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Advanced resuscitation

back to Contents

CONTENTS

First aid is the helping behaviours and initial care provided for an acute illness or injury.

First aid can be initiated by anyone in any situation.

A first aider is someone trained in first aid who should:

- recognise, assess, and prioritise the need for first aid
- provide care by using appropriate competencies
- recognise their own limitations, and seek additional care when needed.

The goals of first aid are to preserve life, alleviate suffering, prevent further illness or injury, and promote recovery.

back to Contents

WHAT IS 'ADVANCED RESUSCITATION'?

Advanced resuscitation is advanced life support—that is, the administration of supplemental oxygen to a patient suffering from a medical condition or injury; resuscitation with the aid of oxygen, and the techniques to defibrillate a patient following a sudden cardiac arrest.

THE USE OF OXYGEN IN FIRST AID

Oxygen may be beneficial in certain conditions. It is used to assist in the resuscitation of a nonbreathing patient and as therapy for a breathing patient (e.g. someone with smoke inhalation or asthma). Oxygen may be administered by a first aider if they are trained to do so.

Conditions for which a patient may benefit from oxygen includes:

- respiratory distress (from gas, smoke inhalation)
- heart attack and heart conditions
- severe, serious injuries
- unconsciousness
- drowning
- head injuries
- heat stroke.

back to Contents

Two first aiders with oxygen equipment

When CPR is required and two first aiders are present or a second person arrives, and oxygen equipment is available, a change over of operators will minimise fatigue particularly for the first aider performing compressions.

If equipment is not immediately available start CPR without oxygen. CPR should not be delayed to obtain oxygen equipment.

When it is determined that the patient is not responsive and breathing normally:

1. ensure that an ambulance has been called
2. first aider 'one' starts CPR
3. first aider 'two' sets up oxygen equipment
4. first aider 'one' continues performing compressions
5. first aider 'two' takes over breaths using oxygen equipment
6. first aider 'one' or 'two' indicates their readiness or need to change every 2 minutes
7. change over smoothly with minimal interference to the resuscitation procedure
8. ensure the change of operator is done approximately every two minutes to minimise fatigue.

Continue CPR with the use of oxygen until:

- the patient 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.

If the patient is breathing and responsive, roll the patient into the recovery position, provide oxygen therapy, monitor vital signs and manage any injuries while waiting for the ambulance.

OXYGEN CYLINDERS

Identification

Medical oxygen cylinders are normally identified as white metal cylinders with a large letter 'N' on the neck of the cylinder.

Storage of oxygen cylinders

Oxygen cylinders may be stored upright or on the side in a cool, dry ventilated area below 45°C. Ensure that cylinders are secured using appropriate brackets.

When the cylinder is almost empty (1/4 or less full), close valve, remove from oxygen equipment, mark cylinder as 'empty' or 'MT' and store away from full cylinders.

back to Contents

Use of oxygen cylinders

- Only use a cylinder with an Australian Standards-approved regulating device.
- Always use correct pressure gauges with oxygen.
- Ensure valve seat and seal inserts are clean, dry and in good condition.

Do not allow petroleum-based grease or oil to come in contact with the oxygen-supply devices on the stem of the cylinder.

Care with oxygen

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
- direct oxygen output towards the area of defibrillation—alternatively, have the oxygen equipment switched off.

SELECTING AN OXYGEN CYLINDER

1. Select the appropriate sized medical oxygen cylinder to suit the equipment to be used. Only medical oxygen, which is filtered and purified when a cylinder is filled, should be used. Medical oxygen cylinders are white all over with a capital 'N' near the neck.
2. Select a full cylinder, ensuring that the plastic seal is in place over the oxygen outlet and pin indexing holes. Leave the seal in place until the cylinder is needed.

The plastic seal enables the first aider to readily distinguish full cylinders from used ones. Make sure the plastic seal is intact and has not been moved.

The most commonly used oxygen cylinders are:

- C-size cylinders = 400–490L of usable oxygen
- D-size cylinders = 1640L of usable oxygen

'Portable' oxygen resuscitators commonly use the C-size cylinder.

A plastic seal covering the pin holes distinguishes a full cylinder from a used cylinder.

back to Contents

PREPARING THE CYLINDER

C and D-size cylinders have two pin indexing holes on the cylinder stem, for correct location of the cylinder on to the regulator. These index holes prevent non-medical oxygen regulators from being used by mistake.

1. Engage the cylinder onto the two protruding pins on the regulator's inlet face. There should be a seal between the cylinder's outlet hole and the regulator's oxygen inlet. This seal is the first location to check if any oxygen leaks are present.
2. Listen for leaks once the cylinder clamp screw has been firmly tightened and the cylinder is turned on.
3. Before 'cracking' (opening) the cylinder, manually remove the plastic seal completely from a full cylinder.

'CRACKING' THE CYLINDER

1. Place the oxygen key wheel/spanner onto the keyway at end of oxygen cylinder.
2. Explain to bystanders and patients that you are about to crack the cylinder (to avoid frightening them with the sudden sound).
3. Place one hand halfway down the cylinder for stability. With the other hand, turn the oxygen outlet hole away from yourself and anyone else present—the oxygen jet can cause a nasty friction burn.
4. Turn the key wheel slowly and gently anti-clockwise until oxygen flow is heard, then quickly turn back to the Off position, to clear dust or other contaminants from the valve area.
5. The new oxygen cylinder is now ready to be connected to equipment. Select appropriate oxygen-connecting apparatus.

back to Contents

OXYGEN EQUIPMENT

Assembling oxygen equipment

To permit the oxygen contained within an oxygen cylinder to be given to a patient, the following basic components are required:

- oxygen cylinder—preferably full (refill when contents are 1/4 or less)
- oxygen regulator—reduces oxygen cylinder pressure to a working level
- flow rate control—permits either fixed or variable flow rates of oxygen
- tubing and mask—for effective administration of oxygen to the patient.

Before using any oxygen equipment (including masks, airway and suction equipment), it must be checked for faults and defects in accordance with the manufacturer's instructions, industry standards and regulatory requirements.

Restoring and maintaining equipment ready for future use

Whenever oxygen equipment has been used:

- precautions must be taken to ensure there is no potential for the spread of infection from one patient to another, or to a first aider
- prepare equipment again for immediate use—check regularly; turn cylinder on and off again to check contents
- discard consumable oxygen equipment appropriately (e.g. masks).

After use, clean and prepare the equipment for reuse by:

- replacing disposable components
- cleaning and sterilising non-disposable components.

After equipment has been dismantled:

- wipe regulator carefully with damp cloth
- check that the seal between the regulator housing and cylinder yoke is always correctly positioned and in good condition.

Servicing equipment

Oxygen regulators and flow valves require annual servicing. The manufacturer's recommendations for servicing should be followed.

back to Contents

GIVING OXYGEN

There is a variety of oxygen equipment available to provide oxygen to non-breathing patients, and to assist spontaneously breathing ill or injured patients. It is important that the first aider is familiar with the general characteristics of the equipment and devices used to provide oxygen.

Whatever device is used, it is always important to explain to the patient what it is and why it is necessary.

THE BREATHING PATIENT

Oxygen may be administered to provide supplemental oxygen to a conscious or unconscious breathing patient using a:

- plastic oxygen face mask or a two-pronged nasal cannula
- self-filling, bag-valve-mask (BVM) resuscitator—hand-powered
- demand-valve resuscitator—oxygen-powered.

THE NONBREATHING PATIENT

Oxygen may be given to a nonbreathing patient via:

- an oxygen-powered resuscitator using a demand-valve regulator with a manual override button
- a hand-powered, self-filling BVM system.

Oxygen therapy must be administered at an appropriate flow rate for the well-being of a patient. To ensure this, it is important to continue to monitor the patient throughout the procedure.

INFECTION PREVENTION

Simple precautions can protect the first aider and the patient from infection. These precautions aim to prevent the transmission of blood and other body fluids (saliva, vomit, pus, urine, faeces), and to keep wounds and surfaces clean.

Infection transmission between the first aider and the patient can be prevented or minimised by:

- washing and drying your hands thoroughly before and after giving first aid
- wearing clean disposable gloves, whether or not you are likely to be exposed to blood or other body fluids
- avoiding coughing, sneezing or talking while managing a wound
- wearing a face mask if the first aider has a respiratory tract infection
- using a resuscitation face shield when giving CPR to a nonbreathing patient
- using sterile or clean dressings
- handling and disposing of blood, needles and waste appropriately.

When oxygen is being given and there is more than one patient, a new mask for each patient is used to ensure that neither the first aider nor the patient are placed at risk of cross-infection.

back to Contents

THE BREATHING PATIENT

PLASTIC OXYGEN FACE MASK

The simple universal plastic face mask can deliver up to 60% oxygen from the cylinder, depending on the flow rate, and the speed and depth of the patient's breathing. Exhaled air is vented through the holes on each side of the mask. These light-weight, plastic oxygen masks are disposable so reduces infection risks, and they are transparent allowing the first aider to assess the patient.

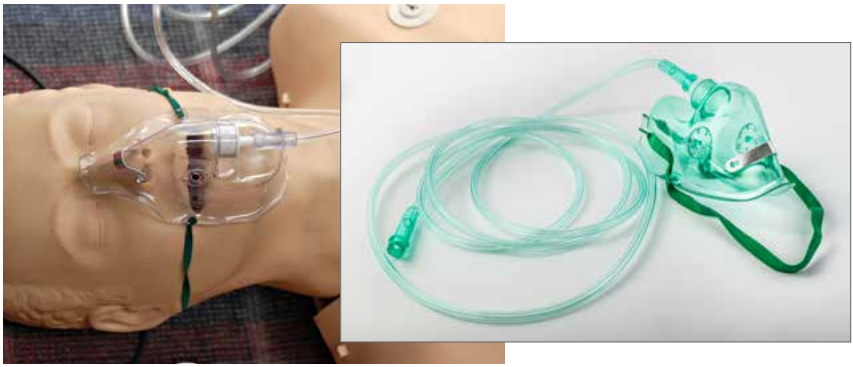
At low oxygen flow rates and deep respirations the patient may draw in room air through the side holes thereby diluting the oxygen concentrations received. As a general guide, a flow rate between 8–15 litres per minute (lpm) should ensure adequate oxygen is delivered to the patient. A flow rate under 8 lpm with quick respirations, may not be enough to 'flush' out the carbon dioxide in the face mask fully and therefore may have an affect on respiratory effort.

Some patients may find it difficult to tolerate a face mask and complain of suffocation when placed over the face and mouth. Forewarning the patient of this and other effects will ensure the patient will be able to tolerate the mask with less anxiety.

If the patient cannot tolerate any form of mask over the face then the two-pronged cannula should be used. This is better than no oxygen at all. Patients should be encouraged to breathe normally when receiving oxygen therapy and using the face masks.

Using a plastic oxygen face mask

1. Turn on the oxygen cylinder.
2. Connect the mask (via the tubing) to the oxygen unit.
3. Turn on the oxygen, allowing the oxygen to flow through the mask.
4. Introduce the mask to the patient explaining the benefits and the effects.
5. Hold the mask to the patient's face, gradually adjusting the elastic around the patient's head and the malleable nose piece.
6. Observe the patient's breathing.



back to Contents

THE BREATHING PATIENT

TWO-PRONGED NASAL CANNULA

The two-pronged nasal cannula is made up from plastic tubing with two plastic tips that sit at the base of the nostrils. It will deliver oxygen concentrations of 30–40%, with an oxygen flow rate of 3–5 lpm as the maximum possible flow rate.

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

The nasal cannula is usually well tolerated but it can cause some soreness around the nostrils and the maximum oxygen concentration it will deliver is limited.

This device is a useful means of oxygen delivery when low to moderate oxygen concentrations are required.

It is mainly used for chronic airway disease patients who are feeling slightly short of breath. Anyone who has acute shortness of breath needs high concentrations of oxygen.

Using a two-pronged nasal cannula

1. Turn on the oxygen cylinder.
2. Connect the nasal cannula (via the tubing) to the oxygen unit.
3. Turn on the oxygen allowing the oxygen to follow through the nasal cannula.
4. Introduce the nasal cannula to the patient explaining the benefits and the effects
5. Observe the patient's breathing.

back to Contents

THE BREATHING PATIENT

SELF-FILLING, BAG-VALVE-MASK RESUSCITATOR WITH OXYGEN

A self-filling bag-valve-mask (BVM) resuscitator is a soft bag manually squeezed and preferred by many first aiders as they can feel the movement of the bag, indicating the condition of the airway, and the presence or absence of breathing. The self-inflating bag fills spontaneously after they are squeezed, pulling oxygen or air into the bag. They deliver 100% oxygen to the patient. Self-filling, BVM resuscitators may be used for patients with severe respiratory distress, unconscious patients, and those who have been exposed to carbon monoxide inhalation.

A minimum of two trained people are recommended to provide ventilation when BVM oxygen is used.

Using a self-filling BVM resuscitator with oxygen

1. Attach the reservoir bag to the self-filling BVM system.
2. Attach the oxygen to the nipple on the reservoir bag.
3. Turn the oxygen on. The reservoir bag will inflate at 15 lpm to maintain a full reservoir.
4. Choose an appropriate size face mask (adult or child).
5. Place the mask over the patient's face (the narrow part over the bridge of the nose). Bring the patient's face to the mask to ensure a good seal.
6. Check that the mask is firmly applied.
7. Hold the mask with one hand. As the patient breathes in they will automatically receive 100% oxygen until the end of inhalation.

back to Contents

THE BREATHING PATIENT

DEMAND VALVE RESUSCITATOR

A demand valve resuscitator is an oxygen-powered device that provides a safe and effective method of delivering an oxygen concentration to ventilate spontaneously breathing patients on demand, or to patients in respiratory distress.

In breathing patients, inhalation triggers the demand valve, and oxygen automatically flows at 100% until inhalation is complete. Expired gases pass into the atmosphere. This is useful for patients with severe respiratory distress, unconscious patients, and those who have been exposed to carbon monoxide inhalation.

Using a demand valve resuscitator

1. Turn on the oxygen cylinder valve anti-clockwise; about one or two full turns.
2. Check the content gauge for an adequate oxygen supply.
3. Place the face mask firmly over the patient's nose and mouth ensuring an airtight seal. As the patient breathes in, the resuscitator will automatically supply 100% oxygen until the end of inhalation.
4. The patient exhales through the mask. There is no need to remove the mask.

THE NONBREATHING PATIENT

SELF-FILLING BAG-VALVE-MASK RESUSCITATOR

A self-filling BVM resuscitator is preferred by many first aiders as they can feel the movement of the bag, indicating the condition of the airway, and the presence or absence of breathing.

For nonbreathing patients, a hand-powered self-filling BVM resuscitator may be used with or without oxygen connected to the equipment.

A minimum of two trained people are recommended to provide ventilation when BVM resuscitator is used.

back to Contents

THE NONBREATHING PATIENT

Using a self-filling BVM resuscitator WITH oxygen

1. Kneel at the head of the patient and check for a clear and open airway.
2. Insert an oropharyngeal airway (if available).
3. Attach the reservoir bag to self-filling BVM system.
4. Attach the oxygen to the nipple on the reservoir bag.
5. Turn the oxygen on (the reservoir bag will inflate at 15 lpm to maintain a full reservoir).
6. Choose an appropriate size face mask (adult or child).
7. Place the mask over the patient's face (the narrow part over the bridge of the nose). Bring the patient's face to the mask to ensure a good seal.
8. Check that the mask is firmly applied and that the head tilt is maintained. Create a seal over the nose and mouth with your thumbs over the bridge of the nose, and your index fingers around the base of the mask. Use your remaining fingers to lift the jaw bone into the mask; this will maintain a head tilt.
9. Hold the mask with one hand and gently squeeze the bag with the other hand and watch for chest to rise; release bag.
10. Check constantly that the equipment is functioning and your technique is correct.

Using a self-filling BVM resuscitator WITHOUT oxygen

1. Kneel at the head of the patient and check for a clear and open airway.
2. Insert an oropharyngeal airway (if available).
3. Choose an appropriate size face mask (adult or child).
4. Place the mask over the patient's face (the narrow part of the mask goes over the bridge of the nose). Bring the patient's face to the mask to ensure a good seal.
5. Check that the mask is firmly applied and that the patient's head tilt is maintained. Create a seal over the nose and mouth with your thumbs over the bridge of the nose, and your index fingers around the base of the mask. Use your remaining fingers to lift the jaw bone into the mask; this will maintain a head tilt.
6. While holding the mask with two hands, have an assistant gently squeeze the bag and watch for the chest to rise; then release the bag.
7. Check constantly that the equipment is functioning and that your technique is correct.

back to Contents

THE NONBREATHING PATIENT

DEMAND VALVE RESUSCITATOR

In nonbreathing patients a manual override is used to inflate the lungs. This is operated by depressing a button directly. Excess lung pressure is prevented by a pressure relief valve.

Ensure that you do not over-inflate the patient's lungs. The pressure from a demand valve may cause injury to the lungs if they are over-inflated.

Using a demand valve resuscitator

1. Kneel at the head of the patient and check for a clear and open airway.
2. Insert an oropharyngeal airway device if available.
3. Turn the oxygen cylinder on: about one or two full turns, anticlockwise. Check the contents gauge for an adequate supply.
4. Choose an appropriate size face mask (adult/child).
5. Position the mask over the patient's face (the narrow part of the mask goes over the bridge of the nose). Bring the patient's face to the mask to ensure a good seal.
6. Ensure that the mask fits correctly and does not allow oxygen to escape while being used.
7. Check that the mask is firmly applied and the head tilt is maintained.
8. Press the button on the demand valve resuscitator until the chest starts to rise, then release and wait until lungs deflate (do not over-inflate).
9. Check constantly that the equipment is functioning and that your technique is correct.

MAINTAINING THE AIRWAY

OROPHARYNGEAL AIRWAY DEVICE

If there is difficulty keeping an open airway, an oropharyngeal airway device is used to assist in establishing and maintaining an adequate airway.

This device may be used in conjunction with a:

- self-filling BVM resuscitator
- mechanical resuscitator
- face mask on an unconscious patient.

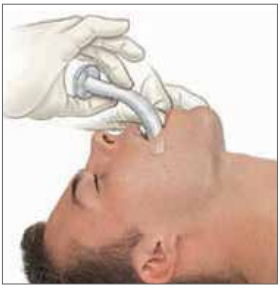
back to Contents

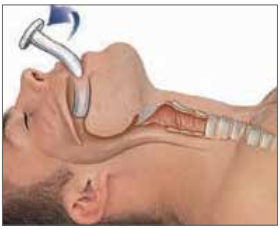
Warning

- Only use on an unconscious patient (it can irritate the back of the throat and cause vomiting, coughing and spasms of the larynx).
- If the patient shows any sign of vomiting or rejecting the device, remove the device immediately.
- Do not use on patients with tissue trauma to the mouth.

Inserting an oropharyngeal airway

1. Check that the patient's airway is clear.
2. Place an oropharyngeal airway device against the patient's cheek to ensure the correct size to use. The tubing should extend from the corner of the mouth to the tip of the earlobe.
3. To insert, use thumb and index finger crossed to pry the patient's teeth apart, and hold the mouth open.
4. Point the tip of the airway device toward the roof of the patient's mouth then insert the airway device, approximately 1/3 of its length, into the patient's mouth.
5. Rotate the device over the tongue until the device points towards the side of the patient's mouth.
6. Gently push the airway device approximately 2/3 of its length into the mouth, rotating so that the tip is pointing down the pharynx.
7. Gently push the airway device further into the patient's mouth until its flange is pressing on the lips.
8. Extend the patient's head and if necessary apply a jaw thrust to assist in settling the airway device into the correct position.





back to Contents

MAINTAINING THE AIRWAY

OROPHARYNGEAL SUCTION

A suction catheter is used to remove fluid (e.g. mucus, saliva, vomitus fluid) from the mouth and nose to prevent inhalation of the fluid, and to obtain and maintain an unobstructed airway.

This should only be carried out on an unconscious patient otherwise the patient will gag involuntarily.

If a large volume of material is present, the oropharyngeal airway device may need to be removed prior to suctioning.

Do not leave suction turned on unnecessarily as it wastes oxygen at approximately 20 lpm.

A portable suction unit

A typical flexible 'Y' suction catheter and suction tubing

A rigid Yankauer suction catheter and suction tubing.

A hand-operated suction device.

back to Contents

MAINTAINING THE AIRWAY

Oropharyngeal suction using a flexible 'Y' suction catheter

1. Connect an appropriate size Y suction catheter to the end of the suction tube.
2. Determine the maximum length of the catheter by measuring the distance from the corner of the patient's nose to their earlobe (place the catheter against the patient's face).
3. Turn the suction source on.
4. Open the patient's mouth with crossed fingers technique.
5. Insert the catheter to the appropriate depth with 'Y' piece open.
6. Suction by blocking 'Y' piece on the catheter with a finger and rotate the catheter continuously during removal. Suction for a maximum of 5 seconds at any one time.
7. Allow the patient to breathe oxygen, or ventilate the patient.
8. Ensure the suction bottle does not fill beyond 2/3 full.

Oropharyngeal suction using a rigid Yankauer sucker

1. Connect the Yankauer sucker to suction tubing.
2. Turn the suction source on.
3. Open the patient's mouth with crossed finger technique.
4. Hold the hand piece by cradling it in curved fingers of one hand, leaving the thumb free.
5. Insert the tip of the sucker into your direct-view area of the pharynx. The curve in the sucker should match the natural curve of the mouth and pharynx. If a hole is present on the hand piece, it should be uncovered during insertion.
6. Suction for a maximum of 5 seconds. If a hole is present on the hand piece, it needs to be blocked with your thumb to activate the suction.
7. Allow the patient to breathe oxygen, or ventilate the patient.
8. Ventilate the patient or continue to provide supplemental oxygen therapy.
9. Ensure the suction bottle does not fill beyond 2/3 full.

Oropharyngeal suction using a hand-operated suction device

1. Determine the maximum length of the catheter by measuring the distance from the corner of the patient's nose to their earlobe (place catheter against face).
2. Open the patient's mouth with crossed finger technique.
3. Insert the nozzle to the appropriate depth.
4. Rapidly squeeze the handle of the suction unit with one hand. Rotate and withdraw the nozzle with the other hand.
5. Allow the patient to breathe oxygen, or ventilate the patient.
6. Ensure the suction bottle does not fill beyond 2/3 full.

back to Contents

DRSABCD action plan

DANGER

Check for danger and ensure the area is safe for:

- yourself
- bystanders
- the patient.

RESPONSE

Check for a response:

- ask name
- squeeze shoulders.

No response?

- Send for help.

Response?

- Make comfortable.
- Monitor breathing and response.
- Manage severe bleeding and then other injuries.

SEND FOR HELP

Call triple zero (000) for an ambulance or ask a bystander to make the call.

Stay on the line.

[If alone with the patient and you have to leave to call for help, first turn the patient into recovery position before leaving to calling for an ambulance.]

AIRWAY

Open the patient's mouth and check for foreign material.

Foreign material?

- Roll the patient onto their side and clear the airway.

No foreign material?

- Leave the patient in the position found.
- Open the airway by tilting the head back with a chin lift.

back to Contents

In an emergency call triple zero (000) for an ambulance

BREATHING

Check for breathing.

- Look, listen and feel for 10 seconds.

Not normal breathing?

- Ensure an ambulance has been called.
- Start CPR.

Normal breathing?

- Place in the recovery position
- Monitor breathing.

CPR

Start CPR

30 chest compressions

: 2 breaths

Continue CPR until:

- help arrives
- the patient starts breathing
- or you are physically unable to continue.

DEFIBRILLATE

Apply a defibrillator as soon as possible and follow the voice prompts.

back to Contents

THE AUTOMATED EXTERNAL DEFIBRILLATOR

COMMON FAQS ANSWERED

What is a defibrillator? ... also known as an (AED) or 'defib'.	A defibrillator is an accurate and easy-to-use computerised medical device, called an Automated External Defibrillator, AED or 'defib'. A defibrillator analyses a person's heart rhythm and recognises a rhythm that requires a shock. The device will advise the first aider when a shock is needed. The defibrillator uses voice and/or visual prompts to tell the first aider the steps to take.
How does a defibrillator work?	A defibrillator delivers a set amount of electrical shock to the heart after it analyses that the heart's rhythm is not normal. The defibrillator determines whether a shock is required to the heart via the adhesive electrode pads attached to the patient's chest. The shock delivered by an defibrillator interrupts the chaotic rhythm of the heart and gives the heart the chance to return to its normal rhythm.
What is defibrillation?	Defibrillation is the process of attempting to restore the heart's normal rhythm.
What is a Sudden Cardiac Arrest (SCA)?	A SCA is associated with a disturbance of the electrical activity in the muscles of the heart's larger pumping chambers. With the use of a defibrillator an electric shock can be delivered to hopefully restore the heart's normal electrical rhythm. A SCA is not gender or age specific.
What are the benefits of using a defibrillator?	Application of a defibrillator increases the chances of surviving a SCA. For every minute that passes without a defibrillator being applied, the chance of survival after a SCA is reduced by 10%.
When is a defibrillator used?	Use a defibrillator if a patient is unresponsive and not breathing normally. The DRSABCD Action Plan has been followed and CPR has commenced. A defibrillator should be used whenever CPR is performed. If the patient is breathing, regardless of whether they are conscious or unconscious, a defibrillator is not required.

back to Contents

Common FAQs answered continued

Who can use a defibrillator? Do I have to be a healthcare professional to use one?	Anyone can use a defibrillator; you do not have to be a healthcare professional. A defibrillator is easy to use; it is just a matter of following the machine's clear verbal or visual instructions. The defibrillator will guide the user, step-by- step, through the defibrillation process. However, training is recommended to give the first aider greater confidence.
What if I attached a defibrillator to a conscious patient? Can I harm them?	No. If there is normal electrical activity in the heart (i.e. the heart is beating normally) the defibrillator will not allow a shock to be delivered. For example, if a person thinks the patient is not breathing but the heart is beating, the defibrillator will assess whether there is a heart rhythm and advise that a shock is not required. The defibrillator will not allow a shock to be delivered.
Can I shock a patient accidentally?	No. The defibrillator assesses the status of the person's heart beat. If the heart beat is normal, it will not shock. If it is not normal, the device will advise the first aider to press the shock button.
Can a heart stop beating after a defibrillator has got it beating again? How would I know?	Yes, a heart can stop beating again. Once a shock is delivered, the defibrillator will continue to monitor the patient's heart rhythm because the pads remain on the patient. If the defibrillator analysis reveals that the heart has stopped beating, it will advise that another shock is required. Continue to follow the voice/visual prompts.
Why don't I just wait until the ambulance arrives?	Defibrillation is most effective when carried out as soon as possible within 12 minutes after a sudden cardiac arrest. Average ambulance response time is up to 14 minutes.

back to Contents

THE DEFIBRILLATOR

A defibrillator is a computerised medical device used to treat a Sudden Cardiac Arrest (SCA)—a condition associated with a disturbance of the electrical activity in the heart's ventricular muscles (the larger pumping chambers). The device can:

- check and analyse a person's heart rhythm
- recognise a rhythm that requires a shock
- advise the first aider when a shock is needed.

Defibrillation is the process of restoring the heart's normal rhythm. This process is crucial in the first minutes following a SCA to maximise the patient's chance of survival.

The defibrillator uses voice and/or visual prompts to tell the first aider the steps to take when responding to a SCA.

If a shock is not advised, the defibrillator prompt will indicate that it is safe to touch the patient and instruct you to continue CPR if required.

If a shock is advised, the defibrillator prompt will indicate to stand clear of the patient for the shock to be applied. The defibrillator will then indicate that the shock has been delivered and will automatically analyse the heart rhythm again to see if another shock is required.

Defibrillators are very accurate and easy to use. There are many different brands of defibrillators in Australia, but the same basic steps apply to all of them. Users should follow the automatic prompts of the particular defibrillator being used.

The defibrillator automatically stores data in its internal memory when it has been activated. The paramedics, hospital or doctor may want to check this information following a defibrillation incident. The stored incident data can be transferred to a personal computer or laptop with infrared capabilities or cable, and run the specific software relevant to the make of defibrillator.

back to Contents

THE CARDIOVASCULAR SYSTEM

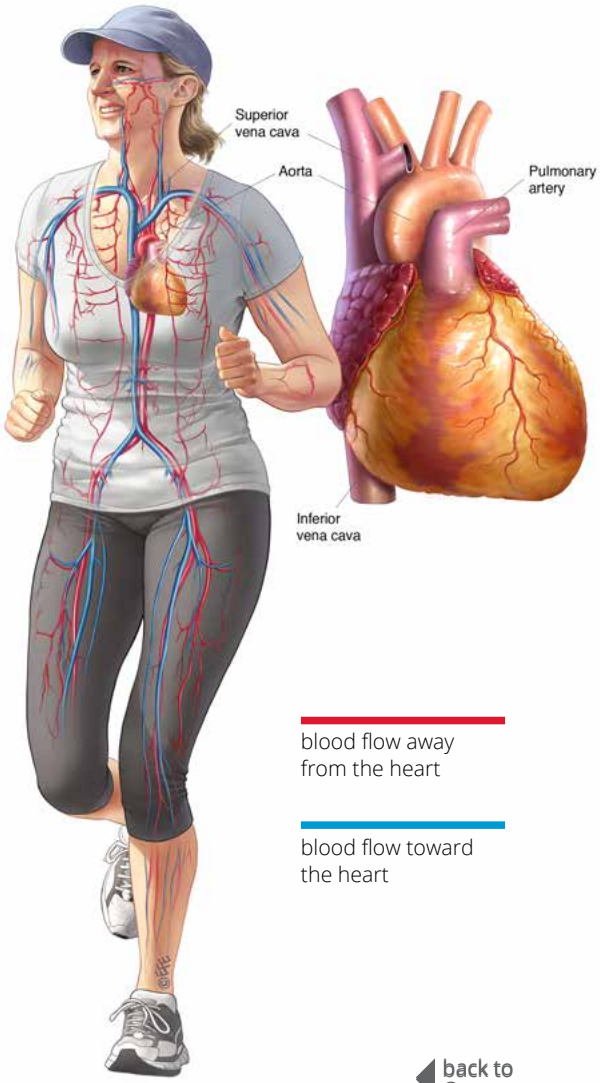
The cardiovascular system comprises the heart, blood and blood vessels (veins, arteries and capillaries) which pump oxygen-depleted blood (red) away from the heart via the pulmonary artery to the lungs, and return oxygenated-rich blood (blue) to the heart via the pulmonary vein.

The heart provides the pumping action needed to keep blood flowing throughout the body. The heart is a muscular organ the size of a clenched fist which acts as a two-sided pump, first relaxing and filling up with blood and then contracting to squeeze (or pump) the blood out into the arteries.

This pumping action is automatic and is caused by a flow of electricity through the heart that repeats itself in a cycle. If this electrical activity is disrupted it can affect the heart's ability to pump properly.

The circulation of blood begins and ends at the heart and consists of:

- pulmonary circulation (red) starting on the right side of the heart, blood is pumped to the lungs where it loses carbon dioxide and absorbs oxygen, and then goes back to the left side of the heart
- systemic circulation (blue) starting on the left side of the heart, blood is pumped to the body, where it delivers oxygen and removes carbon dioxide, and then returns to the right side of the heart.



back to Contents

CHEST PAIN

Although chest pain unrelated to injury can be caused by stress, indigestion, disorders of the oesophagus, and muscle spasm, it can also be the result of cardiovascular disease and a sign of a heart attack or angina.

ANGINA

If the pain is heart-related, it indicates that the amount of blood flowing through the coronary arteries is not sufficient for the heart's needs. A build up of waste products restricts blood flow, causing pain or discomfort in the chest which may spread to the neck, jaw, shoulders and arms.

This type of chest pain is usually identified by a feeling of pressure, burning or tightness in the centre of the chest. This is known as angina (angina pectoris) and can usually be relieved by rest and prescribed medication.

HEART ATTACK

A heart attack occurs when part of the heart muscle is damaged because its supply of oxygenated blood has been cut off. The usual cause is a blood clot occluding (blocking) a coronary artery narrowed by atherosclerosis. If the blood supply is not restored within an hour, part of the damaged heart muscle begins to die. Atherosclerosis is the narrowing of the arteries when fatty deposits build up on the inner walls of arteries thus not allowing enough oxygenated blood to be carried to the heart.

Damaged heart muscle may initiate an uncontrolled disorganised rhythm (ventricular fibrillation) which may cause the heart to stop beating.

SUDDEN CARDIAC ARREST

A Sudden Cardiac Arrest (SCA) can be a result of various causes, with the most common cause being an acute episode of underlying heart disease, such as a heart attack. For some people, the first warning sign of heart attack may be a SCA.

A Sudden Cardiac Arrest is the unexpected collapse (with no apparent cause) of a person whose heart has ceased to function normally due to an electrical malfunction of the heart disrupting the heart muscle's normal rhythm. Just like a pump needs an energy source to work, the heart's pumping mechanism is driven by electrical signals.

During a SCA, the electrical signals to the pump become erratic. The ventricles (the larger pumping chambers) of the heart quiver or 'fibrillate' in a disorganised way and stop the heart pumping blood around the body effectively. The heart stops beating, causing collapse, unresponsiveness and no signs of circulation. This can be fatal if the patient is not quickly resuscitated.

back to Contents

The only effective treatment for fibrillation is using a defibrillator to deliver an electric shock to the SCA patient's heart.

The patient has only a short time from collapse until death. For every minute defibrillation is delayed, the chance of the patient's survival decreases by approximately 10%.

CPR AND DEFIBRILLATION

CPR is given to a patient if they are unconscious and not breathing normally, and a defibrillator (if available) is applied as soon as possible. CPR can maintain the blood flow and keep the blood oxygenated; the defibrillator can assist the heart to regain its normal electrical rhythm.

CPR must continue while the defibrillator is being collected, opened and the pads are being attached to ensure blood flow continues (through compressions) right up until the last minute. The defibrillator will start to analyse and advise, for example, 'do not touch the patient—analysing' once the defibrillator is in place, and it is at this point that the person performing CPR would stop.

It is vital that calling triple zero (000), giving CPR and applying a defibrillator occurs as soon as possible; these actions provide the best chance of surviving a SCA.

Following successful defibrillation, CPR should be continued until it is clear that the patient is breathing and responding. The pads should not be removed; the paramedics will decide when the pads should be removed.

A Sudden Cardiac Arrest can happen to anyone—young or old, male or female—anywhere, at any time. Many patients have no warning signs or symptoms.

Infants and children

Infants and young children who are not breathing or responsive are more likely to be in respiratory arrest. This is when normal breathing stops due to failure of the lungs to function effectively.

Defibrillation is not recommended. Follow DRSABC and ensure an ambulance has been called—triple zero (000).

back to Contents

DEFIBRILLATION

Signs and symptoms

- Defibrillation is given to a patient whose heart has stopped beating normally.
- The patient is unconscious and not breathing normally.

Note

- CPR must continue while the defibrillator is being collected, opened and the pads are being attached.
- If you are alone with the patient, place the patient in the recovery position and collect the defibrillator (if available).
- If two first aiders are present, one should collect the defibrillator while the other begins CPR on the patient.
- You can do no harm by connecting a defibrillator, because the defibrillator will detect if a shock is needed or not.
- The defibrillator will provide visual or vocal automatic instructions (depending on the make of defibrillator). Follow the visual or vocal voice prompts.

What to do

Prepare the patient

1. Expose the patient's chest, removing any clothes if necessary, including a bra.
2. If the patient's chest is damp or wet, wipe it down with a towel to ensure it is dry before applying the defibrillator pads.
3. Remove any medication patches located where the pads will be applied.
4. Remove or move any jewellery where the pads will be applied.
5. Check for pacemaker or implant scars (found between the collar-bone and the top of the breast, or either side of the chest).

back to Contents

What to do

Apply the pads

- Open the defibrillator case.
- Follow the defibrillator's automatic prompts, which will tell you where the pads are to be placed on the patient's chest.
- If there is a second first aider, CPR should continue while the pads are being placed.

On an adult

1 Place one pad to the patient's right chest wall, below the collarbone.

2 Place the other pad on the patient's left chest wall, below the left nipple.

Check for pacemaker or implant scars (found between the collar-bone and the top of the breast, or either side of the chest).

If an implant is identified, place the pad at least 8 cm away from the site. Do not place the pad on top of the pacemaker or implant site.

On a child under 8 years

Use a defibrillator with child pads.

1 Place one pad in the centre of the patient's chest, between the nipples.

2 Place the other pad in the centre of the patient's back, between the shoulder blades.

If child pads are not available, adult pads should be used. Place the adult pads as you would on an adult, ensuring the pads do not touch.

If there is insufficient space on the child's chest, one pad can be placed on the chest, and the other on the back.

It is recommended that both adult and paediatric pads are stored with a defibrillator.

back to Contents

What to do

Use the defibrillator

1 Once the pads are placed, the machine will provide visual or vocal automatic instructions (depending on the make of defibrillator).

2 It is important that no one touches the patient during the analysis and shock process.

If a person has been performing CPR, they should stop and move slightly away so they are not in contact with the patient.

3 The defibrillator will analyse the heart and determine whether a shock should be given.

4 After the shock is delivered, continue CPR until medical assistance arrives.

5 If the patient starts breathing normally, roll into the recovery position.

- DO NOT remove the pads.
- DO NOT turn off the defibrillator.

6 Continue to check the patient's breathing. Be prepared to begin CPR again if the patient stops breathing normally.

back to Contents

COUNSELLING AND SUPPORT

Anyone involved in the resuscitation and defibrillation of a patient should see their doctor or counsellor for debriefing.

Post-event support is especially important in cases where a rescue is unsuccessful, or involves a friend or member of the rescuer's family.

ENSURING DEFIBRILLATOR READINESS

A defibrillator is very easy to maintain. It has extensive automatic self-testing features which eliminate the need for any manual calibration. The defibrillator has been manufactured to perform daily, weekly and monthly automatic self-testing. This saves time, improves testing consistency, and minimises unnecessary battery expenditure.

However, it is important that the defibrillator is also checked manually on a weekly basis and maintained in a continual state of readiness. This will ensure that it is ready for use in an emergency. Regular checking and maintaining of the defibrillator and consumables should be done in accordance with manufacturers' instructions and check lists for the particular defibrillator model.

Inspections and check lists help identify and prevent deficiencies, not just by providing a uniform way to inspect devices, but also by increasing the user's familiarity with the equipment. The weekly check includes:

- checking that the green 'Ready' indicator is flashing and visible. If not, consult the manual for recommended action.
- checking supplies and accessories for damage and expiration dating. Replace any used, damaged or expired items. Ensure that defibrillator pads are stored flat and in a cool area.
- checking the outside of the defibrillator for cracks or other signs of damage. If you see signs of damage, contact your local branch of St John Ambulance Australia or the device's manufacturer for technical support.

Care in the use of defibrillators

Analysis and defibrillation should not take place while moving the patient or in a moving vehicle.

Do not use a defibrillator in the presence of flammable substances and mixtures. There is a possibility of explosion if the defibrillator is used in the presence of flammable anaesthetics or concentrated oxygen. If oxygen is used during resuscitation, ensure that the oxygen flow is directed away from the patient and the defibrillation area during the analysis and delivery of shock

Water conducts electricity and it is important that a patient is moved from free-standing water such as a swimming pool or bath ,and their chest is dried before a defibrillator is used.

Radio frequency interference from devices such as mobile phones and two-way radios should not be used within 1 metre of a defibrillator.

back to Contents

Cleaning your defibrillator

The outside of your defibrillator and the case can be cleaned with a soft cloth dampened with soapy water or chlorine bleach (2 tablespoons per litre of water) or ammonia-based cleaners.

- DO NOT use isopropyl (rubbing) alcohol, strong solvents such as acetone or acetone-based cleaners, abrasive materials, or enzymatic cleaners on the defibrillator.
- DO NOT immerse the defibrillator in fluids or allow fluids to spill onto it.
- DO NOT sterilise the defibrillator or its accessories (refer to manufacturers instructions).

Defibrillator weekly checklist

Defibrillator location						
Defibrillator make and serial number						
Date	Check security cabinet alarm	Check PPE: face shield, scissors, gloves	Inspect case for damage	Check status of green service light	Check expiry date on pads	Signature

back to Contents

TEST YOURSELF

For each statement give either True or False

1. The colour of a medical oxygen cylinder is all white with a large black 'N' on the neck.	
2. Plastic seals over the pin indexing holes of an oxygen cylinder indicates an empty cylinder.	
3. The 'pin index' safety system fitted to medical oxygen equipment prevents non-medical oxygen regulators being used by mistake.	
4. The purpose of a regulator on oxygen equipment is to reduce pressure to a working level.	
5. The purpose for 'cracking' an oxygen cylinder is to prepare it for connection to oxygen equipment.	
6. It is okay to use the same mask with two patients.	
7. A conscious breathing patient should be given 100% oxygen with a plastic oxygen face mask.	
8. Oxygen equipment including plastic face masks and cannulas are very safe so there is no need to explain their use to the patient.	
9. You would give oxygen therapy to an elderly person who is pale, sweaty, feels dizzy and is complaining of pain in the centre of their chest.	
10. An oxygen flow rate between 8–15 lpm should ensure adequate oxygen is delivered to the patient via a face mask.	
11. A nasal cannula is mainly used to deliver oxygen for chronic airway disease patients who feel short of breath.	
12. You have managed a conscious patient with a severe abdominal injury. The patient may benefit from receiving oxygen therapy.	
13. When using an oxygen powered resuscitator to resuscitate a nonbreathing patient, you are aiming to administer only 40% oxygen so as not to overwhelm lung function.	
14. Two trained first aiders are required to give oxygen during resuscitation of a nonbreathing patient.	

back to Contents

15. An oropharyngeal airway device should only be used on an unconscious patient to help maintain an open airway.	
16. To determine the maximum length of a Y suction catheter to be used, the distance is measured from the centre of lips to the earlobe.	
17. If CPR is given within 4 minutes and defibrillation within 8–12 minutes, there is a significantly improved chance of survival.	
18. A heart attack occurs when the electrical activity in the muscles of the heart is disturbed.	
19. The first sign of a heart attack may be a Sudden Cardiac Arrest.	
20. CPR should be continued while the defibrillator pads are being placed on an adult patient.	
21. For a child between 1–8 years who has suffered a Sudden Cardiac Arrest, one pad will be placed on the centre of their chest, the other on the centre of their back.	
22. A first aider can safely ignore any implant device scars noticed while preparing a patient for defibrillation.	
23. You should stop CPR when the defibrillator arrives, and help the other person to quickly apply the pads.	
24. If defibrillation is successful, the first aider should leave the pads on the patient, and defibrillator on.	

Answers

1. True	2. False	3. True	4. True	5. True	6. False
7. False	8. False	9. True	10. True	11. True	12. True
13. False	14. True	15. True	16. False	17. True	18. False
19. True	20. True	21. True	22. False	23. False	24. True

back to Contents

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back to Contents

DEFIBS SAVE LIVES

Sudden Cardiac Arrest is one of the leading causes of death in Australia Having a defib in your workplace or community club can make the difference between life and death. They are easy to use, maintain, and can save a life prior to the ambulance arriving.

St John Ambulance Australia is a world leader in prehospital emergency care. Since the early 1990s, St John has been at the forefront in the use of defibrillators at major public events, and has been placing defibrillators in public places since 2004.

Can you afford not to have a Defib?

<5%

survive*

Without early defibrillation with an AED, less than 5%* of cardiac victims survive.

In 2015 Sudden Cardiac Arrest was one of the leading causes of death in Australia.

70%

increase in survival

Defibrillation within the first few minutes of having a Sudden Cardiac Arrest, increases the chance of survival, to over 70%.*

90% of people who suffer SCA do not survive.*

WITHOUT DEFIBRILLATION

For every minute that passes, the chance of survival reduces by 10%*.

The average ambulance response time is 8–10 minutes in metro areas — up to 30 minutes in regional areas*.

SCA can strike anyone, anywhere, anytime with the only definitive treatment a defib shock.

SHOP ONLINE

shop.stjohn.org.au

back to Contents

* VACAR 2014-2015

Advanced resuscitation is advanced life support—that is, the administration of oxygen to a patient suffering from a medical condition or injury; resuscitation with the aid of oxygen, and the techniques to defibrillate a patient.

Advanced resuscitation provides the advanced first aider with illustrated and step-by-step instructions on how to use and maintain resuscitation equipment and an automated external defibrillator.

Advanced resuscitation has been developed to support the relevant training courses conducted by St John Ambulance Australia Inc. and its State and Territory entities.

EMERGENCY TELEPHONE NUMBERS

TRIPLE ZERO (000)

- Ambulance
- Fire
- Police

Poisons Information Centre
13 11 26

Allergies and anaphylaxis
www.allergy.org.au/

Asthma Australia
1800 645 130

Diabetes Australia
1300 136 588

Diver Emergency Network
1800 088 200

SAVE A LIFE

LEARN FIRST AID
CALL 1300 ST JOHN
WWW.STJOHN.ORG.AU

9 780949 569547

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