

PAEDIATRIC NURSING PRACTICE MANUAL  
SECTION 7

CARE OF THE CHILD WITH A RESPIRATORY CONDITION

7.2 OXYGEN THERAPY

7.2.2 RESPIRATORY ASSESSMENT AND OBSERVATION

7.2.2.1 OXYGEN DELIVERY DEVICES

This document replaces the former 7.2.1 (Headbox Oxygen Therapy), 7.2.2 (Administration of Intranasal Oxygen) and 7.2.4 (Use of a Non Re-breathing Bag)

The care described here is in conjunction with /supplemental to [PNPM 7.2.1](#) Oxygen Administration and [PNPM 3.1.1](#) General Observations, including Respiratory Assessment.

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# 1. A SUMMARY OF OXYGEN DELIVERY DEVICES

The care described here is in conjunction with /supplemental to [PNPM 7.2.1](#) Oxygen Administration and [PNPM 3.1.1](#) General Observations, including Respiratory Assessment.

## Key Points

1. Outcome is assessed by determining whether the device selected produces an appropriate increase in oxygen saturation and a decrease in the patient's work of breathing.
2. This table is a guide only. The actual inspired oxygen percentage will vary according to the patient's respiratory pattern.
3. If the patient is deteriorating immediately seek advice and consider changing the delivery device from a low flow to higher flow device.

| DEVICE   | PERCENTAGE OF OXYGEN DELIVERED  | FLOW RATE   | INDICATIONS   | ADDITIONAL INFORMATION   |
|--|---|---|---|--|
| <b>WAFING OXYGEN</b> <sup>1,2</sup>                          | <30%  | 10 litres   | Use to deliver <b>low dose</b> oxygen to spontaneously breathing patients<br><b>Short term use only</b>   | Assess and monitor child closely for deterioration   |
| <b>NASAL CANNULA</b> <sup>1,2</sup>                          | As a general guide <sup>3</sup><br>1 litre = 24%<br>2 litre = 28%<br>3 litre = 32%<br>4litre = 36%  | 2.5 litres or less for infants<br>3 litre or less for paediatrics<br>4 litre or less for adolescents  | Use to deliver <b>low dose</b> oxygen to spontaneously breathing patients   | Percentage of oxygen delivered is affected by extent of mouth breathing<br><b>Contraindicated</b> if nasal obstruction present i.e. nasal polyps   |
| <b>SIMPLE MASK</b> <sup>1,2</sup>                            | As a general guide <sup>3</sup><br>2 litre = 24%<br>4 litre = 35%<br>6 litre = 50%<br>8 litre = 55%<br>10 litre= 60%<br><b>In an emergency situation minimum 10 litre</b> | To avoid re-breathing of exhaled CO <sub>2</sub> that can be retained in the mask a combined oxygen/air flow of a minimum of 5 litres <sup>4,5,6,7</sup> is required. | Use to deliver <b>low to moderate doses</b> of oxygen to spontaneously breathing patients OR <b>higher flow</b> oxygen during an <b>emergency</b> situation | Percentage oxygen delivered affected by mask fit and respiratory rate<br><u>Air/oxygen</u> concentrations can be mixed to ensure minimum flow rates & prevention of CO <sub>2</sub> retention.                       |
| <b>HEADBOX</b> <sup>2</sup>                                  | Up to 95%   | <u>MINIMUM (as per box size)</u><br>Neonatal:8 L/min<br>Small:12 L/min<br>Large:15 L/min  | Use to deliver <b>moderate - high dose</b> oxygen to spontaneously breathing <b>infants, less than 1yr of age</b>   | Air/oxygen concentrations can be mixed to ensure minimum flow rates & prevention of CO <sub>2</sub> retention.   |
| <b>NON RE-BREATHING BAG</b> <sup>1,2</sup>                   | Up to 95%   | 10 litres   | Use to deliver <b>high dose</b> oxygen to spontaneously breathing patients. Should be used <b>short-term (6-8 hours)</b> and/or <b>emergency</b>            | Not appropriate in the neonatal population. <sup>6,8</sup> Tight mask fit required to deliver higher concentration of oxygen. Are dangerous for patients with poor airway control and risk of vomiting. <sup>9</sup> |
| <b>LAERDAL™ SELF INFLATING BAG &amp; MASK</b> <sup>1,2</sup> | 95-100% with reservoir  | 10 litres<br>(6 litres for neonates)  | Used to provide assisted ventilation and oxygen.  | Do not use to provide wafting oxygen as there is a risk that patients will not be able to overcome the valve. Must be used with a reservoir to provide higher concentration.   |

## 2. OXYGEN THERAPY VIA NASAL PRONGS

The care described here is in conjunction with /supplemental to [PNPM 7.2.1](#) Oxygen Administration and [PNPM 3.1.1](#) General Observations, including Respiratory Assessment.

### Aim

To deliver low dose oxygen to spontaneously breathing patients

**Contraindicated if nasal obstruction present ie. nasal polyps**<sup>1,2</sup>

### Equipment


Green or clear tubing for oxygen outlet

Low flow oxygen meter – **when not in use this must not be kept connected/at bedside**

Nasal prongs or catheter

Adhesive tape

High flow meter (for use in emergency) with simple mask attached

| PROCEDURE   | ADDITIONAL INFORMATION   |
|---|--|
| <p><b>Nasal prongs</b><br/>Insert prongs into nares and secure with tape on either side of the face.</p> <p><u>Maximum Flow Rates</u><br/>2.5lt or less for infants<br/>3lt or less for paediatrics<br/>4lt or less for adolescents</p> |  <p>Percentage of oxygen delivered is affected by extent of mouth breathing.<sup>1,2</sup></p>                                      |
| <p>Check that oxygen is flowing freely and that the tubing/Nasal prongs are not blocked at least hourly.</p> <p>If the prongs become blocked ie. with secretions they will need to be replaced.</p>                                     | <p>A blockage in the tubing may manifest as:</p> <ul style="list-style-type: none"> <li>• An increase in respiratory effort</li> <li>• Respiratory distress</li> <li>• A fall in the SpO<sub>2</sub> levels</li> </ul> |
| <p>Check the patient's mouth and nose hourly for dryness.</p>   | <p>Excessive O<sub>2</sub> flow can lead to drying of the nasal and pharyngeal mucosa.<sup>9,10</sup></p> <p>Mouth and nasal toilets may be required.</p>  |
| <p>Check the patient's face/behind the ears/back of head 4 hourly for signs of pressure.<sup>1</sup></p>  | <p>Repositioning may be required.</p>  |

### 3. OXYGEN THERAPY VIA A SIMPLE MASK

The care described here is in conjunction with /supplemental to [PNPM 7.2.1](#) Oxygen Administration and [PNPM 3.1.1](#) General Observations, including Respiratory Assessment.

#### Aim

To deliver low to moderate dose oxygen to spontaneously breathing patients

**In an emergency situation a minimum of 10 litres of oxygen should be used via the simple mask to ensure higher doses of oxygen are administered.**<sup>1, 2</sup>

#### Equipment


Green or clear tubing for oxygen outlet

High flow oxygen meter

Hudson™ or other simple mask

#### Additional

Air flow meter - **when not in use these must not be kept connected/at bedside**

| PROCEDURE   | ADDITIONAL INFORMATION  |
|---|---|
| Assemble and connect equipment.   |   |
| Select the correct size mask for the patient.<br><br>Place the mask on the face.<br><br>Adjust the straps and nose piece to obtain a secure fit.<br><br>The mask should fit from the bridge of the nose to the cleft of the chin. |  <p>Inspired oxygen concentration may vary depending on the fit of the mask.<sup>10</sup></p>                               |
| Adjust flow to desired rate.<br>A gas flow of at least 5L/min is required to prevent re-breathing CO <sub>2</sub> . <sup>5, 6, 7, 11</sup>  | Air/oxygen concentrations can be mixed to ensure minimum flow rates and prevention of CO <sub>2</sub> retention.  |
| Check that oxygen is flowing freely and that the tubing is not blocked at least hourly.   | A blockage in the tubing may manifest as: <ul style="list-style-type: none"> <li>• An increase in respiratory effort</li> <li>• Respiratory distress</li> <li>• A fall in the SpO<sub>2</sub> levels</li> </ul> |

All protocols should be read in conjunction with the disclaimer in the preface of this manual

Oxygen Delivery Devices

| PROCEDURE   | ADDITIONAL INFORMATION   |
|---|--|
| Ensure the patient is comfortable with freedom of movement.           |  |
| Check the patient's mouth and nose hourly for dryness.                | Excessive O <sub>2</sub> flow can lead to drying of the nasal and pharyngeal mucosa. <sup>9,10</sup><br>Mouth and nasal toilets may be required. |
| Check the patient's skin 4 hourly for signs of pressure. <sup>1</sup> | Irritation may arise if mask is too tight. <sup>3</sup><br>Repositioning may be required.  |

## 4. OXYGEN THERAPY VIA A HEADBOX

The care described here is in conjunction with /supplemental to [PNPM 7.2.1](#) Oxygen Administration and [PNPM 3.1.1](#) General Observations, including Respiratory Assessment.

### Aim

To deliver moderate to high dose oxygen to spontaneously breathing infants less than 1 year of age

### Equipment

Green or clear tubing for oxygen outlet

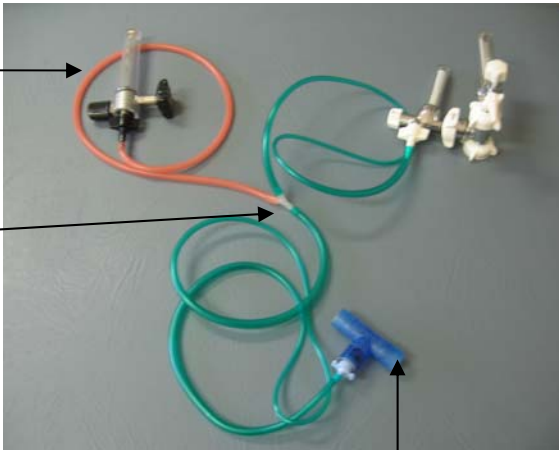
Red tubing for air outlet


Air flow meter - **when not in use these must not be kept connected/at bedside**

2 x High flow oxygen meters (ONE FOR EMERGENCY USE) with simple mask attached

Oxygen analyser calibrated to room air 21% and 100% oxygen

Y connector

| PROCEDURE  | ADDITIONAL INFORMATION  |
|--|---|
| Select a headbox that will enclose the patients head and shoulders.<br>Place in cot. | The concentration of gases will depend on the size of the headbox.  |
| Attach green or clear oxygen tubing and red air tubing to the head box.              | <p>The percentage of O<sub>2</sub>/air mix is administered into the box via a disposable headbox circuit</p> <div style="text-align: center;"> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;">High Flow Oxygen Meter and Green Tubing.</div> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 5px auto;">Extra High Flow Oxygen Meter (for emergency use)</div> <div style="text-align: center; margin: 5px 0;">↓</div>  <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 5px auto;">This end goes into headbox to deliver the oxygen/air mix</div> </div> |

| PROCEDURE  | ADDITIONAL INFORMATION  |
|--|---|
| Turn on the flow<br>Combined flow from air and O <sub>2</sub> mix: <ul style="list-style-type: none"> <li>• Neonatal headbox: no less than 8L/min</li> <li>• Small headbox: 12L/min</li> <li>• Large headbox: 15L/min</li> </ul>   | <ul style="list-style-type: none"> <li>• These levels are required to prevent the re-breathing of CO<sub>2</sub></li> <li>• The box entrance must not be blocked whilst patient is inside</li> </ul>            |
| Position the head box over the patient's head and shoulders<br><br><div data-bbox="432 678 746 750" style="border: 1px solid black; padding: 5px; display: inline-block;">Oxygen Analyser</div><br><br><br><br><br><br><br><br><br><br>Place the oxygen analyser probe so that it is the opposite side of the box to oxygen delivery point. <sup>1</sup><br>Place the oxygen analyser probe near to the patient's face. <sup>1</sup> | <br><br>Oxygen analyser must be calibrated each shift and documented on the nursing care plan.                               |
| Check that oxygen is flowing freely and that the tubing is not blocked at least hourly.  | A blockage in the tubing may manifest as: <ul style="list-style-type: none"> <li>• An increase in respiratory effort</li> <li>• Respiratory distress</li> <li>• A fall in the SpO<sub>2</sub> levels</li> </ul> |
| Check the patient's mouth and nose hourly for dryness.   | Excessive O <sub>2</sub> flow can lead to drying of the nasal and pharyngeal mucosa. <sup>9,10</sup><br>Mouth and nasal toilets may be required.  |
| Check the patient's skin 4 hourly for signs of pressure. <sup>1</sup>  | Use of a headbox that is too small may result in irritation of the patient's skin. <sup>6,8</sup><br>Repositioning may be required unless on minimal handling.  |

## 5. OXYGEN THERAPY VIA A NON RE-BREATHING BAG

The care described here is in conjunction with /supplemental to [PNPM 7.2.1](#) Oxygen Administration and [PNPM 3.1.1](#) General Observations, including Respiratory Assessment.

### Aim

To deliver high dose oxygen to spontaneously breathing patients in short term and/or emergency situations

**Not appropriate in the neonatal population.**<sup>6, 9</sup>

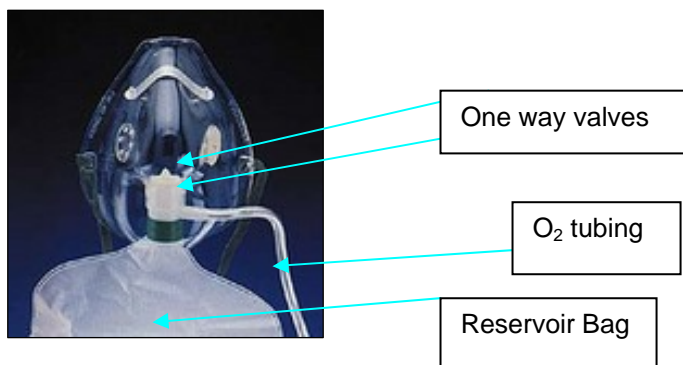
**Not appropriate for patients with poor airway control or at risk of vomiting.**<sup>9</sup>

### Equipment for oxygen therapy via a NON RE-BREATHING BAG

Correct size non re-breathing mask with reservoir bag

Oxygen flow meter (High flow)

Green or clear tubing for oxygen outlet



| PROCEDURE   | ADDITIONAL INFORMATION   |
|---|--|
| Select correct size mask.   | The mask should fit from the bridge of the nose to the cleft of the chin.  |
| Using the green or clear oxygen tubing, attach the bag and mask to the oxygen supply. |  |
| Turn on the oxygen and inflate the reservoir bag until it is full.                    | A minimum of 10L/min should be administered. <sup>5, 10</sup><br>The flow should be sufficient to keep the reservoir bag at least half full of O <sub>2</sub> when the patient takes their deepest breath. |
| Check the O <sub>2</sub> flow through the device.                                     | If the flow is interrupted patients are at risk of asphyxiation as room air is unable to be entrained.<br>Close and regular observation is essential.  |



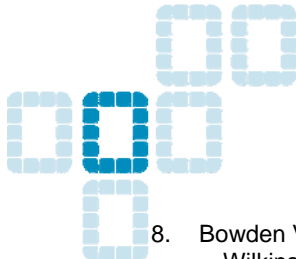
| PROCEDURE   | ADDITIONAL INFORMATION   |
|---|--|
| Place the mask on the patient's face.<br>Adjust the straps and nose piece to obtain a secure fit.<br>Observe the patient's respirations.  | An adequate seal is essential if maximum concentration is to be achieved. <sup>12, 13</sup>  |
| Check that the valve: <ul style="list-style-type: none"> <li>Between the reservoir and the mask rises with inspiration and falls on expiration</li> <li>Located on the external mask surface opens during expiration</li> </ul> | Air exhaled by the patient does not return to the reservoir (is not rebreathed).<br>Instead, it escapes via a one way valve at the side of the mask.   |
| Check the reservoir bag is at least half full on inspiration.<br>It should expand/partially collapse as the patient expires/inspires.   | Compression of the reservoir bag by: <ul style="list-style-type: none"> <li>bed covers</li> <li>twisting at the connection between bag and mask</li> <li>obstruction of the one way valves</li> </ul> will decrease the effectiveness of the O <sub>2</sub> delivery system. |
| Check the patient's mouth and nose hourly for dryness.  | Excessive O <sub>2</sub> flow can lead to drying of the nasal and pharyngeal mucosa. <sup>9</sup><br>Mouth and nasal toilets may be required.  |
| Check the patient's face/behind the ears/back of head 4 hourly for signs of pressure. <sup>1</sup>  | Pressure from a tight fitting mask may result in tissue ischemia over time.  |

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Oxygen Delivery Devices  
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