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The O-Two Single-Use CPAP (Part 1)

The O-Two Single-Use "Open Circuit" CPAP System is a disposable, low-flow device designed for non-invasive ventilation in hospital and pre-hospital settings. It delivers continuous positive airway pressure (CPAP) through a face mask to patients experiencing respiratory distress. The system ensures consistent CPAP delivery by minimizing pressure drop during inspiration and peak pressure during expiration, resulting in stable pressure throughout the respiratory cycle and reducing the work of breathing for patients.

Its open system design allows unrestricted inspiratory flow by providing access to ambient air, and it also prevents accidental occlusion of the ambient air intake port and oxygen hose, reducing the risk of barotrauma. Titrating the O_2 flow rates on the flow control achieves the desired rise in baseline pressure.

CLINICAL APPLICATION ▶

1 Explain the Procedure and Its Benefits to the Patient:

• Describe CPAP therapy to the patient, explaining how it works and its benefits.

• Highlight that CPAP helps keep the airways open, improves breathing, and reduces the work of breathing.

• Address any questions or concerns to ensure the patient understands the importance and purpose of the therapy.

2 Position the Patient Comfortably:

• Position the patient in an upright sitting position, which is typically the most effective for CPAP therapy.

• Ensure the patient is comfortable and well-supported to maintain this position throughout the therapy.

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3   Ensure Patient Cooperation and Address Any Concerns:

• Assess the patient's willingness to cooperate with the therapy.

• Address any anxieties or discomforts they may have.

• Reassure the patient and emphasize the importance of their cooperation for successful therapy.

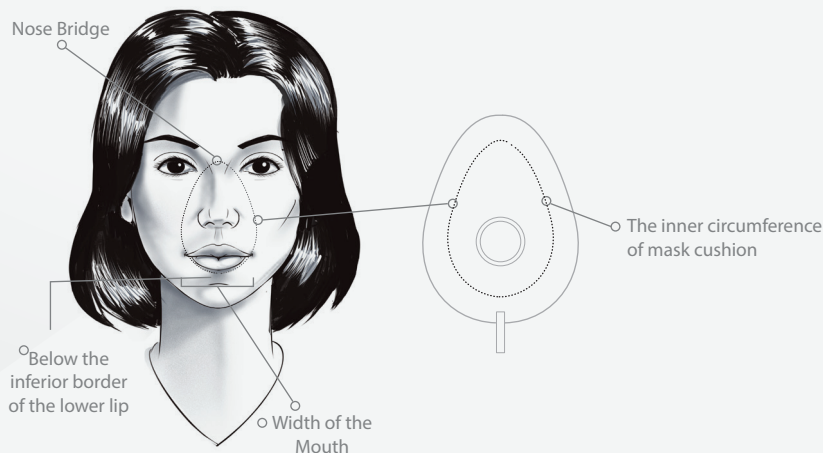• If the patient is anxious, explain each step of the process and provide continuous reassurance.

EQUIPMENT PREPARATION ▶

1   Choosing the Correct CPAP Mask

Nose Bridge

The inner circumference of mask cushion

Below the inferior border of the lower lip

Width of the Mouth

1. **Choose a non-ventilated mask that covers the nose and mouth.**
   The Single-Use CPAP System comes with a mask. In case the mask is replaced, a non-ventilated mask must be used to maintain positive airway pressure without losing air through ventilation ports.

2. **Choose the correct mask size based on the patient's facial dimensions.**
   Ensure the mask fits tightly without causing discomfort, checking for a secure seal to prevent air leaks.

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2 Attach the O-Two CPAP System:

Begin by connecting the vectored flow valve to the mask.

3 Connect Oxygen Tubing:

• Connect the oxygen tubing to a regulated oxygen source, such as an oxygen cylinder or wall-mounted supply.

• Ensure all connections are secure and the system is ready.

4 Initial Application:

- Check all CPAP components to ensure they are working properly.

- Have the patient hold the mask securely to their face and ask them to breathe normally.

- Explain that they will feel a continuous flow of air, which keeps their airway open, and it's normal to feel some resistance when breathing out, as this can take time to get used to.
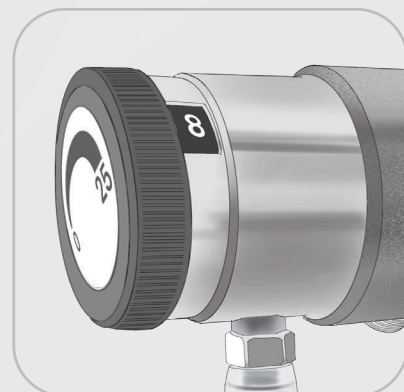
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5 Adjust Flow Rate

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0	5	10	15	20	25 cmH$_2$O
0	8	12	15	20	25 L/min
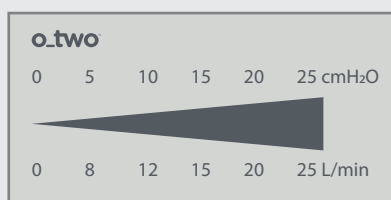
• Use the O$_2$ flow pressure table on the vectored flow valve to set the O$_2$ flow and achieve the desired CPAP pressure.

• Open the oxygen source.

• To start the CPAP therapy with a pressure level of 5 cmH$_2$O, as recommended in various protocols, titrate the O$_2$ flow to 8 L/min.

| FLOW RATE (L/min)	8	10	12	15	20	25
PRESSURE (cmH$_2$O)	5.0	8.0	10.0	15.0	20.0	25.0
OXYGEN (%)*	54	59	62	67	73	77
CYLINDER DURATION D Tank (415L)	52 MIN	42 MIN	35 MIN	28 MIN	21 MIN	17 MIN

* Over a tidal volume range of 100 to 750ml

• Monitor the patient's response to the initial CPAP setting.

• Gradually increase the flow rate to reach the required CPAP pressure according to local protocols.

• Increase the pressure in small increments, allowing the patient to adapt.

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6 Fitting the Mask:
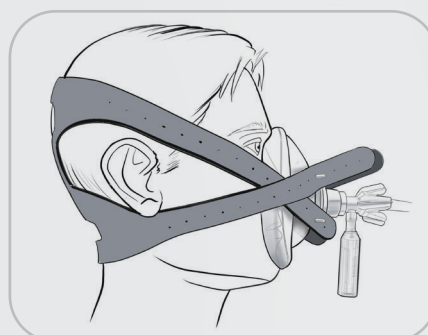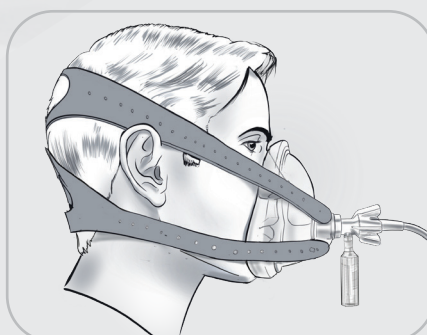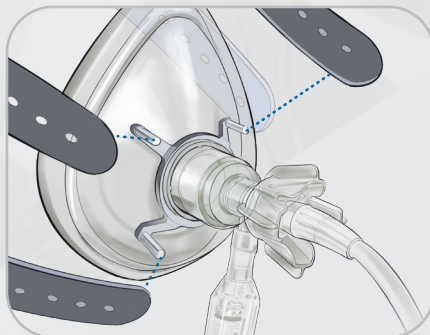
1. Attach the Head Harness Straps: (Choose one of the following methods)

• **Parallel Straps:** Attach the upper straps to the upper hooks and the lower straps to the lower hooks.

• **Crossed Straps:** Attach the upper straps to the lower hooks and the lower straps to the upper hooks.

2. Practical Tips:

• Ensure straps are snug but not too tight to avoid pressure points on the patient's head or face.

• Inspect for air leaks and adjust straps as needed.

7 Cuff Adjustment:
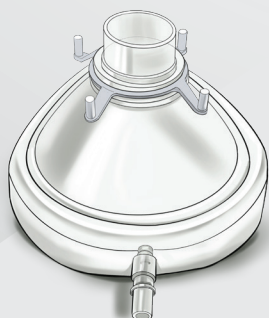
• Use the inflation valve to adjust the cushion pressure around the mask for a good seal if necessary.

• Ensure the mask creates an airtight seal without being too tight, to avoid pressure sores or discomfort.

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8 — Leak Check:

Check the mask and tubing for leaks to ensure a proper seal.

HANDLING UNCOOPERATIVE PATIENTS ▶

1 — Gradually Introduce the CPAP Mask:

• Allow the patient to hold the mask and feel the airflow without wearing it.

• Gradually place the mask on their face, initially placing it loosely and tightening it as they become more comfortable.

• If the patient remains uncooperative, ask a colleague for additional support and reassurance.

2 — Supportive Communication:

• Avoid medical terminology; explain the procedure in simple terms.

• Encourage the patient to express fears or concerns and address them directly.

• Provide ongoing verbal reassurance, affirming that they are doing well and highlighting the benefits of the therapy.

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Hands-On
The O-Two Single-Use CPAP

MONITORING AND ADJUSTMENT ▶
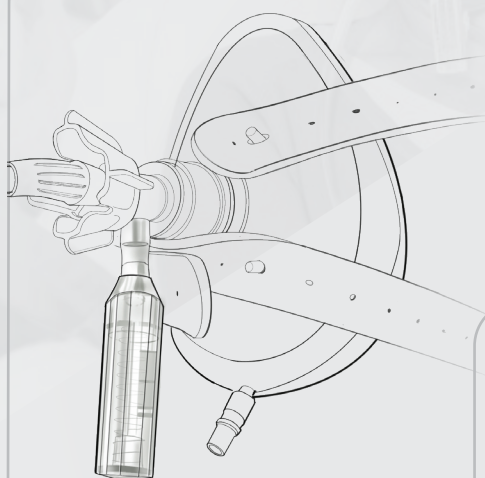
1   Monitor CPAP Pressure

The O-Two Single-Use CPAP system is available in two versions: one without a manometer and another with an attached manometer. The version with a manometer allows healthcare providers to monitor and adjust the CPAP pressure.

IMPORTANT NOTES

• The Luer port is designed for attaching the manometer only. Modifying this setup can compromise the device's ability to maintain consistent and accurate CPAP pressure.

• The pressure manometer is not intended for use in an MRI environment.

• Do not exceed a flow rate of 25 L/min.

2   Check Vital Signs Every Five Minutes:

• **Respiratory Rate:** Monitor the patient's respiratory rate to ensure it remains within the required range and watch for any changes indicating distress or improvement.

• **SpO_2 and $ETCO_2$:** Continuously monitor oxygen saturation (SpO2) with a pulse oximeter and end-tidal carbon dioxide (ETCO2) with a capnography to ensure adequate oxygenation.

• **Blood Pressure:** Regularly check the patient's blood pressure to detect any hypotensive episodes that could result from CPAP therapy or the medical condition.

• **Chest Sounds:** Auscultate the patient's chest to assess breath sounds and detect any complications like barotrauma or fluid accumulation.

• **Work of Breathing:** Observe the patient's effort to breathe. A reduction in the work of breathing indicates effective CPAP therapy, while increased effort may suggest the need for adjustment.

• **Level of Consciousness:** Continuously observe the patient's level of consciousness to detect any changes that may indicate distress or deterioration.

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WHEN DISCONTINUE REMOVE CPAP? ▶

1   Conditions:

Maintaining uninterrupted CPAP therapy is essential for effective respiratory support and patient stability. Therefore, it should only be paused if specific clinical conditions or complications require it.

• The patient is unable to tolerate the mask.

• The patient starts to vomit.

• There is a decline in the patient's mental or respiratory status.

• The patient develops hypotension (systolic blood pressure < 90 or a drop of 20 mmHg).

POTENTIAL COMPLICATIONS & MANAGEMENT: ▶

1.   Aspiration

Aspiration can occur if a patient vomits while wearing the CPAP mask, leading to the inhalation of gastric contents into the lungs and potentially causing aspiration pneumonia.

• **Management:** Immediately remove the CPAP mask, reposition the patient, and administer supplemental oxygen via an alternative method. Prepare for potential advanced airway management if necessary. Ensure suction equipment is available to clear the airway.

2.   Gastric Distension

High levels of CPAP can force air into the stomach, causing gastric distension. This may lead to discomfort, bloating, and increased risk of vomiting and aspiration.

• **Management:** Monitor the patient for signs of gastric distension and adjust CPAP settings if necessary. Have antiemetics available to prevent or treat nausea and vomiting.

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3. Hypotension

CPAP therapy can decrease venous return to the heart, reducing cardiac output and causing hypotension, mainly in patients with pre-existing cardiovascular conditions.

• **Management:** Regularly monitor the patient's blood pressure. If severe hypotension occurs, remove the CPAP mask and provide supportive care as needed.

4. Corneal Drying

Air leaks from the CPAP mask can direct airflow towards the eyes, leading to corneal drying and irritation.

• **Management:** Ensure the CPAP mask fits properly to prevent air leaks. Adjust the mask as needed to improve comfort and protect the eyes.

5. Barotrauma

Excessive airway pressure can cause barotrauma, resulting in lung injuries such as pneumothorax or pneumomediastinum.

• **Management:** Monitor for signs of barotrauma. If it occurs, immediately remove the CPAP mask and provide supportive care.

For more information on how to integrate a filter or in-line nebulizer into the O-Two CPAP system, please refer to the Hands-On: The O-Two Single-Use CPAP (Part 2)

Important Note: The O-Two Hands-On is intended as a quick reference for the setup, settings, and optimal use of O-Two products. For comprehensive information, please refer to the product manual. This guide is designed to support continuous learning within the medical community, ensuring that users of O-Two devices are equipped with the best practices. However, it does not replace official policies, clinical judgment, or serve as medical advice.

Always adhere to the authorized guidelines of your healthcare facility. Consult your institution's specific protocols and policies before making any changes to patient care practices.

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