RCH@Home Manual: Oxygen Therapy

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1. What is oxygen therapy?

Oxygen therapy is a safe and effective way of delivering supplemental oxygen to infants and children which aims to achieve and maintain adequate oxygenation.

Oxygen therapy may be needed for infants and children who are unable to maintain adequate oxygen levels on their own. This may be due to medical conditions affecting the heart and/or lungs.

Some symptoms of low levels of oxygen in the body can cause changes in breathing including shortness of breath, increased effort of breathing, increased heart rate, changes to colour of the face, lips, eyelids and fingernails, decreased activity tolerance, fatigue, restlessness or irritability and headache. Children may need oxygen therapy continuously or only at certain times e.g. when asleep, when unwell or when having a seizure.

**NOTE:** Oxygen is a drug and requires a medical order. Oxygen therapy should be closely monitored & assessed at regular intervals.

2. Giving oxygen at home and in the community

In the home and community, we use either oxygen cylinders or concentrators to supply oxygen to the child. Oxygen can be given to the child by nasal prongs, a face mask, CPAP/BiPAP mask, via their tracheostomy tube or ventilator. Oxygen can also be warmed or humidified, as dry compressed gas may damage the lining of the trachea.

The amount of oxygen delivered to the child can vary and it is dependent on the child’s oxygen requirements. Please refer to the child specific care pages to determine the child’s oxygen requirements.

3. Simple nasal prongs

Nasal prongs are simple and easy to use. The prongs inside the infant/child’s nostrils and allow them to continue with normal daily routine including feeding/eating with minimal impact to their otherwise normal activities. They are available in different sizes therefore you will need to make sure you have the appropriate size nasal prongs for the infant/child’s age and size.
3.1 Safety points for oxygen delivery via Nasal Prongs

- Maximum delivery of non-humidified oxygen via nasal prongs is as follows:
  - 2 L/min in infants/children under 2 years of age
  - 4 L/min for children over 2 years of age

- Administering oxygen at higher flow rates via nasal prongs will damage the membranes inside the nose

- The tape used to hold the nasal prongs in place can cause irritation of the child’s skin, it is important to keep an eye on the skin and inform the child’s parents if you note any skin redness or breakdown. Tapes should be changed weekly, or more frequently as required

- Check nasal prongs and tubing for kinks and/or twists to ensure adequate flow of oxygen, untangle and reposition as required

- Position the tubing over the ears and secure behind the infant/child’s head. Ensure straps and tubing are away from the infant/child’s neck. Nasal prong tubing is a potential choking hazard. Children on oxygen must be closely supervised

3.2 What you will need for nasal prong oxygen

- Appropriate size nasal prongs (as supplied by the family)

- Oxygen cylinder with regulator connected, or oxygen concentrator

- Tape to secure nasal prongs

3.3 How to use the nasal prong oxygen

Procedure

1. Connect the nasal prongs tubing directly onto the oxygen source
2. Wash your hands (can use ABHR)
3. Check the oxygen flow by turning on and holding the prongs near to your ear and listening for a hissing sound or feel for the oxygen coming out
4. Place nasal prong tubing around the child’s face, with the prongs inside the nostrils
5. Ensure nasal prongs are secured to the child’s face by taping them to the cheeks
6. Place remainder of tubing over the top of the ears and behind the head
7. Ensure a good fit by sliding the sleeve back towards the head
8. Turn the oxygen on to the prescribed level
9. Wash your hands (can use ABHR)

Check that the oxygen remains at the correct amount throughout your shift
4. Simple face masks

Face masks are simple and easy to use. They are available in different sizes therefore you will need to make sure you have the appropriate size. Select a mask which best fits from the child's bridge of nose to the cleft of jaw, and adjust the nose clip and head strap to secure in place.

4.1 Safety points

- The minimum flow rate of oxygen you must give using the face mask is at least 4 L/min. This helps to clear the exhaled carbon dioxide out of the mask. Up to 15 L/min can be used if needed
- Position the straps over the ears and adjust at the side of the mask. Ensure straps and tubing are away from the infant/child’s neck. Oxygen tubing is a potential choking hazard
- Children on oxygen must be closely supervised

4.2 What you will need

- Appropriate size face mask (as supplied by the family)
- Oxygen tubing
- Oxygen cylinder or concentrator

4.3 How to use the mask oxygen

Procedure

1. Connect the face mask to the oxygen tubing
2. Connect the tubing to the oxygen source (cylinder or concentrator)
3. Wash your hands (can use ABHR)
4. Check the oxygen flow is working by turning on the oxygen to the prescribed amount and holding the mask near your ear and listen for a hissing sound or feel for the air coming through the mask
5. Place the mask on around the child's face, ensuring it fits properly
6. Wash your hands (can use ABHR)
5. Using a tracheostomy mask

There are a few types of oxygen delivery devices available for tracheostomy tubes. These include:

- **OXY-VENT™ with Tubing** - The adaptor sits over the TRACH-VENT™ and the tubing attaches to the oxygen source (flow meter). Trach-Vent's are changed daily or as required if contaminated or blocked by secretions.

- **TRACH-VENT+™** - Alternatively a Hudson RCI HME - TRACH-VENT+™ (Swedish nose filter) has an integrated oxygen side port which connects directly to oxygen tubing which is attached to the oxygen source (flow meter). Note: this may not be suitable for all children.

- One type is a transparent plastic device that fits over the standard Heat Moisture Exchanger (also known as HME or Swedish nose humidifier). Another is a combination HME and oxygen connection (see below).

5.1 Safety points

- For patients with a mask that fits over the tracheostomy tube, you must give at least four litres oxygen per minute. This helps to clear the exhaled carbon dioxide out of the mask. Oxygen should also be humidified.

- The combination HME filter can be used with smaller amounts of non-humidified oxygen.

- Oxygen tubing is a potential choking hazard. The tubing should be secured to minimise the risk of choking. Children on oxygen must be closely supervised.

5.2 What you will need

- Appropriate tracheostomy mask (as supplied by the family) or HME filter
- Oxygen tubing
- Oxygen cylinder or concentrator
5.3 How to use tracheostomy oxygen

Procedure

1. Connect the tracheostomy mask or HME filter to the oxygen tubing
2. Connect the tubing to the oxygen source (cylinder or concentrator)
3. Check the oxygen flow is working by turning on the oxygen to the prescribed amount and holding the mask near your ear and listen for a hissing sound or feel for the air coming through the mask
4. Gently place the mask over the child’s tracheostomy, ensuring it fits properly or attach the HME filter directly to the tracheostomy tube

6. Oxygen cylinders

Oxygen cylinders come in various sizes and used as portable alternatives to oxygen concentrators and can be used intermittently.

6.1 How long will the cylinder last?

This depends on the flow rate, but a small size cylinder will last approximately:

- One hour at 8 litres per minute
- Two hours at 4 litres per minute
- Eight hours at 1 litre per minute
- Sixteen hours at 0.5 litre per minute

Please check the volume left in the cylinder by looking at the flow meter gauge. A spare cylinder should be on hand if the cylinder is going to be used for an extended time or if the used one is partially empty. Plan appropriately if you feel the oxygen may run out i.e. inform parents and/or call an ambulance if required.
7. Connecting a flow meter

Procedure

1. Remove plastic cover from cylinder head
2. Position the regulator onto the cylinder and engage the two small pins on the inner side of regulator. Screw into the dimples and tighten
3. Open the cylinder with the key wheel by turning anti clockwise
4. Check the gauge for amount of oxygen (should be full, or in green)
5. Check that the flow meter is working
6. When the cylinder is not in use, empty (bleed) the regulator and turn off the cylinder so the oxygen is not wasted. When turning off the oxygen cylinder, turn off the key wheel and allow the regulator (flow meter) to empty before turning off the flow meter

8. Trouble shooting

Procedure

1. Start at the child and work back to the oxygen source i.e. cylinder/concentrator
2. Check the connection of the tubing to the mask or nasal prongs
3. Check nasal prong for any blockages, kinks or twists, clear or change prongs if necessary.
4. Check the oxygen flow (listen with your ear or put tubing end into water and observe bubbles if oxygen flowing)
5. Check the connections of the equipment for blockage, disconnections, or leaks
6. Check the gauge on the cylinder (may be empty)

9. Storage

- Oxygen cylinders should be stored safely and securely in a dry, clean and well-ventilated area
- Oxygen cylinders should be kept indoors and not subjected to extremes of heat and cold. Keep the cylinder or oxygen tubing/prongs away from fire/naked flame (including candles), petrol, paraffin (petroleum jelly), heating gas cylinders, or other flammable materials
- Cylinders should be kept so they do not become rusty or dirty. They should never be re-painted, have markings obscured or any labels removed
- If the child is on regular O2, you will need to check there is enough Oxygen in the cylinders at the start and end of your shift
- If the portable oxygen is needed, ensure that the cylinder is well supported at all times and secured during transit.
10. Using an oxygen concentrator

An oxygen concentrator is a machine which is used to concentrate the oxygen from the air in the room. Oxygen concentrators are electrically powered machines and the concentrator makes a quiet humming sound when turned on.

Oxygen concentrators take oxygen from the air and deliver it at a high concentration to the child via nasal prongs or a face mask. Oxygen concentrators are easy to use and maintain. They do not run out of oxygen or need refilling but do rely on a continuous power source.

The child can receive flow rates from 0.125 to 8 litres per minute.

11. Oxygen Safety

Fire and safety precautions must be observed:

- Do not smoke in the vicinity of oxygen equipment
- Do not use aerosol sprays in the same room as the oxygen equipment
- Oxygen should be used in a free ventilated space - don't let the concentration of oxygen build up in a confined space.
- Turn off oxygen immediately and ensure all valves are turned off when not in use. Oxygen is heavier than air and will continue to hold in fabric making the material more flammable. Therefore, never leave the nasal prongs or mask under or on bed coverings and/or cushions whilst the oxygen is still running
- Do not use oxygen cylinders in hot places. Keep the cylinder or oxygen tubing/prongs away from fire/naked flame (including candles), petrol, paraffin (petroleum jelly), heating gas cylinders, or other flammable materials. Grease or oils should be kept away from the cylinder valve or equipment
- Oxygen cylinders should be secured safely in the home and car to avoid injury
- Keep the oxygen equipment out of reach of children and pets
- Children or untrained adults should not handle the cylinder
- The area around the cylinder should be kept clear (don't hang clothes on it)
- Oxygen equipment and tubing can be a tripping hazard
- Do not use hair dryer while oxygen is in use
- Do not use an electric blanket if oxygen is used

11.1 Safety points for use of an oxygen concentrator

- The concentrator plugs into an ordinary electrical wall socket
- Oxygen cylinders will need to be utilised during a power failure or if the concentrator is not working properly, cylinders should be readily available at all times
- The concentrator must be used in a well-ventilated area allowing about 30 centimetres clearance from walls or other objects to ensure the air intake filter is not obstructed
- The manufacturer recommend that up to a maximum of seven meters of tubing can be connected to the flow-meter on a cylinder

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11.2 Using the oxygen concentrator

Procedure

1. Press the ‘on’ switch

2. Check and adjust the flow-meter, it should be reading at the prescribed amount of oxygen (litres/minute)

3. Check the tubing to ensure that it is connected to the flow-meter and unblocked

4. Keep the air-filter clear at all times