



PUBLIC SAFETY & AQUATIC RESCUE TRAINING MANUAL

35th EDITION





Module 6: Resuscitation

Table of Contents

Safety first	2
Prevention of cross-infection during CPR	2
Prevention of cross-infection during CPR training	3
Anatomy considerations that can affect CPR	4
The nervous system	4
The circulatory system	5
The respiratory system	6
Best practice guidelines	7
Chain of survival	7
The Australian Resuscitation Council	8
Primary victim assessment—DRSABCD	9
Danger	10
Response	10
Airway	12
Breathing	19
Cardiopulmonary resuscitation	20
Compressions	21
Rescue breathing	22
Team CPR	24
CPR for children and infants	25
CPR for a pregnant victim	26
CPR overview	26
Complications during CPR	27
Defibrillation	28
Recovery	33
Management of the victim after CPR	33
Documentation	34
Victim handover	34

Safety first

As a lifesaver, you are trained to provide resuscitation and first aid, and you must take all the appropriate precautions against communicable and infectious diseases. This is to prevent the spread of hazardous microorganisms between lifesavers and victims as well as between other SLS members.

Many communicable and infectious diseases are preventable through immunisation and can be managed by taking both universal and transmission-based precautions. Examples of precautions include:

- the use of personal protective equipment (PPE) such as single-use resuscitation masks, eyewear, clothing and gloves
- washing your hands with warm soapy water or hand sanitiser after contact with a victim or body fluids
- safe use of sharps containers to dispose of used needles and syringes
- cough etiquette—cover mouth and nose when coughing or sneezing
- management of waste contaminated with body fluid
- immunisation against infectious diseases, e.g., hepatitis and tetanus.

Prevention of cross-infection during CPR

Several disorders are known to have been communicated during mouth-to-mouth resuscitation, as the mouth, saliva, exhaled air and blood are common sources of transmissible viruses and bacteria.

Rules for low-risk CPR

- Using mouth-to-mask resuscitation is recommended.
- Always wear gloves.
- Always wash your hands after resuscitation.
- Avoid contact with the victim's blood or body fluids, if possible.

Blood or other body fluids from the victim may contaminate your clothing or other first aid equipment used during cardiopulmonary resuscitation (CPR.) Items that are soiled or single-use should be placed in a leak proof, heavy-duty plastic bag and disposed of as per your local standard operating procedures (SOPs).

If any body fluid from the victim splashes into your eye, gently rinse your exposed eye with water and seek medical advice. If blood or body fluid splashes into your mouth during CPR, thoroughly rinse your mouth out with water and also seek medical advice.

Needlesticks

You may encounter hazardous sharps ('needlesticks') when presented with an unconscious victim. Be sure to wear gloves when handling them with care and dispose of them safely using a sharps container as per your local SOPs. All needlestick injuries carry a risk of infection. To treat a needlestick injury you wash the broken skin area with warm soapy water and advise the victim to go to the hospital or visit a medical professional. You may also recommend mental health support services. Remember to complete an incident report form. You can find out more about Incident Reporting on the [SurfGuard User Guide](#).

Prevention of cross-infection during CPR training

Your trainer should brief you on the problems of cross-infection before you commence any manikin training.

Although the risk of disease transmission during CPR training is extremely low, care should always be taken. SLSA recommends following the [ARC Guideline 10.3 - Cross Infection Risks and Manikin Disinfection](#) to minimise the risks of infection during CPR training.

Rules for low-risk CPR training

- During training
 - Keep clean, contaminated and sterile items separate.
 - Use your own manikin mask and bag.
 - Recognise when you have not followed standard infection control procedures.
 - Wash your hands with warm soapy water before, during and after training sessions.

- After training
 - Disassemble the manikin as recommended by the manufacturer.
 - Wash and scrub all accessible parts of the manikin with warm water and detergent. This includes face pieces.
 - Rinse the washed parts with fresh running water.
 - Soak the accessible manikin parts and oxygen masks in a disinfecting agent such as 10 per cent bleach or 70 per cent alcoholic chlorhexidine for at least 2 minutes. Rinse again to ensure that all bleach/disinfectant solution has been removed.
 - Inspect the training equipment for cracks and tears to make thorough cleaning possible.
 - Replace any cracked or torn parts.

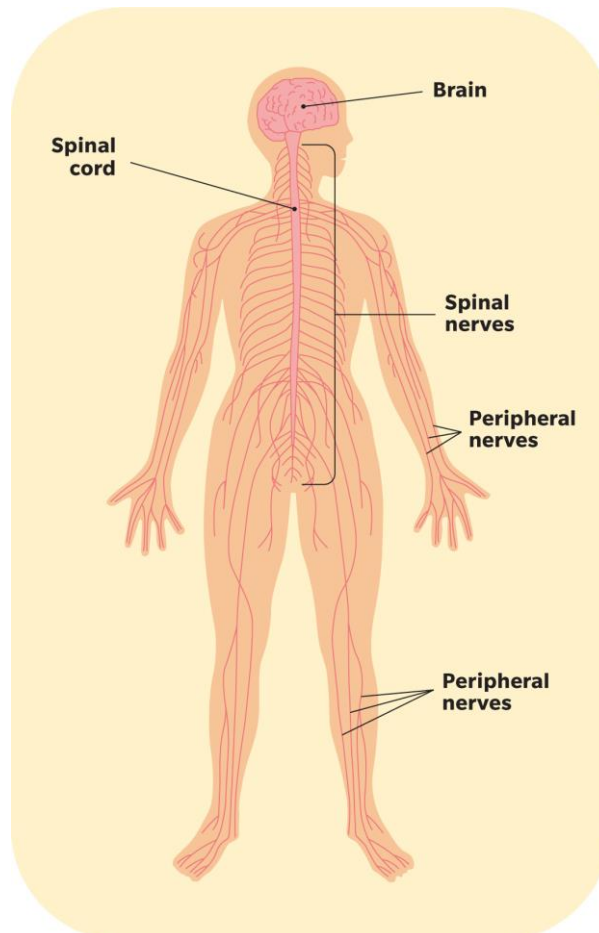
Anyone who is a carrier of any infectious disease, such as hepatitis or HIV, should seek advice before commencing resuscitation training.

Other important safety considerations related to CPR, such as manual handling, are referenced throughout this module.

Anatomy considerations that can affect CPR

Every lifesaver needs a basic understanding of the systems of the human body, to support common lifesaving practices such as resuscitation. These systems are the nervous system, circulatory system and respiratory system.

The nervous system



The brain, through the spinal cord and the nerves, controls every part of the body. In particular, the brain sends messages that control the heartbeat, the movement of the muscles of breathing and all other body functions. Brain cells require a continuous supply of oxygen in order to function, and they are irreversibly damaged if starved of oxygen for more than a few minutes.

Central nervous system

The brain and spinal cord comprise the central nervous system. Messages from the brain are relayed throughout the body via the spinal cord and a complex network of nerve pathways that extends throughout the entire body.

Peripheral nervous system

The peripheral nervous system comprises all the nerves, ganglia (clusters of nerve cell bodies) and sensory receptors outside the central nervous system. It relays impulses from the central nervous system to voluntary muscles (skeletal muscle), and to the autonomic nervous system. This provides the nerve supply to those parts of the body that are not controlled consciously, including the cardiac (heart) muscle and the smooth muscle around blood vessels and the glands of the body.

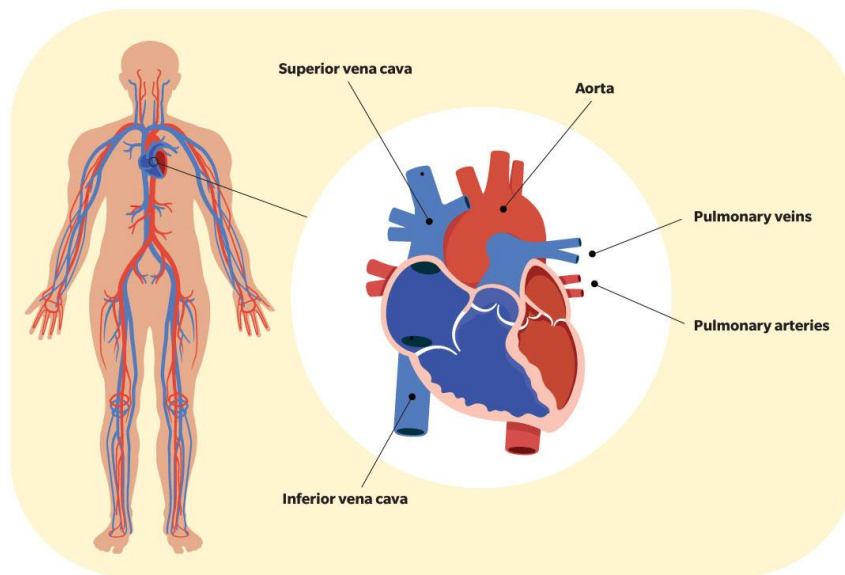
The peripheral nervous system also relays information back to the brain from the body including sensation, temperature and proprioception (the sense of where parts of the body are in relation to each other).

The breathing control centre

The involuntary urge to breathe is regulated by an area of the brain called the breathing control centre, which is located in the brain stem, close to where the brain joins the spinal cord. To function properly, this control centre must have a good supply of oxygen. Lack of oxygen to the control centre may cause breathing to stop.

Should the airway become blocked for any reason, brain cells will begin to suffer damage due to lack of oxygen. This can rapidly lead to the death of the victim if the airway is not cleared.

The circulatory system



The circulatory system moves blood around the body. The main components of this system are:

- The heart—a muscular pump that has four chambers and is about the size of its owner’s clenched fist. There is a left and a right atrium, and a left and a right ventricle. The two atria pump blood into the two ventricles, which are larger and more powerful than the atria. The left ventricle is more powerful than the right ventricle, as it needs to pump blood all the way around the body.
- Circulation of blood—is caused by the mechanical action of the heart. The heart’s right side pumps blood to the lungs, where oxygen is absorbed into the blood and carbon dioxide is released. Blood, rich with oxygen, is returned from the lungs to the left side of the heart. It is then pumped out of the heart via the aorta. The aorta then divides into many smaller arteries to supply blood and oxygen to organs, muscles and all other tissues.

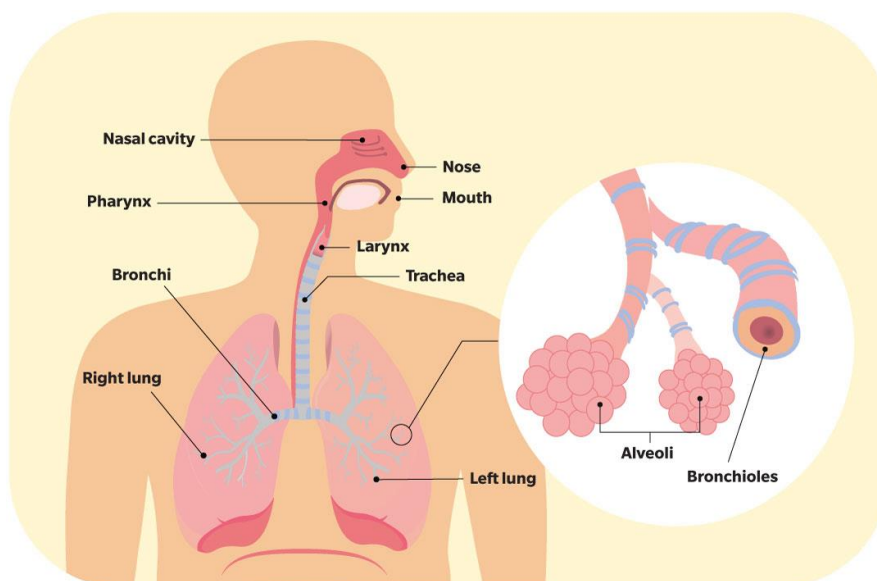
- Arteries—carry blood from the heart at high pressure, so their walls are strong, muscular and elastic. The blood in the arteries is a bright red colour, due to its oxygen content; if an artery is cut, blood spurts out at the rate of the heartbeat. Serious blood loss can occur quite rapidly from a cut artery, because of the high blood pressure. Arterial bleeding is serious and must be controlled as soon as possible.
- Veins—carry blood back to the right side of the heart from the organs and muscles of the body after oxygen has been used. The blood in veins is dark red and moves at low pressure, and it is kept flowing in one direction by one-way valves. Veins are thin-walled. Many are near the surface of the skin and are easily seen as blue lines on the feet, hands and forearms.
- Capillaries—the tiny vessels that link the ends of the smallest arteries with the smallest of the veins. Each artery divides into an enormous number of these tiny vessels, which form a network that is in close contact with the cells of the body. The capillaries allow oxygen and nutrients to reach every cell in the body, and carbon dioxide and other waste products to be removed.

First aid implications

With the exception of the fingernails, toenails and hair, injury to any part of the body will result in damage to blood vessels and, therefore, bleeding.

For all organs and parts of the body to receive adequate oxygen, they need lungs that are being ventilated to get oxygen into the blood, and a heart that is beating to pump the oxygenated blood around the body and supply all organs, especially the brain.

The 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

The lower airways include the trachea and lungs, which consist of 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 bronchi known as the left main bronchus and right main bronchus, which then divide into progressively smaller bronchioles and, finally, alveoli (air sacs), which are surrounded by capillaries.

The tubular 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 are located on either side of the chest (thorax) and fill most of the chest cavity, which is separated from the abdomen by a large sheet of muscle known as the diaphragm.

How do we breathe?

Breathing is the act of moving air into and out of the lungs.

Breathing in is called inhalation. It is an involuntary muscular action caused by contraction of the muscles to lift and expand the chest while the diaphragm is pulled down and flattened. This combined action increases the size of the chest cavity and draws air into the lungs.

Breathing out is called exhalation. Exhalation is caused when the muscles of the chest and the diaphragm relax. As the chest cavity becomes smaller, air is pushed out of the lungs.

The air we breathe in contains 21 per cent oxygen. Some oxygen in the air is absorbed by the lungs into the bloodstream and the air we breathe out contains 16 per cent oxygen.

Best practice guidelines

Chain of survival

Successful resuscitation and best practice to give better survival rates is based on the principle of the 'chain of survival'. This comprises:

Early recognition and call for help

Identify and access the victim. Contact emergency services as quickly as possible to prevent cardiac arrest.

Early CPR

Commence CPR as soon as possible to buy time.

Early defibrillation

Introduce a defibrillator as soon as possible to deliver a shock to return the heart to its normal rhythm if needed.

Post-resuscitation care

Promote early access to advanced post-resuscitation care to restore quality of life, e.g., hospital.



The Australian Resuscitation Council

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

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.

The [ARC Guideline 10.1—Basic Life Support \(BLS\) Training](#) states all those trained in CPR should refresh their CPR skills at least annually. All lifesavers should be familiar with ARC (and ANZCOR) guidelines and be able to access them readily. Further information about the ARC and their guidelines can be found at www.resus.org.au.



All procedures and scientific literature referred to in this module are derived from the ARC guidelines.

Primary victim assessment—DRSABCD

The DRSABCD primary assessment procedure is a quick way for you to identify if a victim has any life-threatening injuries or conditions and to deal with them in order of priority.

Note: The Australian guidelines for resuscitation have minor differences for children and infants. An infant is a person newly born to 12 months old, and a child is aged between 12 months and 8 years old. You should also take into account variations in body size.

Resuscitation Chart

D		<p>DANGER</p> <p>Check for and remove any dangers to yourself, bystanders and the victim.</p>
R		<p>RESPONSE</p> <p>Check for a response by talk and touch.</p>
S		<p>SEND </p> <p>If unresponsive, send for help by calling Triple Zero (000).</p>
A		<p>AIRWAY</p> <p>Open airway and ensure it is clear. If not, roll victim onto their side and clear the airway.</p>
B		<p>BREATHING</p> <p>Look, listen and feel for breathing. If victim not breathing or breathing is not normal, start CPR. If normal breathing returns, roll victim on to their side and monitor them.</p>
C		<p>CPR (30:2)</p> <p>Start CPR.</p> <p>Perform 30 chest compressions followed by 2 rescue breaths. Continue chest compressions if unwilling or unable to perform rescue breaths.</p> <p>Perform compressions at the centre of the victim's chest, at a rate of 100-120 per minute and to 1/3 the depth of the victim's chest.</p> <p>Ensure adequate backward head tilt when performing rescue breaths for adults and children. For infants, apply no head tilt and use 2 fingers to compress the infant's chest.</p>
D		<p>DEFIBRILLATION </p> <p>Attach an Automated External Defibrillator (AED) as soon as it is available and follow its prompts.</p>

Continue CPR until:

- Responsiveness or normal breathing returns.
- A health care professional arrives and takes over CPR.
- It is unsafe or impossible to continue (e.g., exhaustion).
- A health care professional advises to cease CPR.

To get involved or learn to save a life, visit sls.com.au

This information is no substitute for CPR and first aid training. Surf Life Saving recommends that everyone learn CPR and first aid. June 2019.

Table 1 – Resuscitation Chart

Danger

Pause and plan your approach towards a potential victim to make sure that there is no danger to yourself or bystanders, or further danger to the victim. Remove any danger to the victim or those threatened if safe to do so. This will involve checking the area around the site of the incident and putting on gloves to protect yourself against cross-infection.



Response

You should quickly assess the consciousness of a victim by talk and touch. You may follow the COWS acronym.

- C Can you hear me?
- O Open your eyes?
- W What's your name?
- S Squeeze my hands if you can hear me.

Note:

- The assessment of consciousness must be done quickly, so as not to delay CPR or first aid treatment if necessary.
- Infants respond more to touch—place one hand on an infant's forehead and use your other hand to gently squeeze their shoulder while talking loudly to them. The infant may respond by making a noise, moving or opening their eyes.



The conscious victim

Conscious victims should be reassured and made comfortable, treated with respect, carefully assessed and managed according to their signs and symptoms. Remain calm and supportive as you talk them through how you intend to help and care for them while respecting their dignity. Take into consideration if the victim is aged or infirm as you ask them simple questions and about how they feel to help reduce any anxiety. Continue to monitor their response. Encourage them to share the details of the incident or their illness if bystanders cannot.

Note:

- A victim, or their parent or guardian, may withdraw their consent for treatment at any time after you commence providing first aid or basic emergency care.
- Refer to the *SLSA General Code of Conduct* (in *SLSA Policy 6.05-Member Protection*) for guidance on how to treat both members and conscious victims with respect.

The unconscious victim

If there is no response to questions or touch, the victim is deemed unresponsive. The victim's airway and breathing now become the priority. A victim who shows only a minor response, such as groaning without eye opening, should be managed as if unconscious.

Send for help

Send for help through your patrol captain or SLS state communication centre using the 4 Ps, or by phoning triple zero (000). Request assistance and equipment from other patrol team members and/or bystanders. Also request that they report back to you to ensure emergency services have been called.

Prepare to stay with the victim until they have been handed over to another lifesaver or to the paramedics.



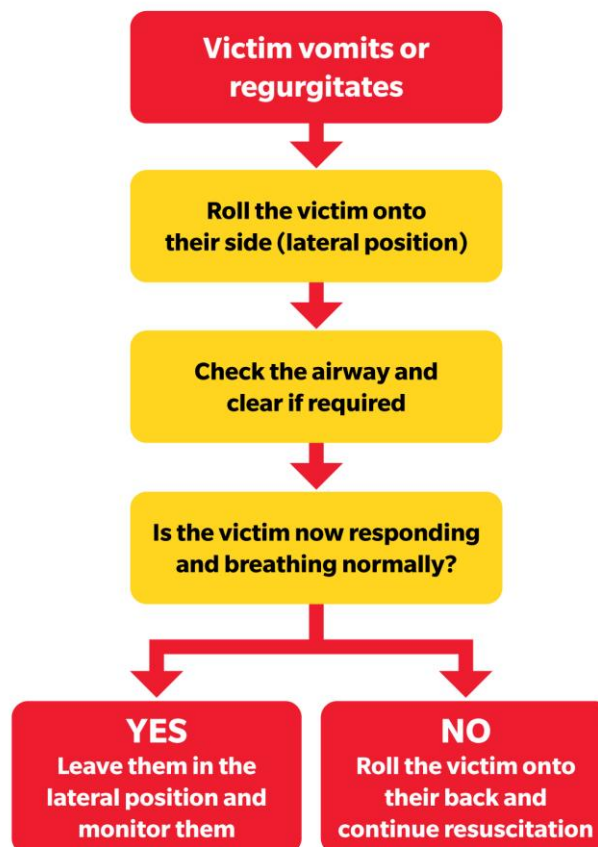
Airway

One of the keys to a successful resuscitation is a clear ('open') airway. This is achieved by applying backward head tilt and chin lift, and by clearing any visible foreign matter obstructing the unconscious victim's upper airway. Good observation of and access to the victim's airway must be achieved.

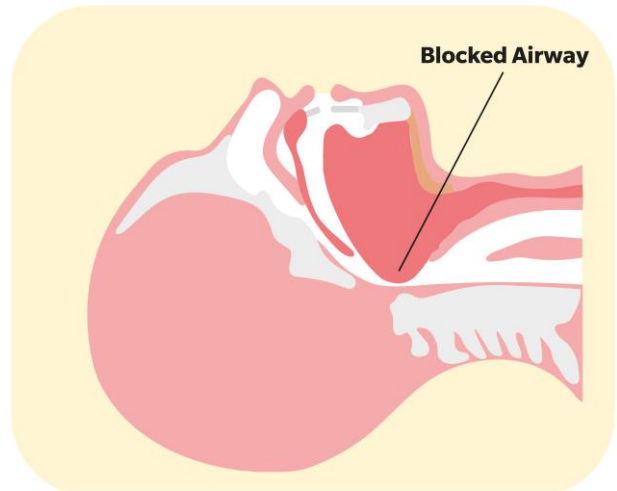
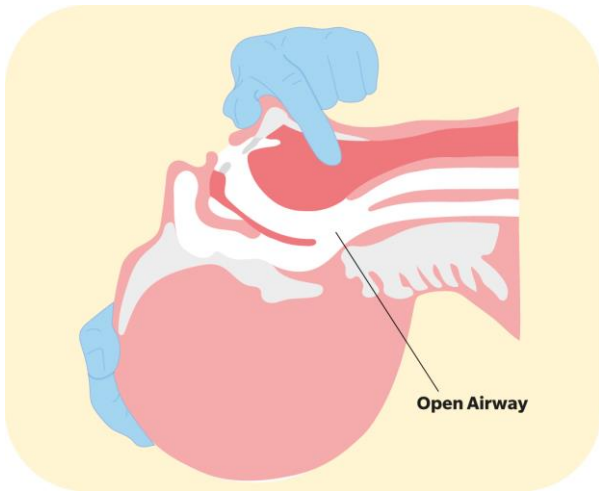
Care of the airway takes precedence over other injuries, including the possibility of spinal injury. The one exception to this guideline is the management of severe, life-threatening bleeding, which takes precedence over airway management. Once life-threatening bleeding has been managed, assess the airway. Refer to your first aid training on bleeding.

The victim should not be routinely rolled onto their side to assess for airway obstruction and breathing. Assessing the victim's airway while they are on their back takes less time, is easier and avoids unnecessary movement. Maintain an open airway by applying backward head tilt and chin lift.

Vomiting and regurgitation often occur after drowning due to large amounts of swallowed water. If matter such as sand, debris or vomit is found on initial assessment, or at any time during resuscitation, this needs to be removed from the upper airway to prevent obstruction. In this case, follow the flowchart below:

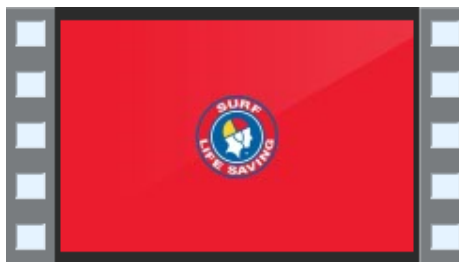


Repeated attempts to clear frothy or blood-stained fluid that continues to accumulate in the upper airway during resuscitation is likely to be unsuccessful. Lifesavers should continue with external chest compressions and rescue breaths to minimise unnecessary interruptions.



All body tissues, especially the brain, must be supplied with adequate oxygen. All persons who are unconscious require treatment using the principles of basic life support.

Rolling a face-down victim onto their back (supine position)



Rolling a face-down victim onto their back

Note: For the purpose of this description you will be on the victim's left-hand side, facing the surf. It is possible to perform the procedure on either side of the victim.

Follow the steps below to roll a face down victim onto their side.

1. Kneel closely beside the victim.
2. Place the victim's right arm along their side and ensure that the left arm is extended above their head.
3. Using the victim's hip and shoulder, roll the victim onto their back.

Rolling a victim onto their side (lateral or recovery position)

You should quickly roll a victim onto their side if they are vomiting or regurgitating or showing signs of recovery during CPR.

Note: In this description you are on the victim's right-hand side, facing the surf.

1. Kneel closely beside the victim.
2. Place the victim's left arm at right-angles to their body, pointing to the surf.
3. The victim's right arm may be across their chest or along their side.
4. Raise the victim's right leg at the knee, which is closest to you.
5. Use the victim's hip and shoulder to roll them onto their side, towards the surf.
6. Angle their right thigh to approximately 90 degrees to their torso to prevent them rolling onto their stomach.
7. Tilt the head backwards and slightly downwards while support of the jaw is maintained. This position allows drainage of fluids and mucus from the mouth. The victim's right arm can stay where it is or be placed under the victim's head for added support.

Note:

- If CPR is being carried out by a single operator, the victim should be rolled away from the operator to enable them to check and clear the airway and assess breathing.
- If CPR is being carried out within a team environment, the victim should be rolled towards the person doing compressions while the airway operator continues to manage the victim's airway.
- For larger victims, you may put one arm under the victim's raised knee to provide extra leverage instead of using the hip to roll the victim.
- A hip and shoulder roll should be carried out quickly in an attempt to minimise the inhalation of stomach contents into the lungs.



Assessing the airway

1. Look in the victim's mouth to see if there is any material in the mouth, while maintaining backward head tilt, chin lift and drainage.
2. If there is any obstruction, let go of the chin and use your gloved fingers to clear away any material such as vomit from the victim's mouth. False teeth (dentures) should not be removed unless they are loose and interfering with the victim's airway.



Opening an open airway

A clear airway is achieved by applying backward head tilt and chin lift. This ensures that the victim's mouth is open, the jaw is lifted forward, and the tongue and soft tissues are lifted away from the back of the throat.

Backward head tilt and chin lift is achieved by the jaw support ('pistol grip') or jaw thrust methods. It should be used whether the victim is lying on their back or their side. The victim's airway should be kept open where possible. While head tilt is important for effective rescue breaths, apply with caution if a neck/spinal injury is suspected.

Where a spinal injury is suspected, commence with neutral head position and progress as necessary towards backward head tilt in order to achieve an open airway.

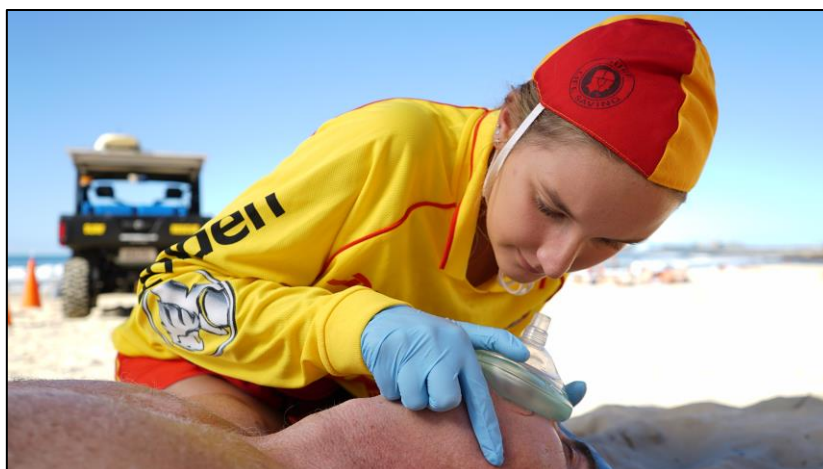


Backward head tilt

One hand is placed on the victim's forehead or the top of the head. The other hand provides chin lift. The victim's head is tilted backwards. It is important to avoid excessive force, especially where neck injury is suspected. You are encouraged to use this method in single person CPR scenarios.

Jaw support ('pistol grip')

Place the thumb over the chin below the lip and support the tip of the jaw with the knuckle of the middle finger. The hand is held in a 'pistol grip' fashion with the index finger lying along the jaw line. Care is required to prevent the ring finger from squashing the soft tissues of the neck. The jaw is held open slightly and lifted up from the chin.



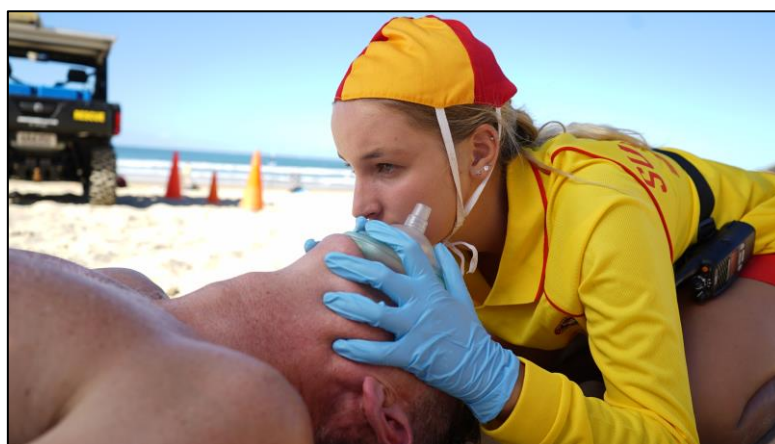
Jaw thrust

Jaw thrust is a very efficient method of achieving backward head tilt and chin lift. You are encouraged to use this method in two-person or team CPR scenarios.

In the jaw thrust method, you are positioned behind the top of the victim's head. Your middle, ring and little fingers are applied to the back part of the victim's jaw on either side of the angle of the jaw—lifting the jawbone upwards and outwards and opening the airway.

The index finger is applied to the line of the jaw, in front of the angle of the jaw. The thumbs are applied to either side of the mouth or, when using a mask, are used to seal the mask against the face.

In learning this hold, there is no substitute for frequent practice sessions on people rather than manikins. While manikins are essential in practice, jaw holds are best taught on the human jaw, as there are great size variations both in jaws and in your hands.



Airway for children and infants

It is important to note that an infant's airway is different from an adult's, and is more likely to become blocked because an infant's

- head is relatively larger
- neck is relatively shorter
- tongue is larger
- windpipe is softer and more easily compressed.

Opening an open airway for children and infants

Children's heads should be tilted slightly backwards to maintain their airway. The level of tilt is sometimes referred to as 'the sniffing position'.

Backward head tilt should not be used with infants, as it stretches the tissues and this may block the airway.

Instead, the head should be kept in the neutral position, with the lower jaw lifted at the point of the chin. If the neutral position does not provide a clear airway, it may be necessary to tilt the head back very slightly.

Lateral and recovery position for children and infants

Children should be rolled into the lateral or recovery position the same way as an adult.

Infants can be rolled onto their side or rolled onto your arm (slightly facing downwards) to drain regurgitation or vomit.



If a child or infant vomits or regurgitates during CPR, roll them into the lateral position away from you to allow the contents to drain and check their airway for any foreign material that needs to be cleared. After the airway is clear, check to see if the young victim is breathing normally again.



Leave infants on their back on a firm and flat surface to check their breathing and monitor their skin colour—remember to keep them warm. Continue with CPR if normal breathing does not return or if they are still not breathing.

Breathing

Breathing may be checked when the victim is on their back or on their side. In both cases, keep the appropriate level of head tilt while you *look, listen and feel* for signs of normal breathing.

- **Look** for movement of the chest and upper abdomen.
- **Listen** for sounds of normal breathing, with your ear close to the victim's nose and mouth.
- **Feel** for any movement of air from the victim's mouth or nose with your cheek.



Note:

- The decision on whether the victim is breathing normally is usually easy, but the wind and the noise of the sea can cause difficulties.
- Do not mistake the occasional gasp for normal breathing; this is not normal breathing and the victim requires commencement of CPR.
- Movement of the lower chest and upper abdomen does not necessarily mean the person has a clear airway.

Victim is breathing normally

If the victim is breathing normally and unconscious, place them in the recovery (lateral) position while keeping them safe and warm.



Victim is not breathing normally

Commence CPR if the victim is not breathing normally.

Note:

- A victim who has been submerged may be given two rescue breaths before commencing CPR.
- Be aware that any over inflation may cause a victim to regurgitate.

Cardiopulmonary resuscitation

Cardiopulmonary resuscitation (CPR) is the preservation or restoration of life by establishing and maintaining a person's airway, breathing and circulation.

A person whose natural heartbeat has become disrupted, or has stopped, may be kept alive by lifesavers who provide artificial circulation of the blood and artificial ventilation of the lungs (rescue breathing). External chest compression is capable of providing circulation of the blood. In this procedure, the heart is rhythmically compressed between the breastbone (sternum) and the backbone (spine). This procedure is known as cardiopulmonary resuscitation or CPR.

Any attempt at resuscitation is better than no attempt.

CPR procedure

1. Ensure the victim is placed on their back and on a firm surface.
2. Comfortably kneel close to the victim's chest with one knee level with the victim's neck and the other level with the lower chest.
3. Visualise the 'centre of the chest' as you place the heel of one hand at that point while holding your wrist or interlocking fingers with your other hand. Keep your arms straight where possible to use your body weight to compress vertically at the centre of the victim's chest.
4. Perform 30 rhythmic compressions on the centre of the chest, compressing about one-third of the depth of the victim's chest at a rate of 100–120 compressions per minute. Make sure you release the victim's chest fully to allow blood to flow back into their heart.
5. Follow compressions with two rescue breaths. Look to see the victim's chest rise and fall after each rescue breath to check you are not over- or under-inflating.
6. Continually assess for consciousness and normal breathing without stopping compressions and ensure that the airway is kept clear.



Note:

- A lifeguard may be on either side of the victim, and procedures should be practised from both sides.
- A CPR cycle is complete following the delivery of the second rescue breath.
- Compression applied too high is ineffective. If applied too low, compressions may cause regurgitation and/or damage to internal organs.
- It is possible that ribs may fracture while performing compressions. If so, you should check your hands and continue with CPR.
- In team CPR scenarios, the airway operator is performing the rescue breathing and the compression operator is performing the compressions at any given point in time. Refer to the *Team CPR* section of this module for more information.
- Position yourself in a comfortable position in relation to the victim—kneel close to and alongside the chest of the victim so that you can apply vertical rhythmic compressions. This position minimises energy loss from shuffling and is best to avoid back injury. It will vary slightly for lifeguards of differing sizes and shapes.
- There is no need to measure or remeasure in order to determine the location point for chest compressions.

Compressions

Hand positions

The methods described here are widely used. Your choice of hand position will depend on the size of the victim as well as your own body size, strength, personal preference and comfort.

Locate the centre of the chest. Place the heel of your preferred hand on this point. Your fingers should be parallel to the ribs, raised and relaxed, so that all pressure is applied to the victim's sternum and not to the ribs.

Apply vertical pressure from the shoulder through the heel of the compressing hand. Where possible, try and keep your compressing arm straight and use your body weight as the compressing force to effectively compress to one-third the depth of the chest. This takes less physical effort than trying to use the arm muscles and will be less tiring.

The other hand is placed securely on top of the first. To prevent the top hand slipping (and to avoid ineffective compressions), the fingers and thumb of the upper hand may be locked around the wrist or through the finger gaps of the lower hand.



Hand position with thumb and fingers around wrist



Hand position with fingers interlocked

Rescue breathing

There are three main methods of performing rescue breathing.

1. Mouth-to-mask rescue breathing

This is the recommended form of rescue breathing and uses a simple variation on the jaw thrust method of holding the airway open. The general rules are exactly the same as described later for mouth-to-mouth rescue breathing, but mouth-to-mask rescue breathing should be used whenever possible.

CPR should never be delayed while waiting for a resuscitation mask or oxygen to arrive at the scene. However, resuscitation masks should be carried with you when on patrol.

Backward head tilt is essential but apply with caution if a spinal injury is suspected. The victim's jaw may be lifted using the 'pistol grip' or jaw thrust method.



Mouth-to-mask rescue breathing



Mouth-to-mask rescue breathing during oxygen aided resuscitation

2. Mouth-to-mouth rescue breathing

Although it is possible for rescue breaths to be performed in different positions, it is customary for the victim to be positioned on their back. Follow the steps below to perform mouth-to-mouth rescue breathing.

1. Kneel beside the victim's head and open their airway by tilting their head back and lifting the jaw using jaw support or jaw thrust (cautiously if a spinal injury is suspected).
2. Place your mouth over the victim's slightly open mouth, sealing their nose with your cheek.
3. Blow until you see the victim's chest rise, then lift your mouth from the victim's mouth, allowing the air to leave the lungs. At the same time, turn your head and place your ear close to the mouth to listen for, and feel, the air leaving while you watch the chest return to its original position.
4. Watch the upper abdomen, and maintain backward head tilt and jaw lift, to ensure that the stomach is not becoming swollen with air (See *Distension of the stomach*).

The very nature of lifesaving requires that lifesavers be trained and prepared to administer mouth-to-mouth rescue breathing. The *International Lifesaving Federation Medical Position 11* (2016) states that CPR for a drowning victim should include both chest compressions and rescue breaths. However, if you are unwilling or unable to perform mouth-to-mouth rescue breathing for a drowning victim, you should do chest compressions only.

3. Mouth-to-nose rescue breathing

Mouth-to-nose rescue breathing is used:

- in CPR of infants, when the lifesaver's mouth should cover the infant's mouth and nose
- in cases where severe facial injuries make it the preferred method
- in deep-water rescue breathing
- when a victim's jaw is tightly clenched
- when the airway operator prefers this method.

The technique for mouth-to-nose rescue breathing is similar to that used for mouth-to-mouth, except that in mouth-to-nose rescue breathing:

- air is blown into the nose
- the mouth must be sealed during inflation. In both methods, the air exits through both the mouth and the nose
- sealing the mouth is achieved by pushing the lips together with the thumb. You can also seal the mouth using the jaw thrust method
- the mouth is then opened after inflation, for air to exit.

The rules for inflating and watching the victim's chest are the same as in mouth-to-mouth rescue breathing.



Mouth-to-nose rescue breathing

Sealing the victim's airway

Sealing the victim's nose is necessary during mouth-to-mouth rescue breathing, and this is best done by the lifesaver's cheek. Occasionally, air will continue to escape from the victim's nose. In such cases, it is necessary to change to the jaw support method (using 'pistol grip') and seal the nostrils with your thumb and forefinger.

If the nostrils are sealed using thumb and forefinger, there is a tendency to lose head tilt, so added care is needed to make sure that this does not happen.

Team CPR



When two lifeguards arrive at a scene where a victim requires CPR, one lifeguard should commence DRSABCD while the second lifeguard calls for assistance and obtains additional equipment and personnel as required, e.g., defibrillator, first responder with oxygen.

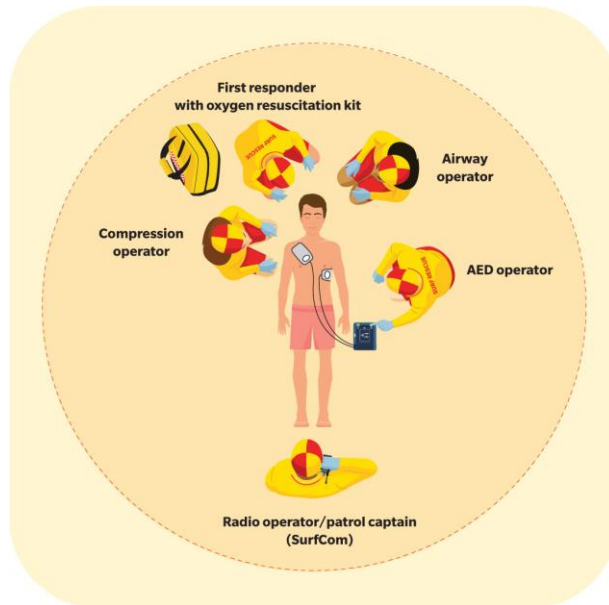
If two lifeguards are available to perform CPR, one lifeguard may perform rescue breathing while the other provides compressions. It is recommended that the operators switch providing compressions at least every five cycles (30:2), to prevent rescuer fatigue and deterioration in the quality of chest compressions. This should be done with minimal interruption to compressions.

Compressions may be counted out loud so that others can follow the CPR cycle. At a minimum, it is recommended that the last five compressions be counted aloud.

The airway operator who is managing the victim's airway coordinates the rollovers when a victim regurgitates or vomits. They may be behind the victim's head if they are using jaw-thrust method to maintain the victim's airway.

Qualified lifeguards may safely administer oxygen to any victim who is not adequately perfused. Trained lifeguards may assist them with the administration of oxygen-aided resuscitation and oxygen therapy during team CPR. Usually this assistance takes the form of ensuring the appropriate oxygen mask is securely placed over the victim's airway and keeping the oxygen at a safe distance from potential sources of combustion, e.g., flames, cigarettes, defibrillator.

When additional lifeguards are available to help, they may approach the CPR scene from the victim's feet to introduce themselves and confirm an ambulance has been called before proceeding as directed by the airway operator.



CPR for children and infants

CPR for infants and children also involves compressions and rescue breaths.

Compression for children and infants

Effective compression for both children and infants is applied at the centre of the chest and to approximately one-third of the depth of the chest. It is also performed at 100–120 compressions per minute.

You will usually use one or two hands to compress children and two fingers to compress infants.



Rescue breaths for children and infants

The guidelines for performing rescue breaths on children are the same as those for adults, except for the volume of air to be blown into the victim. Great care must be taken in judging the volume of air to be blown into the lungs of a small person, as over-inflation increases the risk of regurgitation. The airway operator should blow only until the victim's chest is seen to rise, and then stop.

When performing rescue breaths on an infant:

- place your mouth over the infant's nose and mouth
- puff in just enough air through your slightly open mouth to cause the chest to rise
- use an infant resuscitation mask where available.

Note:

- If an infant resuscitation mask is not available, an adult mask may be used in an upside-down position.
- The volume of air required is very small and practice should be carried out on infant manikins.

CPR for a pregnant victim

A visibly pregnant woman should have a towel or blanket placed under her right buttock during CPR (a good way to remember this is to use the saying, ‘mother is always right’). If placing a pregnant victim in the lateral position, she should be positioned on her left side to avoid restricting blood flow in the inferior vena cava.



CPR overview

CPR overview			
Body type	Adult	Child	Infant
Head tilt	Full head tilt backwards	Slight head tilt backwards	No head tilt (neutral position)
Number of hands/fingers	2 hands	1–2 hands	2 fingers
Compression: rescue breaths	30:2		
Location of compression	Centre of chest		
Depth of compression	1/3 Depth of chest		
Compressions per minute	100–120		
Cycles every 2 minutes	5–6		

Table 1 - Provides an overview of CPR.

How long should CPR be continued?

CPR should be temporarily suspended while a victim is being defibrillated and continued until:

- an authorised person declares the victim deceased
- the lifesaver cannot physically continue
- the risk of danger returns
- the victim is handed over to paramedics
- the victim recovers (is breathing normally).

Don't give up—people have recovered after resuscitation attempts lasting longer than an hour.

Complications during CPR

Blocked airway

If the victim's chest does not rise with inflation, check that:

- the head is tilted back, and the jaw is lifted correctly
- the seal of your mouth or resuscitation mask is firm
- there is no foreign material in the airway
- enough air is being blown in.

Vomiting and regurgitation

Vomiting is an active process in which muscular action makes the stomach eject its contents upwards. It is nearly always accompanied by a loud noise. You will usually know when a victim is vomiting or is about to vomit.

Regurgitation is the silent flow of stomach contents into the mouth and nose. It is the silence that makes regurgitation dangerous, as it may be very difficult to detect.

Both are extremely common during resuscitation, especially in cases of drowning where large amounts of water may be swallowed. Every victim who has vomited or regurgitated should immediately be rolled into the lateral position.

A person who regurgitates or vomits while lying face up (supine position) is very likely to inhale some of the stomach contents into the lungs, which may lead to serious lung damage and infection. Once a victim has regurgitated or vomited, it is essential that the victim be rolled onto their side immediately to clear any materials, then assess the breathing (See *Rolling a victim onto their side*).





Distension of the stomach

In cases of drowning, the victim's stomach is often swollen at the time of rescue. This swelling of the stomach most often occurs because they have swallowed water and air in the process of drowning.

Stomach swelling may be made worse if rescue breathing is performed with the airway partially blocked by the tongue or foreign material, if you blow too hard, or if you blow too much air.

A distended stomach can be recognised by a persistent and possibly increased swelling in the upper part of the victim's abdomen. It leads to increased upward pressure on the diaphragm, making rescue breathing more difficult. It also greatly increases the risk of regurgitation.

No attempt should be made by lifersavers to reduce the swelling of a victim's abdomen; treatment of this condition should be left to ambulance paramedics or hospital staff. Check that all of the ARC guidelines for correct rescue breathing are being followed and that the airway is not blocked.

Further stomach distension can be prevented by:

- following the ARC guidelines for maintaining a clear airway
- watching for the rise and fall of the chest
- blowing only until you see the chest rise
- not blowing too quickly.

Defibrillation

The use of a defibrillator can greatly aid a person's chance of survival in the event that they require resuscitation.

Defibrillators are portable devices able to recognise shockable rhythms in a victim in cardiac arrest and to deliver an electric shock to return the heart to its normal rhythm. Early access to defibrillation, when combined with starting effective CPR as early as possible, provides the best chance of survival for a victim suffering cardiac arrest.

In the case of victims who have been submerged in water, a defibrillator is unlikely to advise that a shock is required. This is because most drowning victims are unconscious due to respiratory failure that progresses to a non-shockable cardiac arrest rhythm. A defibrillator will recommend a shock in only a small percentage of drowning victims. It is therefore important that all lifersavers maintain their training to perform effective CPR.



Defibrillation safety

Lifesavers should be able to operate an automated external defibrillator (AED) safely on adults and children. Safety measures include, but are not limited to, the following:

Victim

- Check responsiveness—a victim must be unresponsive and not breathing normally.
- Ensure the AED pads are not touching each other.
- Do not place AED pads over medication patches.
- Make sure that the AED pads are at least 8 cm away from an implanted pacemaker.
- Oxygen units should be moved away during defibrillation and the flow of oxygen from face masks directed away from the victim's chest.
- Remove any 'quick and easy to remove' necklaces or other body jewellery that is in the way of, or within 2.5 cm of, pad placement before AED use.

Environment

- Avoid operating an AED in an unstable environment that may prevent it from performing a valid assessment of the victim, e.g., in a moving vehicle.
- Do not operate an AED in an explosive environment, e.g., where gases or fumes might be present.
- Dry a wet victim's chest before positioning the AED pads.
- Ensure no-one has contact with the victim during defibrillation.
- Move the victim before operating the AED if they are on a conductive surface like a metal platform or a pool of liquid, e.g., water, vomit, blood.

Refer to the AED manufacturer's guidelines to note more safety precautions for the AEDs used at your surf lifesaving club, e.g., their level of water resistance for wet weather conditions.

Operation of the AED

The AED operator is responsible for ensuring that the correct defibrillation process is followed; however, a more qualified and/or experienced lifesaver may be in charge of coordinating the situation and the lifesavers involved.

CPR should be commenced and continued with minimum interruption until an AED is ready to analyse. The AED operator will be in charge of the procedure. You should follow the AED operator's instructions.

1. Always check that conditions are safe for the use of an AED. _____
2. Turn on the AED and follow the prompts.
3. Apply AED pads to the victim's chest as per AED diagrams.
4. Respond to the AED prompts.
5. Deliver a shock in a safe manner if prompted to do so.
6. Respond to the AED prompts; this may include continuing CPR or checking the victim for normal breathing or a response.



Positioning of AED pads

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

Place pads on the victim's exposed chest in an anterior-lateral position—one pad slightly below the collarbone on the victim's right chest and one pad on the victim's left side below their armpit.

Most AED pads are 'universal', which means it does not matter which is placed in each position as long as both positions are covered.

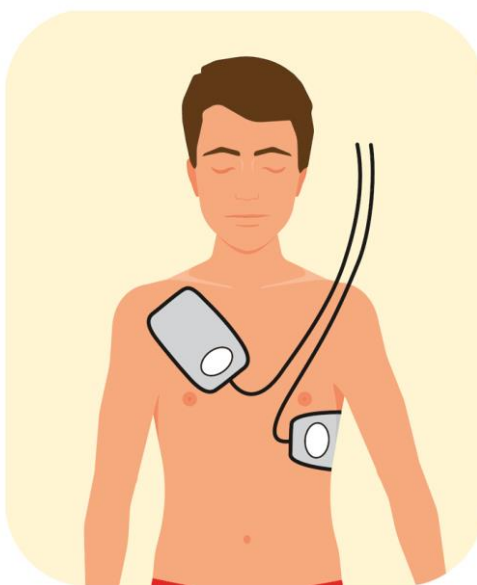
Applying AED pads

The following points will help ensure effective adherence of AED pads.

- Apply AED pads after:
 - cutting clothing off a victim using shears if needed to access the victim's chest. This includes bras.
 - drying the victim's chest if required after their removal from an aquatic environment
 - removing chest hair at the site of application with a razor or wax strips if needed to allow for pad adhesion to the victim's skin.
- Apply AED pads on clean, dry skin with a smooth rolling action to prevent air bubbles underneath.

Do not:

- use alcohol wipes to clean the skin
- reposition or remove AED pads once they have been applied.

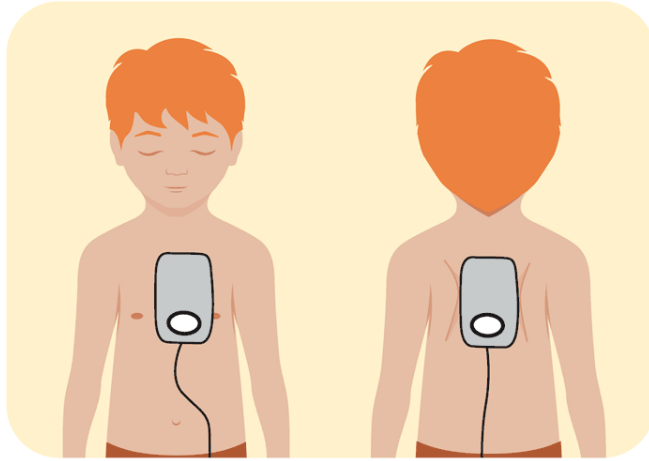


AED pads for children and infants

Standard adult AED pads are suitable for use on victims 8 years and older. Ideally, for children under 8 years old and infants, paediatric pads and an AED with a paediatric capability should be used. These pads are placed in the same way as the adult AED pads and come with a diagram of where on the chest they should be placed.

Note:

- If the AED does not have a paediatric mode or paediatric pads—the standard adult AED pads can still be used. Apply the AED pads firmly to the bare chest in the positions shown in the diagram for adults, ensuring that they do not touch each other on the child's chest.
- If the AED pads are too large—use the front–back position. Apply one AED pad on the upper back (between the shoulder blades) and the other on the front of the chest, if possible, slightly to the left.



Shock delivery protocols

Shocks are delivered one at a time followed by a pause for AED recharging, response checks and resuscitation, as required.

The important shock delivery protocols to remember are:

- make sure all personnel are clear of the victim during analysis and before delivering a shock
- do not remove AED pads after a victim shows signs of recovery. Keep them in place to allow prompt action should the victim’s condition deteriorate
- respond to all prompts within safety constraints.

All AED pads are single-use and should not be re-used on another victim.

AED prompts

AED prompts may vary, depending on the make and model, but they are usually similar to those shown in Table 2.

Prompt	Action
‘Remove clothing’	Use the shears provided to cut off victim’s clothing if necessary, to access the victim’s chest.
‘Apply pads’	Apply pads to victim.
‘Analysing’	Pause CPR and do not touch the victim.
‘Charging’	Ensure conditions are safe for the delivery of shock.
‘Stand clear’, ‘Do not touch the victim’	Keep clear of the victim.
‘Shock advised’, ‘Press to shock’, ‘Push flashing button’	Look and warn other operators, then push the shock button.
‘No shock advised’, ‘If needed continue CPR’	Check responsiveness and breathing then continue CPR if necessary.
‘Motion detected’	Ensure that you are using the AED on a stable surface.

Table 3 — Examples of AED prompts and appropriate action

Recovery

If breathing has returned, you should roll the victim into the lateral position and maintain an open airway, while continuously monitoring the victim’s breathing. Remember to leave infants on their back on a firm and flat surface to check their breathing and monitor their skin colour. Update your patrol captain and emergency services of any changes in the victim’s condition. A first responder may introduce oxygen at this time if not already in use.



Management of the victim after CPR

Remember that recovery may only be temporary, and you must continue to monitor the victim closely. Breathing may stop after early success with resuscitation. In such cases, CPR must be started again.

To manage a victim after CPR:

- assist a first responder to monitor and record the victim’s vital signs (See Table 3)
- handle the victim gently at all times
- leave any AED pads applied in position
- maintain a clear airway and continue to monitor breathing
- make conscious victims comfortable and reassure them
- monitor the victim’s conscious state
- protect the victim’s privacy and dignity—cover them with towels, blankets or clothing where appropriate and/or create a screen around them using towels and/or beach umbrellas
- protect the victim from extremes of heat or cold and, depending on the circumstances, use blankets or other protection from the hot sun. Make sure you maintain clear observation of the victim’s airway and breathing.

Sign	Check	Normal	Abnormal
Conscious state	alert, voice, pain, unconscious	Alert and orientated Responds to voice or pain	Drowsy or unconscious Does not respond to voice or pain
Breathing	rate, rhythm, sounds	Adult: 15–20 breaths per minute Child: 20–25 breaths per minute Infant: 30–40 breaths per minute	Adult: <15 or >20 breaths per minute Child: <20 or >25 breaths per minute Infant: <30 or >40 breaths per minute
Pulse	rate, rhythm, volume	Adult: 60–100 beats per minute Child: 80–100 beats per minute Infant: 110–160 beats per minute	Adult: <60 or >100 beats per minute Child: <80 or >100 beats per minute Infant: <110 or >160 beats per minute
Skin	colour, condition, temperature	Warm and natural colour	Cool or hot, pale, moist, red/flushed, blue/cyanosed

Table 4 - Summary of normal and abnormal signs for adults and children

Documentation

An incident report must be completed and provided to your patrol captain for any incident involving CPR. A copy can be given to the paramedics who arrive on the scene if requested.

When completing a report:

- detail an accurate and factual account of events
- sign and date the form as well as any alterations. Do not use correction fluid
- write with an ink pen.

Details of the incident should not be released without the consent of the victim and must be kept confidential as per privacy legislation supported by your local SOPs.

Victim handover

After an ambulance has been called, continue to perform CPR if required and maintain the safety of yourself, the victim and bystanders until the ambulance paramedics accept responsibility for them. Do not stop CPR when they arrive.

As part of your handover you should provide a concise summary of relevant details known about the victim, the incident and treatment provided as this information aids further treatment decisions. An incident report can assist you with this.

The mnemonic IMIST AMBO is used by ambulance officers in many states and can assist lifesavers in the delivery of a clear, concise and structured handover.

I	Identification	Identify the victim by their name, age and gender.
M	Mechanism of injury/ Medical complaint	What happened, how and when?
I	Illness and injury	Information obtained during a primary and/or secondary victim assessment (signs and symptoms).
S	Signs	Vital signs (pulse, breathing rate, skin colour, temperature) and conscious state
T	Treatment and trends	First aid treatments provided and responses to treatment over time.
Allow for questions		
A	Allergies	Any known allergies?
M	Medications	Any medications recently or regularly taken (prescribed or illicit)?
B	Background history	What is the victim's medical background history? Do they have a MedicAlert® bracelet or necklace?
O	Other information	Other information about the victim: <ul style="list-style-type: none"> • Any belongings to go with the victim to hospital? • Any communication barriers? • Any cultural or religious considerations? • Names of first responders/lifesavers on the scene? • What is the victim's social situation? • What is the scene? e.g., surf conditions?
Allow for questions		

Table 5 – IMIST AMBO

Information about the health of a victim must be kept confidential. Only authorised people, such as the patrol captain and club executive officers should be able to see it. Giving away personal information without the victim's approval is unethical, and in some cases may be illegal.

All lifesavers involved in a resuscitation incident should report to their patrol captain after the victim has been handed over to take part in a debrief. Refer to the *Safety and Wellbeing* module for more information on the importance of debriefing and mental health following a critical incident while on patrol.