ☐ Lifeguard
- ☐ Other _____

What condition was the patient in when transport?
- ☐ Conscious
- ☐ Unconscious
- ☐ Deceased
- ☐ Unknown

Person completing form:

Name: _____

Position: _____

Phone: _____

Email: _____

Signature:

SURF LIFE SAVING

INCIDENT REPORT LOG

PART B: CPR / OXYGEN REPORT FORM

1. Patient's condition when first observed:

- ☐ Conscious
- ☐ Unconscious
- ☐ Breathing
- ☐ Not Breathing
- ☐ No Signs of Life

2. Colour of patient when first observed:

- ☐ Normal ☐ Pale
- ☐ Blue ☐ Grey
- ☐ Unknown

3. Patient's colour changed during resuscitation:

- ☐ Normal ☐ Pale
- ☐ Blue ☐ Grey
- ☐ Unknown

4. Airway of the patient was obstructed when first observed by:

- ☐ Vomit
- ☐ Seaweed
- ☐ Dentures
- ☐ Clenched jaw
- ☐ Airway was clear
- ☐ Unknown

5. How long was it, from when the incident was first reported to the time of the first artificial breaths?

- ☐ 0-1 min ☐ 1-3 min
- ☐ 3-5 min ☐ 5-10 min
- ☐ 10-20 min ☐ Other

6. How long was CPR carried out?

- ☐ 0-1 min ☐ 1-3 min
- ☐ 3-5 min ☐ 5-10 min
- ☐ 10-20 min ☐ Other

7. Which method was used for Rescue Breaths?

- ☐ Mouth to Mask
- ☐ Mouth to Mouth
- ☐ Mouth to Nose
- ☐ Bag valve mask
- ☐ Combination

8. What oxygen equipment was used?

- ☐ Oxygen Therapy
- ☐ Air Bag Resuscitator

9. How long was oxygen administered for?

- ☐ 0-1 min ☐ 1-3 min
- ☐ 3-5 min ☐ 5-10 min
- ☐ 10-20 min ☐ Other

10. Was a pulse oximeter used?

- ☐ Yes ☐ No

If yes reading: _____ %

11. The patient regurgitated / vomited due to:

- ☐ Mechanical Device
- ☐ Blocked Airway
- ☐ Revival

12. An airway was inserted: (type)

- ☐ OP Airway
- ☐ Combitube
- ☐ LMA Mask
- ☐ Other
- ☐ Not used

13. How long was it, from when the incident was first reported to the time an airway was inserted?

- ☐ 0-1 min ☐ 1-3 min
- ☐ 3-5 min ☐ 5-10 min
- ☐ 10-20 min ☐ Other

14. A defibrillator was used by:

- ☐ Lifesaver
- ☐ Lifeguard
- ☐ Ambulance
- ☐ Doctor
- ☐ Not used

15. How long was it, from the incident was first reported to the time the defibrillator was applied?

- ☐ 0-1 min ☐ 1-3 min
- ☐ 3-5 min ☐ 5-10 min
- ☐ 10-20 min ☐ Other

16. How many times was a shock delivered?

- ☐ 1 ☐ 2
- ☐ 3 ☐ 4
- ☐ 5 ☐ Other

17. Did the patient regain consciousness?

- ☐ Yes
- ☐ No

18. How long was it, after calling for assistance, before the ambulance arrived?

- ☐ 0-1 min ☐ 1-3 min
- ☐ 3-5 min ☐ 5-10min
- ☐ 10-20 min ☐ Other

19. The patient was conveyed to hospital by:

- ☐ Ambulance
- ☐ Helicopter
- ☐ Private vehicle
- ☐ Other

20. Which hospital was the patient conveyed to?

_____

21. What condition was the patient in when transported?

- ☐ Conscious
- ☐ Unconscious
- ☐ Deceased
- ☐ Unknown

22. Condition on discharge from hospital (if known):

- ☐ Full recovery
- ☐ Deceased
- ☐ Unknown

23. Was trauma counselling arranged for the rescuer/s?

- ☐ Yes
- ☐ No

24. Was a carry used?

- ☐ Yes
- ☐ No

If yes, what kind? _____

Name of person completing form: (If different from other side of form)

_____

Position: _____

Phone: _____

e-mail: _____

Signature: _____

Please provide brief details of the incident including any recommendations:

Appendix 8—Hazards, Risks and Control Measures

HAZARDS

AS/NZS 4801:2001 defines a hazard as being:

'a source or situation with a potential for harm in terms of human injury or ill health, damage to property, damage to the environment or a combination of these.'

To identify hazards:

- ensure that there is no immediate danger before approaching a site—look up, down, around and behind you. Get information on the sequence of events that led up to the incident,
- conduct a walk-through survey of the site. Keep alert to changes, especially in areas you have already checked,
- review what you have seen. You want to make the emergency site as safe as possible for the rescuers, the victims and the bystanders.

Hazards may be:

- obvious e.g., broken glass near the victim,
- hidden e.g., syringe and needle lying underneath the victim,
- developing e.g., leaking gas or fuel or an unstable structure.

It is essential to maintain awareness of your surroundings and what is happening over time.

Some common hazards include:

- manual handling,
- hazardous substances,
- body fluids,
- vehicle traffic,
- slippery surfaces,
- sharp edges,
- falling objects,
- unstable structures,
- rising or fast flowing water, submersion in water,
- people – aggressive, armed with a weapon, uncontrollable, extreme anxiety/stress.

Contaminated waste disposal

First aid supplies and tools or other items that have come in contact with bodily fluids such as vomit or blood should be disposed of in clinical waste bags.

RISKS

AS/NZS 4801:2001 defines risk as being:

'(in relation to any potential injury or harm) The likelihood and consequence of that injury or harm occurring.'

To assess risks, consider the following questions.

- in your mind, what likelihood is there that any particular hazards will actually cause harm?
- what sort of injury/harm could occur?
- how serious an injury could it be?
- have any identified hazards already caused harm or injury?
- what severity are these injuries (if they exist)?
- how much, how often and how long have people been exposed to these hazards?
- what is the likely risk of further injury?

EXAMPLE RISK ASSESSMENT MATRIX

		CONSEQUENCES				
Likelihood		**Insignificant 1**	**Minor 2**	**Medium 3**	**High 4**	**Extreme 5**
Almost certain	A	Moderate	High	High	Extreme	Extreme
Likely	B	Low	Moderate	High	Extreme	Extreme
Possible	C	Low	Moderate	High	High	Extreme
Unlikely	D	Low	Low	Moderate	High	High
Rare	D	Low	Low	Low	Moderate	Moderate

RISK MANAGEMENT

Risk management is defined as a process by which hazards are identified; the risks are assessed, controlled or minimised; then the possibility of injury or illness is removed or minimised through effective control measures.

As part of the underpinning philosophy of risk assessment and management, three principles apply:

1. **Accept no unnecessary risk:** Clearly identify what is acceptable and what is not acceptable, given the context and desired outcome. If the consequences of the risk are considered unacceptable, measures must be taken to avoid exposure.
2. **Make risk decisions at the appropriate level:** Clearly identify who and what is the appropriate level to accept the risk associated with the activity and who should be aware of the risks involved.
3. **Accept risk only if the benefit outweighs the loss:** Clearly identify and understand the potential costs of loss and the potential benefits of conducting the activity so that an evaluation can be made.

RISK MANAGEMENT PROCESS

The following guidelines are based on the Australian standard for risk management and will help you identify and treat risks.

Communicate and consult: This should occur at every stage of risk management. You should consult your team and locals about their perceptions of hazard and risks and strategies to adopt in mitigating them.

Establish the context: Define the scope for the risk management process within the context of your organisation's objectives and set the criteria against which the risks will be assessed.

Identify: Identify all hazards, their associated risks and what mitigation strategies are currently in place.

Analyse risks: Think about all possible consequences and the likelihood that they will occur. If you are unsure of what consequences or chances to consider, discuss this with your team and other people involved.

Evaluate risks: Prioritise the risks you have identified based on your analysis. The highest risks will be the most urgent to manage.

Treat risks: Treatment of risks involves the implementation of strategies to reduce the level of risk for identified hazards.

Monitor and review: Any risk mitigation strategies you have adopted should be continuously monitored to ensure they are working effectively. If they are found to be not working, you will need to adapt your control strategies.

CONTROL MEASURES

AS/NZS 4801:2001 defines control of hazards/risks as:

'(in Australia) The process of elimination or minimisation of risks.'

HIERARCHY OF CONTROL MEASURES

This is the order of priority given to actions when dealing with risks presented by hazards. Following are the actions and the priority from most to least effective.

The Australian/New Zealand Standard for Risk Management (AS/NZS ISO 31000:2009) provides information on the traditional hierarchy of hazard controls.

It is common practice to simultaneously apply more than one of the following levels of hazard control:

Elimination: The best way to eliminate the risk is to eliminate the hazard by its prevention of occurrence or remove it from the workplace/situation. Elimination may not always be immediately practicable, therefore other controls must be considered until elimination can be achieved.

Substitution: It may be possible to replace the activity, process or substance with a less hazardous one once the hazard has been identified.

Engineering controls: All engineering controls aim to separate people from the hazard in some way. There are four sub-groupings of engineering controls:

1. **Isolating** the hazard from people—with mechanical aids, barriers, machine guarding, ventilation or insulation,
2. **Enclosing** the hazard or providing an enclosed work environment for people,
3. **Containing** the hazard to prevent it spreading or coming in contact with people,
4. **Limiting** the spread or extent of the hazard.

Administrative controls: Are the people and process management strategies used to support other hazard controls. Administrative controls include establishing appropriate policies, procedures and work practices. These should be supported by training and effective supervision to reduce an employee's exposure to risk, and separating people from potential sources of harm through procedural controls.

Personal protective equipment (PPE): Is regarded as the least desirable and least effective means of control; however, it is commonly the first line of defence for the wearer. Employers and organisations have a statutory duty to provide suitable and properly maintained PPE to cover and protect an employee (employees include volunteer members of an organisation). This duty includes the training of personnel in the correct selection, use, cleaning, maintenance and disposal of their PPE.

Behaviour: The decisions and actions of people have been recognised as a significant influence on the creation and maintenance of a safe working environment. All the fancy systems, procedures, equipment and so on are only a part of the safe work environment—a person who decides to take a short cut, or chooses not to follow a safety rule, can undo the hard work of many and put people or equipment at risk of harm.