**Bubble CPAP – Diamedica**

Bubble CPAP (bCPAP) devices provide both positive pressure and increased fractional concentration of oxygen (FiO₂) to newborns with respiratory distress.

**USE FOR**
- Respiratory distress syndrome
- Increased work of breathing

**STANDARD OF CARE**
Neonatal patients should reach oxygen saturations of 90 – 95% by 15 minutes after birth.

**ASSESSMENT & PREPARATION**

Always perform ABC assessment and resuscitation as needed before using the TRY CPAP algorithm.

**REVISED TRY ALGORITHM**

1. **Baby is breathing spontaneously**
   - Heart Rate (HR) greater than 100 bpm

   - **Start Prophylactic CPAP** (ideally in the delivery room)

   - **Start CPAP**

   - **Weight less than 1500 gm**
     - and/or
     - **Weight above or equal to 1500 gm**
   - **Gestation less than or equal to 32 weeks**
   - **RR greater than 60 bpm**
   - **SpO₂ less than 90% on room air**
   - **No response to 0.5–1 L/min oxygen**

2. **PREPARE DEVICE**

   - **Follow hand washing protocol**
   - Plug the power cable into the back of the machine and plug into a socket.
   - Place device 30-35cm away from the wall to allow air flow into the device.
   - **A Fill** the blue bubble bottle with clean water up to the line. Then place back into bottle bracket.
   - **B Fill** the humidifier bottle with sterile water or normal saline and connect it to the gas port outlet. Ensure the grill below is not obstructed.
   - Connect **inspiratory tubing** to the main gas outlet, a water trap can be attached if required.
   - Connect the **expiratory tubing** to the bottle port.

**DISINFECTION & INFECTION PREVENTION**

- **Clean hands with soap and water or 70% alcohol before and after handling bCPAP materials that will be used on patients**.
- Ensure patient related tubing is new or has been disinfected thoroughly before use.
- **Device:** Turn off and wipe down with 70% alcohol.
- **Bottle, humidifier & water trap:** Dispose of water and clean with soap and water.
- **Tubing & prongs:** Dispose of or IMMEDIATELY follow protocols for disinfection and reuse. Disinfected tubing should be stored in loose rolls, preventing sharp bends or kinks.
- **Gross particle filter:** Cleaned in soap and water and left to dry.

**REMINDER**

If no back up power is available, the baby should receive oxygen from an oxygen cylinder until they can be safely returned to a bCPAP device.

**COMPLICATIONS**

- Nasal blockage and necrotic septum
- Gastric distention
- Pneumothorax
- Decreased cardiac output
- Pressure leaks
- Power failure
MANAGEMENT OF A PATIENT

Bubble CPAP – Diamedica

Check patient response 15 minutes after bCPAP initiation

Refer to increasing and decreasing bCPAP treatment algorithms to guide management

STANDARD OF CARE:
Prior to changing bCPAP settings ensure bCPAP is functioning well using DOPE:
D: Displacement of prongs
O: Obstruction of prongs or tubing
P: Patient problem (e.g., pneumothorax)
E: Equipment failure (e.g., power cut, tubing leak, see "complications")

3. SET INITIAL FLOWS

A Dial the level of water to 6cm
Start with:
• 1 L/min oxygen flow
• 2 L/min air flow

B Connect the correctly sized bCPAP prongs between to the two flexible tubing of which one is connected to the inspiratory (blue) tubing and one is connected to the expiratory (clear) tubing

Occlude prongs and check for bubbling

4. START PATIENT ON bCPAP

Follow hand washing protocol, wear gloves if needed

A Suction secretions, apply nasal saline and insert OGT

B Put on hat and stick the velcro strips to the front of the hat. Attach clips to the velcro.

Place prongs in patient’s nose leaving 1 mm of space. Secure tubing to the velcro. Apply chin strap if required

5. MANAGE & MONITOR PATIENT

Routinely every 3-4 hours:

A Provide a drop of saline to each nostril

B Ensure prongs completely fill the nostrils and do not touch nasal septum

Re-check for bubbling at desired water level

Review DOPE at every monitoring checkpoint (15 minutes after any management change and every 4 hours)

Continue, increase, decrease or stop bCPAP treatment according to algorithms

OXYGEN BLENDING TABLE

Assuming an oxygen concentration output of 95% Oxygen

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<th>Air Flowmeter (l/min)</th>
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<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
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<tr>
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<td>79</td>
<td>64</td>
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</tbody>
</table>

Oxygen Flowmeter (l/min)

power connection

external foam filter

oxygen and air mixing chart

voltage protector

NEST360 Clinical Job Aid – Bubble CPAP (Diamedica) July 2024
INCREASING TREATMENT

Bubble CPAP

When increasing the bCPAP keep total airflow to no more than 2 L/min, but you can increase the oxygen flow as required. Refer carefully to the blending table shown above.

If the device is functioning well, but some or all of the following are present consider increasing bCPAP:
- O₂ saturation less than 90%
- RR is greater than 60 bpm
- Persistent increased work of breathing (grunting, severe lower chest indrawing, nasal flaring)

TIME | OXYGENATION | WORK OF BREATHING
--- | --- | ---
START | FiO₂ 50% | Water level 6 cm
15 – 20 min | Is SpO₂ >90% yes | • Continue current FiO₂ and water level
15 – 20 min | Increase FiO₂ to 60% yes | • Assess work of breathing every hour.
15 – 20 min | Increase FiO₂ to 70% yes | • If significant work of breathing is present despite SpO₂ being 90–95%, increase water level by 1 cm up to a maximum of 8 cm
15 – 20 min | Increase FiO₂ to 80% yes | • Monitor HR, RR, SpO₂ & temperature every hour until stable then 3-4 hourly and at 15 minutes after change of settings. Maintain SPO₂ 90–95%
15 – 20 min | Is SpO₂ >90% no | • Ensure airway is patent
15 – 20 min | Increase FiO₂ to 90% no | • Instill normal saline drops every 3-4 hours
15 – 20 min | Increase water level to 7cm no | • Document on chart
15 – 20 min | Call for assistance no | • Increase water level to 7cm
15 – 20 min | Reassess for complications and alternative diagnosis yes | • Call for assistance
15 – 20 min | Reassess for complications and alternative diagnosis yes | • Increase water level to 7cm

Water level should never exceed 8cm

A senior consultant may increase CPAP as they deem necessary. Depending on the bCPAP device in use; maintain a total flow rate of 6-10 L/min and use an oxygen blending table to determine amount of oxygen to set.
Bubble CPAP

Select starting point by bCPAP FiO₂ settings

The patient has been clinically stable for 24 hours on current treatment and has:
- O₂ saturations greater than 90%
- RR is less than 60 bpm
- No significant signs of increased work of breathing
- No other signs of respiratory distress

**Does the baby meet weaning criteria?**

- **Yes**
  - CPAP settings above minimum
    - FiO₂ > 30%
    - Water level > 5 cm
    - Total flow rate > 6 L/min
  - Decrease CPAP treatment
    - Reduce FiO₂ by 10% every 3-4 hours until FiO₂ is 30%
    - Maintain water level
    - If baby does not meet weaning criteria at any point, maintain at current settings and treatment
    - Maintain FiO₂ of 30%
    - Reduce water level by 1 cm every 3-4 hours until water level is 5 cm
    - If baby does not meet weaning criteria at any point, maintain at current settings and treatment
    - If baby is stable for 3-4 hours with minimal CPAP settings of 30% FiO₂ and water level of 5 cm, stop CPAP
    - Put on 1 L/min oxygen via nasal prongs

- **No**
  - CPAP settings below or equal to minimum
    - FiO₂ ≤ 30%
    - Water level ≤ 5 cm
    - Total flow rate ≤ 6 L/min
  - Keep on current CPAP settings and treatment

- **Yes**
  - Stop CPAP treatment
    - Disconnect baby from CPAP device
    - Put on 1 L/min oxygen via nasal prongs
  - Assess baby at 15 mins, 1 hourly then 3-4 hourly for 12 hours. If baby meets criteria to restart CPAP at any point, restart CPAP and consult
  - Follow guidelines for weaning off oxygen before removing oxygen

**Weaning Criteria**

The patient has been clinically stable for 24 hours on current CPAP settings with:
- RR is less than 60 bpm
- SpO₂ 90 – 95%
- No significant signs of increased work of breathing
- No other signs of respiratory distress
1 DEVICE DOES NOT TURN ON
- Check that the power cable is securely attached
- Check that the power socket is turned on

2 IF THE SILVER BALLS IN EITHER THE O₂ OR FLOWMETER ARE NOT MOVING
- Tap the front of the flowmeter firmly with your knuckle or the handle of a screwdriver
- If the silver ball within the flowmeter still does not go up, contact the maintenance department to request cleaning of the flowmeter and to check that all internal tubing is still connected

3 IF THE WATER IN THE bCPAP BOTTLE IS NOT BUBBLING
- Check that the CPAP prongs fully fill the nostrils and that the patient’s mouth is not open
- If the prongs are well-fitted, remove from the patient’s nose and occlude the prongs with your finger
- If the water is still not bubbling, ensure the connection to the main gas outlet is not loose or broken

4 IF THE TOTAL FLOWMETER DOES NOT GO UP TO 10 L/MIN
- Contact the maintenance department to request an internal filter change

5 IF THE LOW OXYGEN LEVEL ALARM (YELLOW LIGHT) IS ON
- Wait 15 minutes to allow the machine to accumulate a sufficient level of oxygen concentration
- Ensure there is 30-35 cm space behind the device to allow air flow
- Clean the gross particle filter
- Contact maintenance department to clean fine particle filter

DAILY MAINTENANCE
- Always disinfect the bCPAP device with 70% alcohol using gauze or a cotton swab before first use and between patients
- Make sure to change water daily. Do not leave water in bCPAP bottle, water trap or humidifier when device is not in use

PREVENTIVE MAINTENANCE
- The bCPAP device should be turned on weekly to a total flow of 10 L/min and allowed to run for at least 15 minutes
- For preventive maintenance of the oxygen concentrator component of this device, refer to the oxygen concentrator module or user manual

CONTACT A TECHNICIAN OR MAINTENANCE DEPARTMENT IF DEVICE CONTINUES TO NOT WORK PROPERLY AFTER ADDRESSING THE COMMON ISSUES