**PATIENT ASSESSMENT & DEVICE PREPARATION**

**Bubble CPAP**

Bubble CPAP (bCPAP) devices provide both positive pressure and increased fractional concentration of oxygen ($\text{FiO}_2$) 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. Assess and manage using the TRY algorithm.

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**1. ASSESS WHICH PATIENT TO PUT ON CPAP**

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

**T**one is **GOOD**

**R**espiratory distress

**E**xpiratory effort

**Y**es HR is greater than 100 bpm

- Baby is breathing
  - HR is greater than 100 bpm
  - Weight is more than 1 kg

- Tone is **POOR**
  - Baby is floppy
  - Weight is between 1–1.5 kg
  - Premature, less than 30 wks

- Weight is more than 1.5 kg
  - RR is greater than 60 bpm
  - $\text{SpO}_2$ is less than 90% in room air
  - Signs of increased work of breathing

- **NO bCPAP**
  - Put on $\text{O}_2$ 1 L/min if $\text{SpO}_2$ is less than 90% in room air

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**2. PREPARE DEVICE**

Follow handwashing protocol

- **A**. Plug the power cable into the back of the machine and plug into a socket or extension
- **B**. Fill to **6 cm** with **clean water** then place bottle back into bottle holder
- **Connect the inspiratory tubing** to the patient port and the **expiratory tubing** to the bottle port
- **Choose correctly sized prongs**
  - **D**. Connect the correctly sized bCPAP prongs between the inspiratory and expiratory tubing

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**COMPLICATIONS**

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

**DISINFECTION & INFECTION PREVENTION**

- Clean hands with soap and water or alcohol before and after handling bCPAP materials that will be used on patients
- Ensure patient related tubing is new or has been cleaned thoroughly before use
- Tubing should be stored in loose rolls, preventing sharp bends or kinks

**Refer to the General Infection Prevention Module**
**MANAGEMENT OF A PATIENT**

**Bubble CPAP**

Check patient response 15 minutes after bCPAP initiation. Refer to increasing and decreasing bCPAP treatment algorithms to guide management.

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

**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”)

**SET INITIAL FLOWS**
Start with total flow 6 L/min with 50% FiO₂
Occlude prongs and check for bubbling

**START PATIENT ON bCPAP**
Follow handwashing protocol, wear gloves if needed

A. Suction secretions, apply nasal saline and insert OGT

B. Put hat on baby. If no hat is available one can be made using stockinette.

C. Attach clips to fold of the hat (the clip is between the fold of the hat and the hat—it is not touching the patient’s skin)

D. Place prongs in patient’s nose leaving 1 mm of space. Attach tubing to hat clips.

**MANAGE & MONITOR PATIENT**

Routine every 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

**COMPLICATIONS**
- Nasal blockage and necrotic septum
- Gastric distention
- Pneumothorax
- Decreased cardiac output
- Pressure leaks
- Power failure

Always remove prongs from baby’s nose during power outages or when bCPAP is turned off

**DISINFECTION & INFECTION PREVENTION**
- Clean hands with soap and water or alcohol before and after handling bCPAP materials that will be used on patients
- Device: Turn off and wipe down with alcohol
- Bottle: Dispose of water
- Tubing & prongs: Dispose of or IMMEDIATELY follow protocols for cleaning and reuse

Refer to the General Infection Prevention Module
INCREASING bCPAP TREATMENT
Increase fractional concentration of oxygen (FiO₂) and/or pressure

If the device is functioning well, but some or all of the following are present consider increasing bCPAP:

- RR is greater than 60 bpm
- O₂ saturations less than 90%
- Persistent increased work of breathing

**bCPAP water level**: 6 cm
**Oxygen**: 3 L/min
**Blended Flow**: 6 L/min
**FiO₂**: 50%

**O₂ saturations greater than 90%?**

**Yes**

**No**

Increase FiO₂ to 70%
**Oxygen**: +1 L/min

**After 4 hours**: O₂ saturations greater than 90%?

**Yes**

Substantial indrawings or work of breathing?

**No**

**BABY IS RESPONDING TO TREATMENT**
**CONTINUE MANAGEMENT**

**Increase FiO₂ & maintain pressure**
- FiO₂: 80%
- Oxygen: 4.5 L/min
- bCPAP water level: 6 cm
- Blended flow: 6 L/min

**Maintain FiO₂ & increase pressure**
- FiO₂: 70%
- Oxygen: 5 L/min
- bCPAP water level: 7 cm
- Blended flow: 7 L/min

**O₂ saturations greater than 90%?**

**Yes**

**No**

**CALL FOR ASSISTANCE!**
bCPAP water level should not be >8 cm

**Maintain total flow & increase settings**
- Oxygen: +0.5 L/min
- bCPAP water level: +1 cm
- FiO₂: +10%

**REASSESS FOR COMPLICATIONS OR ALTERNATIVE DIAGNOSIS**
WEANING TREATMENT

**Bubble CPAP**

WEANING A PATIENT FROM bCPAP TREATMENT

Select starting point by bCPAP FiO₂ settings
Stability criteria for weaning bCPAP treatment.
The patient is clinically stable as stated below:

- RR is less than 60 bpm
- O₂ saturations greater than 90%
- No significant signs of increased work of breathing
- No other signs of respiratory distress

1. **bCPAP settings: more than 50% FiO₂**
   - Patient continues to meet weaning criteria:
     - Maintain bCPAP water level
     - Reduce FiO₂ by 10% 4 hourly until FiO₂ reaches 50%
   - **Blended Flow**
     - FiO₂: 90% 80% 70% 60% 50%
     - O₂ flow rate (L/min): 5 4.5 4 3.5 3

2. **bCPAP settings: less than 50% FiO₂**
   - Patient continues to meet weaning criteria:
     - Alternately reduce FiO₂ by 10% and water level by 1 cm 4 hourly until FiO₂ reaches 20% and water level reaches 5 cm
   - **Blended Flow**
     - FiO₂: 40% 30% 20%
     - O₂ flow rate (L/min): 2 1 0

3. **Patient is stable for 4 hours:**
   - FiO₂ is 20% (air)
   - Water level is 5 cm
   - Remove from bCPAP
   - Leave on room air
   - Reassess patient after 15 min then 1, 4, and 8 hours

If patient meets criteria for bCPAP again at any point, restart bCPAP and discuss patient with seniors.
**REPAIR & MAINTENANCE**

**Bubble CPAP**

Test the device for use by setting up patient circuit. Cover or occlude prongs and check for bubbling.

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**DAILY MAINTENANCE**

Always wipe the bCPAP device with 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 when device is not in use.**

- **If the bCPAP device is not turning on**
  - Check that the power cable is securely attached
  - Check that the power socket is turned on

- **If the silver ball within the O₂ or total 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

- **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 check the seal at the patient port
  - If the seal is deteriorating or cracked, contact the maintenance department

- **If total flowmeter does not go up to 10 L/min**
  - Contact the maintenance department to request an internal filter change

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**PREVENTIVE MAINTENANCE**

The bCPAP device should be turned on weekly to a total flow of 10 L/min and allowed to run while connected to an oxygen source for at least 15 minutes.

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