Set-up of Oxygen Equipment

Oxygen is often used in the treatment of serious illness and injury and has been used with great success by Australian lifesavers since 1973.

CHECKING EQUIPMENT BEFORE USE

Before patrol and before using oxygen equipment, it must be checked thoroughly.

POSITION OF EQUIPMENT

When oxygen is in use, the equipment must be placed so that the operator responsible for it can reach it easily and can see the contents gauge.

Safety Precautions when Using Oxygen

- Oxygen must at all times be used with care and respect.
- Never use oxygen near an open flame.
- Never use oxygen near cigarettes.
- Never use grease or oil with oxygen equipment.
- Remember that oxygen promotes all types of combustion (burning).
- Do not allow anyone to tamper with oxygen equipment.
- Store the oxygen unit in a cool place.
Store oxygen bottles lying flat, or securely fastened if upright.

Only use medical oxygen. It is supplied in black cylinders with a white shoulder.

THE COMPONENTS OF OXYGEN RESUSCITATION EQUIPMENT

It is very important for those trained in the use of oxygen resuscitation units to make sure that they are aware of the components and operation of the unit or units in use at their location.

The basic components are:

- **Protective case.** This houses all the relevant equipment. In some models it will include the oxygen cylinder.

- **Oxygen cylinder.** The body of the cylinder may be black or silver but the shoulders of oxygen cylinders are white. Note that medical oxygen is the only gas to be used in the oxygen equipment. The cylinder is constructed with two pin index holes next to the main outlet. These index holes mate with pins on the mounting yoke of the oxygen equipment. A fresh, full cylinder will usually have a protective wrapping of blue or white plastic around the oxygen outlet to prevent dust and dirt from entering during transport. Before attaching the cylinder to the oxygen equipment, all of this wrapper must be removed.

- **Cylinder cradle.** This provides support for the oxygen cylinder.

- **Cylinder yoke.** This is the connection for the oxygen cylinder. In some instances, it is part of the case; otherwise it may be attached as part of the regulator.

- **Sealing washer.** This fits in the yoke to prevent leakage from the cylinder joint. Spare seals are kept in the oxygen equipment case.

- **Locating pins.** These are positioned in the yoke so that the operator can locate the oxygen cylinder correctly.

- **Thumb screw.** This helps to secure and maintain the cylinder in position.

- **Cylinder key wheel.** This is used to open or close the cylinder valve.

- **External cylinder connection.** This allows larger oxygen cylinders to be attached for training purposes. It is important to remember that when an external cylinder is in use, a small cylinder or the yoke plug should be firmly in place to prevent oxygen leaking. (NOTE: this connection is not found on all units.)

- **Contents gauge.** This indicates the amount of oxygen in the cylinder. When the cylinder is full, it will be marked FULL.

- **Regulator.** This regulates the oxygen pressure and flow of oxygen to the therapy and oxygen control valve.

- **Guedel airways.** These work to maintain a clear airway and can only be used by trained personnel.

- **Air bag.** This is used for inflating a patient’s lungs by squeezing, which supplies oxygen from an oxygen reservoir.

- **Oxygen reservoir.** Attached to an air bag, this supplies up to 95% oxygen when connected to an oxygen supply.

- **Tubing.** Dependent on the unit, there will be either one or two tubes, usually clear and/or green in colour. This tubing supplies oxygen to the airbag and oxygen therapy.

- **Control valves.** These are turned on when using the air bag resuscitator or oxygen therapy. It gives a fixed flow rate of oxygen. On some models the control valve and flow rate are built into the regulator.

- **Anaesthetic masks.** Each unit should contain one adult and one child-size mask.

- **Therapy masks.** A clear, colourless disposable type of therapy mask, such as the Hudson No. 1041 or 1043 is recommended.

- **Chalk.** This is used to mark the volume of oxygen in the cylinder.
Routine Check of Oxygen Equipment

1. Before a cylinder is fitted to the oxygen equipment, the protective plastic wrapping must be removed.

2. The cylinder is “cracked” by turning it on and off very briefly, keeping the cylinder as upright as possible and taking care that the outlet is not pointed at any person or at the sand. Cracking the cylinder removes any foreign matter from its valve opening. The cylinder must be inserted into the yoke, lining up the inlet and outlet holes together with the locating pins and spigot. Check that the sealing washer is present and is not damaged or dirty, otherwise the machine cannot be used. The thumb screw is then firmly screwed home.

3. Check the contents of the cylinder by using the key to open the cylinder valve slowly until the gauge reaches a steady point. This slow build-up of pressure saves damage to the regulator and gauge by avoiding a sudden rush of oxygen. Open the cylinder valve fully, then turn the key wheel back half a turn to prevent locking. The gauge should register FULL. Reject the cylinder if it is half or less than half full, and fit a new cylinder. (NOTE: Laerdal units have a lever switch to turn on and off.)

4. Check the oxygen tubing for cracks or other damage. Ensure that the open end will fit easily to both therapy masks.

5. Check both therapy masks for cleanliness and serviceability.

6. Check the condition of the anaesthetic mask cuffs for fit, perishing or cracks.

7. Ensure the Guedel airways are present and clean. These are for use by appropriately qualified personnel.

8. Check for chalk, gloves and spare sealing washers in the case: chalk for marking the quantity of oxygen in the cylinder; gloves for personal protection during emergency care; and spare seals to replace defective or missing seals as required.

9. Check the flow of oxygen from the cylinder through the tubing.

10. Check the clear colourless oxygen tubing for cracks or other damage, and ensure that the open end of the tube is fitted to the oxygen intake of the air bag.

11. Check the operation of the oxygen nipple by turning the oxygen valve to the ON position. When you do this, the oxygen reservoir should fill.

12. Close the cylinder valve, then drain oxygen from the system by operating either of the two delivery systems.

13. Check that the needle on the oxygen cylinder’s contents gauge falls to zero.

NOTE: As each item is checked, it should be returned to the case in a neat and tidy fashion.

Keep the whole unit clean and free from sand, sea water, oil, grease, etc.

Oxygen Therapy

Oxygen therapy is only used for patients who are breathing. It may be safely given by qualified lifesavers to any patient about whom they are worried. This may include patients suffering from:

- Unconsciousness
- Shock
- Blood loss
- Chest pain
- Shortness of breath, including asthma
- The aftermath of resuscitation
- Severe pain
- Injuries

NOTE: The unconscious breathing patient will be in the lateral position.

The conscious person will be nursed according to his or her needs. For instance, heart patients and asthmatics will usually be most comfortable sitting up, while patients who have lost blood will need to be flat, perhaps with their legs raised.
PROCEDURE FOR ADMINISTERING OXYGEN THERAPY

Having checked the oxygen equipment and placed it correctly, connect the therapy mask to the tubing and turn the oxygen on. Then put the mask on the patient’s face. If a conscious patient does not want to use the mask, remove the tubing from it and direct the oxygen flow around the mouth and nose.

AIR BAG RESUSCITATOR

The air bag resuscitator with oxygen reservoir is a manually operated, soft recoil silicone bag with a secondary plastic bag attached. This secondary plastic bag acts as a reservoir for oxygen when connected to an external oxygen supply.

The resuscitator with oxygen reservoir will supply the patient with up to 95% oxygen when connected to an oxygen supply, with a flow rate of 14 or 15 litres per minute.

Patients who are not breathing should be treated in the first place by expired air resuscitation but will almost always benefit from the use of added oxygen by trained lifesavers. The Bronze Medallion teaches the use of the mouth to mask method and the Advanced Resuscitation Certificate teaches the use of the airbag with oxygen reservoir. This method will provide the patient with an oxygen concentration of more than 90% if the seal between the mask and face is perfect and the oxygen supply is 14 or 15 litres per minute.

When the oxygen unit arrives and is being set up, the first operator continues with the mouth to mask method or changes to it if a mask was not previously available and prepares to change over to the bag. This will take some time, however, and resuscitation must continue during the changeover period. It is possible to give mouth to mask resuscitation with oxygen briefly using the therapy tubing before the bag is ready, as these are given by two separate tubes.

SETTING UP THE OXYGEN RESUSCITATION EQUIPMENT

1. The oxygen equipment operator sets up the machine clear of the patient and both operators, but in a position where the pressure gauge is clearly visible.

2. Immediately after the case is opened, the suitable sized anaesthetic mask is passed to the first operator so that he or she can change to the mouth to mask method of EAR. If mouth to mask...
resuscitation is in progress, however, the air bag oxygen resuscitator can be fitted directly to the mask (after an operational check).

3. The oxygen equipment operator should quickly check:
   a) The correct operation of the patient valve.
   b) The valve to the oxygen reservoir bag.
   c) The connection to the oxygen supply.

4. The oxygen is then turned on to 14 or 15 litres per minute to allow inflation of the air bag reservoir. The airbag is compressed to expel its air, allowing the whole system to be filled with pure oxygen.

APPLICATION OF OXYGEN EQUIPMENT

1. When the oxygen reservoir is inflated, the oxygen equipment operator informs the first operator that the air bag is ready for use.

2. After a signal — usually the first operator tapping the other operator on the shoulder and explaining to the other what he or she is going to do — the first operator positions the patient valve in the anaesthetic mask (or onto the Laerdal pocket mask) and compresses the air bag so that there is no change at all in the timing of respiratory resuscitation. (This is important if cardiopulmonary resuscitation — CPR — is being performed.)

3. The air bag oxygen resuscitator should be compressed with two hands using a squeezing motion, then allowed to refill.

The amount of oxygen to be squeezed into the patient's chest is the amount required to make the chest rise. The bag should then be released and allowed to refill.

NOTE: The rise and fall of the patient's chest should be watched at all times during this operation.

PROCEDURE FOR USE OF OXYGEN EQUIPMENT

From this stage on the procedure for the use of oxygen equipment is identical to that for EAR.

1. The first operator starts manual methods of resuscitation, while the second operator sets up and checks the oxygen equipment.

2. On the changeover to the oxygen equipment the first operator controls the backward head tilt and ensures a proper seal between the mask and patient's face. Meanwhile, the second operator manages the air bag and oxygen system.

3. Both operators are responsible for seeing that the patient's chest rises with each inflation and falls as air leaves the lungs again.

4. If, at any time, either operator is not happy with the functioning of the oxygen equipment, the equipment must be removed immediately and the operator must continue with EAR by the mouth to mouth, mouth to mask or mouth to nose method.

5. If the air bag oxygen resuscitator is being used during cardiopulmonary resuscitation, there must be three lifesavers present. One controls the patient's airway and ensures the seal of the anaesthetic mask; the second activates the oxygen equipment; and the third performs the external cardiac compression.

6. If oxygen equipment is being used on a child, the air bag should be compressed with one hand. When the child's chest is seen to rise, compression of the bag should be stopped. Airbag resuscitators should not be used on infants.

OPERATIONAL TIME

A full “C” cylinder (440–490 litres) will have the following approximate operational time:

- Approximately 50 minutes, with continuous use of oxygen therapy.
- Approximately 30 minutes, with continuous use of airbag (and oxygen).
Equipment Maintenance

a) General care

1. The machine should be kept clean and free from sand and foreign materials.

2. To ensure its correct operation, it must be checked:
   - After every teaching session.
   - Before each patrol.

3. Whenever the oxygen equipment shows defects that may cause it to operate incorrectly, the machine must be taken out of service immediately and repaired by the manufacturer.

b) Care after use

After every use, the resuscitator should be disassembled, cleaned, disinfected, reassembled and tested, in an orderly fashion.

**NOTE:** When using the Laerdal bag, do not remove the plastic adaptor from the patient end of the air bag or the reusable reservoir.

1. Oxygen therapy masks should be thrown away after use. The tube and the anaesthetic masks should be washed thoroughly in warm soapy water so that all foreign material is removed, then rinsed with fresh running water.

2. The patient valve should be disassembled, washed in soapy water to remove all solids, then rinsed in fresh running water and reassembled.

3. The air bag should be washed in warm, soapy water and rinsed in fresh running water.

4. The rear valve should be disassembled, washed in warm, soapy water, rinsed in fresh running water and reassembled.

5. The reservoir valve (on the Laerdal bag) and oxygen reservoir should be washed in soapy water and rinsed in fresh running water.

6. All parts should be soaked in a solution of 70% alcoholic chlorhexidine for at least two minutes.

7. They should then be rinsed and dried.

8. Operate all parts of the equipment after drying and before storage.

c) Servicing

The oxygen equipment should be serviced before each season commences and at other intervals determined by each State Centre and the manufacturer of the unit.

d) Storage

- Store oxygen equipment in a cool but accessible place, as heat causes rubber and plastic components to deteriorate.

- Spare oxygen cylinders should be stored in a cool but accessible place, near the oxygen equipment.

- Store oxygen equipment away from busy traffic areas and possible sand and dust contamination.

- Don’t store oxygen equipment near oil or grease — in contact with high pressure oxygen they can cause fire.

- Don’t store the equipment in an enclosed space — any leakage from the unit could cause oxygen build-up, which is dangerous in the event of fire.

- Don’t cover the unit — any leakage could cause oxygen build-up.

- Don’t allow smoking or naked flames near the oxygen equipment at any time, whether it is stored or in use. Any leaking oxygen could escalate a fire.

- Don’t leave the unit with any pressure in the system. Turn off the cylinder, then drain the oxygen either from the delivery tubes by operating either of the two delivery systems.

- Empty oxygen cylinders should be returned for filling without delay. Cylinders which are half full or less can be used for training.
The Stifneck Spinal Brace

The Stifneck spinal brace is **not a substitute for correct management of spinal immobilisation** by first aiders of packing around the head and neck with sand, towels or other material. Stifneck collars are recommended if the patient has to be moved.

**Lifesavers should NOT move a suspected spinal injury unless they are in a situation where they are threatened by the incoming tide or other danger.**

The use of the Stifneck brace is taught to experienced members of Surf Life Saving Australia who practise this skill regularly. It should not to be attempted by lifesavers who have not been taught and regularly updated in its use.

The Stifneck brace is a plastic and foam device that fits around and supports the neck. It is used by most ambulance services. Their experience has shown that it should not be used in cases requiring either EAR or cardiopulmonary resuscitation.

The Stifneck collar is made in a variety of sizes. Frequent practice is essential to ensure prompt, proper, safe use of the spinal brace. The fitting of a spinal brace is not easy and its correct use requires a detailed understanding of basic principles as well as the practical application. Specialised teaching and practice on a variety of people are necessary to know which Stifneck collar size is appropriate for different types of people.

**MEASURING**

**Determine the “key dimension” on the patient**

With the patient in neutral alignment, place your finger on the trapezius at the base of the neck to determine the “key dimension”.

**Select the collar where the “key dimension” matches the patient’s key dimension.**

**Identify parts of brace**

**Move black screw to the round hole**
APPLYING THE STIFNECK SPINAL BRACE

The Stifneck brace should be applied as soon as necessary during the rescue, provided a suitably qualified person is present to apply it.

1. The timing of application will be determined by the operator.

2. The operator applying the brace will need to check:
   a) which size brace is appropriate, by assessing the patient.
   b) that the brace is intact and the velcro attached correctly.

3. The operator then needs to fit the brace under the patient’s chin, being careful not to put any pressure on the neck or trachea (windpipe). It is necessary for the operator to be mobile so as to be able to check that the brace fits correctly all round the neck.

4. The operator then passes the brace round the patient’s neck while positioned on the patient’s left side to allow correct positioning of the velcro. (All Stifneck braces are made with the velcro on the left side.)

5. The operator then checks that the brace fits snugly, and is neither too loose nor too tight.

6. After fitting the brace, continue with normal spinal injury procedures, remembering that the brace is an aid, not a substitute for the correct management of immobilisation, airway management and transport.