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HLTCPR201A

PERFORM CPR AND OXYGENATION



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SUDDEN CARDIAC ARREST

The heart's electrical system causes the heart to beat and controls the heart rate, ie the number of beats per minute. Sudden cardiac arrest is the unexpected collapse of a casualty, whose heart has ceased to function due to an electrical malfunction of the heart, disrupting that muscle's normal rhythm. It is recognised by the absence of response, absence of normal breathing and absence of movement.

PRIORITIES IN AN EMERGENCY

In all emergency situations, the rescuer must:

- Assess the situation quickly

- Ensure safety for the rescuer, victim and bystanders
- Send for help
- Commence appropriate treatment following the ARC Basic Life Support Flow Chart
When there is more than one victim, **CARE OF AN UNCONSCIOUS VICTIM HAS PRIORITY.**

The rescuer should not be distracted by victims who are calling out, their needs are less urgent as they are able to breathe.

UNCONSCIOUS

Unconsciousness is a state of unrousable unresponsiveness, where a victim is unaware of their surroundings and no purposeful response can be obtained. Unconsciousness, as defined by the ARC is the condition in which the victim fails to respond to “verbal or tactile stimuli”.

Our brain requires a constant supply of oxygenated blood and glucose to maintain normal function. If our brain does not receive this oxygenated blood and glucose due to interruption of this supply, the result will be loss of consciousness within a few seconds and permanent brain damage may result in minutes.

Causes of unconsciousness:

- Blood circulation problems
- Blood oxygenation problems
- Metabolic problems (e.g. diabetes, overdoses)
- Central nervous system problems (e.g. head injury, stroke, tumour, epilepsy)

Fainting is a common cause of unconsciousness and may occur when the victim’s heart rate is too slow to maintain sufficient blood pressure for the brain. Combinations of different causes may be present in an unconscious victim e.g. a head injury victim under the influence of alcohol. (ARC guideline 3)

Recognition:

Assess the victim’s response to verbal and tactile stimuli, ensuring that this does not cause or aggravate any injury.

Give a simple command such as, “open your eyes, squeeze my hand, let it go”. Then grasp and squeeze the shoulders firmly to elicit a response. A person that fails to respond should be managed as if unconscious. A victim who shows only a minor response, such as groaning without eyes opening, should be managed as if unconscious.

NOTE: Infants and small children should NEVER be shaken, they should be assessed by verbal and tactile stimuli.

Management:

Assess and manage the airway and breathing following the ARC Basic Life Support Flow Chart.(page 8)

Positioning an Unconscious Victim:

With an unconscious victim, care of the airway takes precedence over any injury including the possibility of a spinal injury.

ALL UNCONSCIOUS VICTIMS MUST BE HANDLED GENTLY WITH NO TWISTING OR FORWARD MOVEMENT OF THE HEAD OR SPINE.

CARDIO-PULMONARY RESUSCITATION (CPR)

Cardiac Arrest can be defined as sudden profound disturbance in the heart’s rhythm causing the heart to stop beating to a point that it can’t sustain life. Cardio-pulmonary Resuscitation (CPR) is the technique of rescue breathing combined with chest compression. The purpose of

cardiopulmonary resuscitation is to temporarily maintain a circulation sufficient to preserve brain function until specialised treatment is available.

Steps in resuscitation: **DRS ABCD**

- **DANGER** -check for Danger (hazards/risks/safety)
- **RESPONSE**-check for Response (if unresponsive)
- **SEND** – Send for help
- **AIRWAY**-open the Airway
- **BREATHING**- check for breathing(if not breathing/abnormal breathing)
- **COMPRESSIONS**- give 30 Compressions (almost 2 compressions/second) followed by 2 breaths
- **DEFIBRILLATION**-attach an Automated External Defibrillator (AED) if available and follow visual or voice prompts

DANGER

Before approaching an unconscious person you should identify if there is any danger or hazards that would endanger health and safety to yourself, the victim and others. In any situation that involves you to respond to an unconscious person the situation can become confusing, stressful and emotional. As the responder you need to minimise immediate risk to the health and safety of yourself, the victim, and others by isolating any danger or hazards.

Danger /Hazards may include:

- Fallen power lines
- Fuel / petrol
- Fire or smoke
- Toxic fumes
- Severe weather
- Flooding
- Blood & Body Fluids (use of personal protective equipment- PPE)

After ensuring that there is no risk of danger, you may approach the victim in a calm, culturally aware, sensitive and respectful manner.

RESPONSE

Unconscious & Unresponsive - Assess the person's response to verbal and tactile stimuli, ensuring that this does not cause or aggravate any injury. Give a simple command such as, "Open your eyes, Squeeze my hand". Then grasp and squeeze the shoulders firmly to elicit a response. A person that fails to respond should be managed as if unconscious and unresponsive. A victim who responds by answering and appears conscious, leave them in the position you found them if they are at no further risk of harm.

SEND FOR HELP

When calling for help, the "phone first" approach is recommended. This is because in the vast majority of cardiac arrests, a defibrillator is required to treat the victim. In many situations the call for help will occur at the same time as the commencement of resuscitation. Remember if you are calling the ambulance you need to dial 000 and ask for the Ambulance. Always ask the operator to repeat your message back to you before ending the call.

AIRWAY

The airway must be **cleared** and **opened** before you can establish whether the victim is breathing or not.

Clearing the Airway

The victim should NOT be routinely rolled on the side to assess airway and breathing. Assessing the airway of the victim without turning them onto the side (i.e. leaving them on

their back or in the position in which they have been found) has the advantage of taking less time to perform and avoids movement.

The exceptions to this would be in submersion injuries or where the airway is obstructed with fluid (vomit or blood). In this instance the victim should be promptly rolled onto the side to clear the airway. Whilst on the side, the mouth should be opened and turned slightly downwards to allow drainage using gravity. If the person has dentures **ONLY** remove them if they are dislodged, well fitting dentures should be left in place. Visible material can be removed by using your fingers, or the victim's fingers, be mindful that infants bite.

If during resuscitation the victim's airway becomes compromised (e.g. fills with vomit or fluid) immediately roll them onto their side and clear the airway. If the person starts breathing, they can be left on their side with appropriate head tilt to assist with breathing. If the person is **NOT** breathing, they should be promptly rolled on their back and resuscitation commenced.

Opening the Airway

One of the most common causes of an obstructed airway in a person lying on their back is the tongue falling back to block air entry. The 'backward head tilt' in combination with 'chin lift' (jaw support) are effective ways to ensure that the airway is opened.

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. The head is tilted backwards (**NOT** the neck). It is important to avoid excessive force, especially where a neck injury is suspected. When the victim is in the lateral position (on their side) the head will usually remain in this position when the rescuer's hands are withdrawn. Chin lift is commonly used in conjunction with Backward Head Tilt. The chin is held up by the rescuer's thumb and fingers in order to open the mouth and pull the tongue and soft tissues away from the back of the throat.

One technique involves placing the thumb over the chin below the lip and supporting 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 pulled away from the chest.

Children & Infants

- An infant is defined as younger than one year.
- A child is defined as one to eight years of age.

Children should be managed as per adults.

The upper airway in infants is easily obstructed because of the narrowness of the nasal passages, the entrance to the windpipe (vocal cords) and the trachea (wind pipe). The trachea is soft and pliable and may be distorted by excessive backward head tilt or jaw thrust. Therefore, in infants the head should be kept neutral and maximum head tilt should **not** be used. The lower jaw should be supported at the point of the chin with the mouth kept open.

There must be **NO** pressure on the soft tissues of the neck. If this technique doesn't provide a clear airway, the head may be tilted backwards very slightly with a gentle movement.

Not Breathing/ Not Breathing Normally

After the airway is cleared and open the next step is to check whether the victim is breathing (more than the occasional gasp).

The rescuer should:

- Look and Feel for movement of the upper abdomen or lower chest.
- LISTEN and FEEL for the escape of air from the nose or mouth.

BREATHING

Normal breathing is essential to maintain life, victims that you come across that are gasping or breathing abnormally and are unresponsive will require resuscitation

Causes of ineffective breathing include:

- Upper airway obstruction
- Injury to the breathing centre of the brain
- Paralysis or impairment of the nerves and or muscles used to breathe
- Drowning
- Suffocation
- Problems that affect the lungs

To assess if the victim is breathing normally you need to

- **LOOK** for movement of the upper abdomen or lower chest
- **LISTEN** for the escape of air from the nose and mouth
- **FEEL** for movement of the chest and upper abdomen

Movement of the lower chest or upper abdomen does not necessarily mean the victim has a clear airway. Impairment or complete absence of breathing may develop before consciousness is lost by the victim.

Rescue Breathing

If the unconscious victim is not responding and not breathing normally after you have opened and cleared the airway you need to **immediately commence chest compressions** and then rescue breathing .

Give 30 chest compressions followed by 2 rescue breaths.

If you are unable or unwilling to perform breathing continue with compressions only CPR.

Always pause to give rescue breaths when delivering compressions.

Mouth to Mouth

Kneel beside the victim's head. Maintain an open airway.

Take a breath and then place your open mouth as wide as possible over the victim's slightly open mouth. Ensure you maintain an open airway with head tilt chin lift. Seal the nostrils of the victim before you deliver the breath by either pinching the nostrils or sealing them with your cheek as you then blow to inflate the victim's lungs.

Deliver each breath within one second with enough volume to ensure that the victim's chest is rising during each breath. After you have delivered the breath, lift your mouth from the victim's, turn your head towards the victim's chest and listen and feel for air being exhaled from the mouth and nose.

If the chest isn't rising possible causes may include:

- Obstruction in the airway (inadequate head tilt, chin lift, tongue or foreign material)
- Insufficient air being blown into the lungs
- Inadequate air seal around mouth or nose

Mouth to Nose

The mouth to nose method may be used where the rescuer chooses, the victim's jaws' are tightly clenched, or when resuscitating infants and small children.

The technique for mouth to nose is the same as mouth to mouth except for sealing the airway. To seal the airway in mouth to nose you need to close the victim's mouth using the hand that is already supporting the jaw and push the lips together with the thumb.

Take a breath and place your widely opened mouth over the victim's nose (or mouth and nose in infants) and blow to inflate the victim's lungs. Lift the mouth from the victim's nose and look for the fall of the chest; listen and feel for the escape of air from the nose and mouth.

If the chest does not rise there may be an obstruction, an ineffective seal, or not enough air being blown into the lungs. There could also be a leak if your mouth is not open enough or you can't get an adequate seal with the victim's mouth. If you can't problem solve use mouth to mouth resuscitation. Problems may be that the victim's nose may have a blockage preventing airflow inhibiting adequate inflation.

Mouth to Mask

Mouth to Mask resuscitation avoids mouth to mouth contact by the use of a resuscitation mask. Rescuers should take appropriate safety precautions when feasible and when resources are available to do so, especially if a victim is known to have a serious infection (e.g. HIV, tuberculosis, Hepatitis B Virus or SARS).

Position yourself at the victim's head and use both hands to maintain an open airway and to hold the mask in place. Maintain backward head tilt and chin lift. Place the narrow end of the mask on the bridge of the nose and apply the mask firmly to the face.

Take a breath and blow into the mouthpiece of the mask with enough volume and force to achieve chest movement. Take your mouth off the mouthpiece to allow for exhalation, turn your head to listen and feel for the escape of air. If the chest is not rising with each inflation check you have adequate head tilt and a good seal with the mask. Failure to maintain backward head tilt and chin lift is the most common cause of obstruction during resuscitation.

Mouth to Neck Stoma

A person with a laryngectomy has had the larynx (voice box) removed and breathes through a hole in the front of their neck (stoma). A stoma will be more obvious when the victim is on their back for Rescue Breathing and the head is put into backward tilt. If a tube is seen in the stoma, always leave it in place to keep the hole open for breathing and resuscitation.

To deliver breathes to a victim with a stoma place your mouth over the stoma and perform rescue breathing as described above. If the chest fails to rise, this may be due to a poor seal over the stoma or the victim may have a tracheostomy instead of a laryngectomy. If you hear air escaping through the nose or mouth this would indicate a tracheostomy or a blocked stoma or tube. If you suspect that tube is blocked use back blows and chest thrusts in an attempt to dislodge the obstruction.

COMPRESSIONS

If the victim is unresponsive and not breathing normally rescuers should commence compressions.

How to locate the Compression Point

The recommended position for chest compressions during CPR in all age groups is the lower half of the sternum.

Avoid compression below the lower limit of the sternum to reduce the risk of regurgitation and damage to internal organs. Avoid compressing too high as this is ineffective.

Method of Compression

Infants – Find the compression point and utilise the two finger technique using the pulps of two fingers to compress the chest.

Children and Adults

Place the heel of your hand on the compression point, with the fingers parallel to the ribs and preferably slightly raised, so that pressure will not be exerted directly onto the ribs. Place your other hand securely on top of the first. All pressure is exerted through the heel of the bottom hand and the rescuer's body weight is the compressing force. Therefore the rescuer's shoulder should be vertically over the sternum and the compressing arm kept straight. For children a one or two hand technique may be utilised.

Depth of Compressions -The lower half of the sternum should be depressed to approximately one third of the depth of the chest with each compression.

These are approximate compressions depth measurements:

Adult more than 5cms

Children 5cms

Infant 4cms

Rate of Compressions - Rescuers should perform chest compressions for all ages at a rate or approximately 100 compressions per minute (almost 2 compressions/second). This does not imply that 100 compressions will be delivered each minute as the number is reduced by the interruptions for breaths given by rescue breathing.

Compression Ventilation Ratio -A universal compression- ventilation ration of **30:2** (30 compressions followed by 2 ventilations) is recommended for all ages regardless of the number of rescuers.

Compressions **MUST** be paused to allow for ventilations. Interruptions to compressions should be avoided. When performing compressions, if possible, change rescuers every two minutes to prevent rescuer fatigue and to maintain chest compression quality.

RESUSCITATION IN LATE PREGNANCY

In the obviously pregnant woman the pregnant uterus causes pressure on the major abdominal vessels when she lies flat, reducing the venous return to the heart.

A pregnant woman should be positioned on her back with her shoulders flat and sufficient padding under her right buttock to give an obvious pelvic tilt to the left.

DEFIBRILLATION

Defibrillation is the emergency procedure where First Aiders apply an electronic device called an Automated External Defibrillator or (AED) to the chest of a cardiac arrest casualty and the device delivers a controlled electric shock to the casualty's heart.

The evidence to date supports the premise that early defibrillation delivered with an Automated External Defibrillator (AED) may improve survival following cardiac arrest.

Attach the defibrillator and follow the voice prompts and safety requirements. These safety requirements include ensuring that no one is touching the casualty prior to delivering a shock. It may be necessary to dry and even shave the victim's chest if they are excessively hairy or the area is moist where the gel pads are to be placed. Pad to skin contact is important! Avoid having the patient in contact with metal fixtures. If the patient has a pacemaker or cardioverter implant ensure the gel pad is positioned a minimum of eight centimetres away. Do not place the gel pad over medication patches, remove them and wipe the area prior to pad placement.

The standard adult pads are suitable for children over the age of eight. Paediatric pads are used for children between the ages of one to eight years. If the AED does not have a paediatric mode or paediatric pads then standard adult AED pads may be used. ENSURE the pads DO NOT TOUCH each other on the child's chest if you need to utilise standard adult pads on a child.

DURATION OF CPR

If you are resuscitating a victim you should continue to do so with minimal interruptions to chest compressions until:

- The victim responds or begins breathing normally
- It is impossible to continue (e.g. exhaustion)
- A health care professional arrives and takes over CPR
- A health care professional directs that CPR be ceased

BASIC LIFE SUPPORT FLOW CHART

D	DANGERS?
R	RESPONSIVE?
S	SEND FOR HELP
A	OPEN AIRWAY
B	NORMAL BREATHING?
C	START CPR 30 compressions : 2 breaths If unwilling to perform rescue breaths continue chest compressions
D	ATTACH DEFIBRILLATOR (AED) As soon as available and follow its prompts
	CONTINUE CPR until responsiveness or normal breathing return

OXYGEN ADMINISTRATION

Oxygen Sources

Oxygen is a natural chemical that is present in the atmosphere. However, first aid oxygen therapy requires the use of concentrated oxygen. This can be made available in commercially prepared oxygen cylinders, or oxygen concentrators.

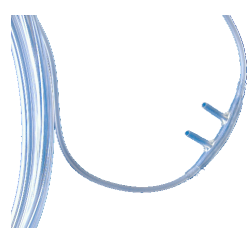
Oxygen Cylinders contain compressed gaseous oxygen, with many sized cylinders commercially available. These cylinders are able to deliver up to 100% oxygen at 12 litres per

minute for a limited time. Once empty, the cylinder needs to be refilled by a commercial operator. www.boc.com.au is a place that prepares oxygen cylinders in Australia.

Oxygen cylinders need to be stored in a safe place, and the appliances attached to the cylinder need to be grease-free. Oxygen Cylinders require the attachment of a pressure regulator that changes the pressure of the oxygen being released from the cylinder to a low pressure, and the flow meter controls the amount of oxygen released as a figure represented by Litres per Minute. Oxygen cylinders should be secured to remain upright and checked to ensure there is an adequate amount of oxygen stored in the cylinder.

Oxygen Concentrators are electrically powered machines that remove oxygen from the atmosphere. Oxygen concentrators are not usually utilised in a first aid context due to their inability to provide 100% oxygen at over 8 litres per minute.

Devices for Administering Oxygen



Nasal Cannulae

Simple Face Mask



Non-rebreather Mask



Bag Valve Mask



Pocket Mask

Nasal Cannulae deliver low to medium concentrations of oxygen. They are therefore not necessarily the best choice for oxygen delivery in an emergency setting, and are usually used for patients who are conscious, talking and not having difficulty breathing.

Nasal Cannulae should not be used with flow rates in excess of 6 litres per minute due to nasal irritation and the possibility of air swallowing.

Simple Face Masks are used for low to moderate concentrations of oxygen. These masks cannot be used for controlled oxygen concentrations and should be adjusted for proper fit. They should not press tightly against the skin and cut off circulation.

Simple Face Masks are useful for patients who are conscious and are having difficulty breathing. They should be used with a flow rate greater than 8 litres per minute to ensure adequate oxygenation for the patient.

Non-rebreather Masks are similar in design to the simple face mask, with an additional reservoir that fills with oxygen while the patient is breathing out, so a greater amount of oxygen is available for the next breath. The Non-rebreather masks should be used for patients who are unconscious or having difficulty breathing and require higher levels of assisted oxygen. The oxygen supply to the non-rebreather mask should be a flow rate as high as possible, greater than 12 litres per minute.

Pocket Masks are utilised to provide breaths to the patient quickly, before a Bag Valve Mask is available. The mask is held onto the patient's face by the operator utilising the head tilt/chin lift manoeuvre, the operator breathes through the mouth-piece to deliver breaths to the patient. Pocket Masks are commonly utilised in Basic Life Support in preference to mouth to mouth resuscitation. Some pocket masks are designed to accommodate additional oxygen.

Bag Valve Masks (BVM) are utilised for patients who are unconscious and not breathing. The oxygen supply to the BVM should be at the highest flow rate possible, usually above 12 litres per minute. The BVM provides additional breaths to the patient through the use of a 'squeeze-bag' that the operator uses to push air into the patient's lungs, creating a breath. To Apply the BVM to the patient's face, seal the mask by pressing it down with the left thumb on the bridge of the nose while the index finger presses around the lips. The rest of the fingers of the left hand pull on the chin and the angle of the jaw to maintain the head in extension. Ensure that you don't squeeze the mouth completely shut as it will effect ventilation. The right hand does a mirror-image of the left hand if a second rescuer is available to squeeze the BVM to deliver the breaths to the patient. The ARC recommends that the use of the BVM is a two-person operation, with one person holding the mask and the other person squeezing the bag to deliver the breaths. Only trained and experienced rescuers should operate the BVM as a one-person operation.

References:

Australian Resuscitation Council Guidelines: 2, 3, 4, 5, 6, 7, 8.

Australian Resuscitation Council Melbourne.

New Zealand Resuscitation Council

American Heart Association 2000, "Adult Basic Life Support" in Circulation, vol 102, 2000

This manual has been derived from the policies and procedures of the Australian and New Zealand Resuscitation Council (ARC) and represents LINK CPR's interpretation of current practice at the time of writing.

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This manual must be used in conjunction with a LINK CPR Perform CPR Course