NEST-ED
Clinical Job Aids

FACILITATING THE CLINICAL USE OF TECHNOLOGIES
FOR NEWBORN CARE IN LOW-RESOURCE SETTINGS
Newborn Essential Solutions and Technologies-Education
Job Aids

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The authors have made every effort to check the accuracy of all information and instructions for use of any devices or equipment. As knowledge base continues to expand, readers are advised to check current product information provided by the manufacturer of each device, instrument, or piece of equipment to verify recommendations for use and/or operating instructions.

In addition, all forms, instructions, checklists, guidelines, and examples are intended as resources to be used and adapted to meet national and local health care settings’ needs and requirements.
We are grateful to the NEST360 Education Writing Team of Elizabeth Molyneux, Sara Liaghati-Mobarhan, Jennifer Werdenberg, Edith Gicheha, George Banda and Josephine Langton, who contributed equally to the content and development of this resource; and to Anniina Lockwood who coordinated its publication. This resource is based upon the NEST-ED Clinical Modules.

We also would like to thank Esalee Andrade-Guerrero for preparing the design and illustrations in this document.

NEST360 is made possible by generous commitments from the John D. and Catherine T. MacArthur Foundation, the Bill & Melinda Gates Foundation, The ELMA Foundation, the Children’s Investment Fund Foundation, The Lemelson Foundation, the Ting Tsung and Wei Fong Chao Foundation and individual donors to NEST360.
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**Phototherapy Light**

Phototherapy uses blue light transmitted onto the patient's skin to break down unconjugated bilirubin

**USE FOR**

Neonatal jaundice requiring treatment

**STANDARD OF CARE**

- Visible jaundice anywhere on the body on day 1 of life
- Jaundice extending below the umbilicus (level 3, see Kramer’s Scale)
- Bilirubin level indicating need for treatment

---

1. **ASSESS PATIENT**

Assess for jaundice in natural or white light

If jaundiced, determine need for phototherapy based on serum bilirubin measurement or physical exam

**2a. BILIRUBIN MEASUREMENT AVAILABLE**

Compare value to bilirubin tables (below) or nomograms to determine need for treatment

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Day of life</th>
<th>Healthy term baby</th>
<th>Premature &lt; 35 wks, LBW or sick baby</th>
</tr>
</thead>
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<tr>
<td>Phototherapy Jaundice of these levels is treated with phototherapy</td>
<td>Day 1</td>
<td>Treat any visible jaundice with phototherapy</td>
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</tr>
<tr>
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<td></td>
<td>Day 3</td>
<td>18 mg/dL 310 µmol/L 15 mg/dL 260 µmol/L</td>
<td></td>
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<tr>
<td></td>
<td>Day 4 onwards</td>
<td>20 mg/dL 340 µmol/L 17 mg/dL 290 µmol/L</td>
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</tr>
<tr>
<td>Exchange Transfusion Jaundice of these levels is dangerous and the baby requires urgent referral for possible exchange transfusion</td>
<td>Day 1</td>
<td>15 mg/dL 260 µmol/L 10 mg/dL 170 µmol/L</td>
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<tr>
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<td>Day 2</td>
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---

2. **2b. BILIRUBIN MEASUREMENT UNAVAILABLE**

If measurement of serum bilirubin is not timely or unavailable, estimate serum bilirubin and determine need for phototherapy using Kramer’s Scale (below)

<table>
<thead>
<tr>
<th></th>
<th>Area 1</th>
<th>Areas 1 and 2</th>
<th>Areas 3, 4, or 5</th>
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<tbody>
<tr>
<td>1</td>
<td>4–6 mg/dL 70–100 µmol/L</td>
<td>Only start phototherapy if day 1 of life</td>
<td>Start phototherapy for all babies, including healthy term babies, especially if palms and soles (area 5) are jaundiced</td>
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Transcutaneous bilirubin and Kramer’s Scale are less precise in determining serum levels after phototherapy has begun

Do not delay treatment while awaiting bilirubin laboratory results

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Clinical Job Aid
**PREPARATION & TREATMENT**

### Phototherapy Light

Blue light within the wavelengths of 425–475 nm² breaks down unconjugated bilirubin to a water soluble, non-toxic form that can be easily excreted.

**USE FOR**
Patient with jaundice on physical exam or a bilirubin level requiring phototherapy.

**STANDARD OF CARE**
- Regular phototherapy irradiance: 25–30 µW/cm²
- Intensive phototherapy irradiance: 30–35 µW/cm²

**COMPLICATIONS**
- Dehydration
- Hypothermia
- Retinal damage
- Eye infections
- Bronze baby syndrome
- Kernicterus

**DISINFECTION & INFECTION PREVENTION**
- Clean hands with soap and water or alcohol before and after handling phototherapy materials that will be used on patients.
- Disinfect phototherapy, lightmeter housing, and LCD controls using 70% alcohol.
- Ideally use one phototherapy unit for a single patient.
- Refer to the General Infection Prevention Module.

1. **ASSESS PATIENT**
   Measure bilirubin to determine if phototherapy is indicated.
   Estimate bilirubin with Kramer’s Scale if testing not available.

2. **PREPARE DEVICE**
   - Turn on the phototherapy light.
   - Set irradiance to regular or intensive.
   - Turn on lightmeter and hold near patient’s mattress.
   - Lower light to increase irradiance OR raise to decrease as appropriate for clinical condition.

3. **PREPARE PATIENT**
   - Follow hand washing protocol.
   - Remove baby’s clothes except for diaper.
   - Place eye mask on patient so it fully covers the eyes.
   - Place patient directly under the light.

4. **MONITOR PATIENT**
   During treatment:
   - begin thermal management with a radiant warmer if needed.
   - check daily bilirubin levels (if available).
   - turn patient and check eye pad every 4 hours.
   - check for signs of dehydration, hypothermia, kernicterus or eye infection.
   - Minimise interruptions to treatment with the exception of feeding.

5. **REMOVE PATIENT FROM DEVICE**
   If bilirubin can be measured stop phototherapy when:
   - bilirubin 50 mmol/dL or 3 mg/dL below the level requiring treatment OR
   - jaundice is limited to area 1 in premature infants and areas 1 & 2 in term infants.

If jaundice persists despite 7 days of phototherapy conduct investigations for pathologic causes of jaundice.
Phototherapy & Lightmeter

Phototherapy devices are usually rolling units with brakeable caster wheels. Devices may be rolled from patient bed to patient bed as needed.

**DAILY MAINTENANCE**
Always wipe the phototherapy unit with 70% alcohol using gauze or a cotton swab before first use and between patients.

**PREVENTIVE MAINTENANCE**
Test the phototherapy light weekly to ensure it is still providing a therapeutic range of 25–35 µW/cm² at 40 cm.

- If the light is **not turning on**
  - Check that the power cable is securely attached to the phototherapy device
  - Check that the switch and power outlet are turned on

- If the light turns on but **only some bulbs are working**
  - Contact your maintenance department to ask for replacement bulbs

**CONTACT A TECHNICIAN OR MAINTENANCE DEPARTMENT IF DEVICE CONTINUES TO NOT WORK PROPERLY AFTER ADDRESSING THE COMMON ISSUES**
Phototherapy uses blue light transmitted onto the patient's skin to break down unconjugated bilirubin.

**USE FOR**
- Neonatal jaundice requiring treatment

**STANDARD OF CARE**
- Visible jaundice anywhere on the body on day 1 of life
- Jaundice extending below the umbilicus (level 3, see Kramer's Scale)
- Bilirubin level indicating need for treatment

### Phototherapy Light

**ASSESS PATIENT**
Assess for jaundice in natural or white light.
If jaundiced, determine need for phototherapy based on serum bilirubin measurement or physical exam.

**BILIRUBIN MEASUREMENT AVAILABLE**
Compare value to bilirubin tables (below) or nomograms to determine need for treatment.

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**BILIRUBIN MEASUREMENT UNAVAILABLE**
If measurement of serum bilirubin is not timely or unavailable, estimate serum bilirubin and determine need for phototherapy using Kramer's Scale (below).

### Kramer's Scale

1. 4–6 mg/dL 70–100 μmol/L
2. 8–10 mg/dL 130–170 μmol/L
3. 12–14 mg/dL 200–240 μmol/L
4. 15–18 mg/dL 250–310 μmol/L
5. 15–20 mg/dL 250 to >340 μmol/L

**Area 1**
Only start phototherapy if day 1 of life.

**Areas 1 and 2**
If premature, low birth weight or a sick term baby start phototherapy.

**Areas 3, 4, or 5**
Start phototherapy for all babies, including healthy term babies, especially if palms and soles (area 5) are jaundiced.

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Transcutaneous bilirubin and Kramer’s Scale are less precise in determining serum levels after phototherapy has begun.

Do not delay treatment while awaiting bilirubin laboratory results.
**ASSESS PATIENT**
Measure bilirubin to determine if phototherapy is indicated
Estimate bilirubin with Kramer’s Scale if testing not available

**PREPARE DEVICE**
Turn on the phototherapy light
Set irradiance to regular or intensive
Turn on lightmeter and hold near patient’s mattress
Lower light to increase irradiance
OR raise to decrease as appropriate for clinical condition

**PREPARE PATIENT**
Follow hand washing protocol
Remove baby’s clothes except for diaper
Place eye mask on patient so it fully covers the eyes
Place patient directly under the light

**MONITOR PATIENT**
During treatment:
• begin thermal management with a radiant warmer if needed
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**COMPLICATIONS**
• Dehydration
• Hypothermia
• Retinal damage
• Eye infections
• Bronze baby syndrome
• Kernicterus

**DISINFECTION & INFECTION PREVENTION**
• Clean hands with soap and water or alcohol before and after handling phototherapy materials that will be used on patients
• Disinfect phototherapy, lightmeter housing, and LCD controls using 70% alcohol
• Ideally use one phototherapy unit for a single patient

**NEST360**
Jaundice Management — Phototherapy Light (Phoenix)
**Phototherapy Light**

Phototherapy devices are usually rolling units with brakeable caster wheels. Devices may be rolled from patient bed to patient bed as needed.

### DAILY MAINTENANCE

Always wipe the phototherapy unit with 70% alcohol using gauze or a cotton swab before first use and between patients.

### PREVENTIVE MAINTENANCE

Test the phototherapy light weekly to ensure it is still providing a therapeutic range of 25–35 µW/cm² at 40 cm.

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**If the light is **not turning on**

- Check that the power cable is securely attached to the phototherapy device.
- Check that the switch and power outlet are turned on.

**If the light turns on but **only some bulbs are working**

- Check that phototherapy light is set on therapeutic rather than examination lights.

If you have confirmed that phototherapy lights are on and lights that do not show are treatment lights, contact your maintenance department to ask for replacement bulbs.

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**CONTACT A TECHNICIAN OR MAINTENANCE DEPARTMENT IF DEVICE CONTINUES TO NOT WORK PROPERLY AFTER ADDRESSING THE COMMON ISSUES**
PREPARE DEVICE
Turn on device by pressing power button or inserting a glucometer strip into the port until you feel a “click”

CHECK GLUCOSE LEVEL
Collect second blood drop on tip of the glucometer strip
Read and record glucose level
Treat according to ward protocol if glucose is less than 2.5 mmol/L

CONCLUDE ASSESSMENT
Using a dry cotton swab, apply pressure to the heel to stop the bleeding

DISINFECTION & INFECTION PREVENTION
• Clean hands with soap and water or alcohol before and after handling glucometer materials that will be used on patients
• Always wipe the glucometer with 70% alcohol between patients
• Dispose of strip in hazardous waste container
• Dispose of used lancet in sharps container

NEST360
Point-of-Care Diagnostics — Glucometer (StatStrip Connectivity) Clinical Job Aid

ASSESSMENT & PREPARATION

Glucometer

Glucometers provide a rapid approximate measurement of whole blood glucose to help direct treatment

USE FOR
• Initial assessment of all infants admitted to the neonatal unit
• Directing ongoing management for patients

STANDARD OF CARE
Glucose levels in all newborn patients should not fall below 2.5 mmol/L (45 mg/dL)

To calculate mmol/L from mg/dL: mmol/L = mg/dL / 18
To calculate mg/dL from mmol/L: mg/dL = 18 × mmol/L

COMPLICATIONS
• Bruising
• Bleeding
• Nerve or bone damage
• Pain
• Infection
• False readings

Ensure the glucometer is accurate for neonatal blood glucose range
Blood glucose samples should never be taken from the finger of a neonate

? Refer to the General Infection Prevention Module

not fall below 2.5 mmol/L (45 mg/dL)
Glucometer

Glucometer and strips should be stored in a clean, dry, and secure area. Keep strips container tightly closed when not in use. Care should be taken to ensure that glucometers and strips remain in the ward and are accessible for use when required.

DAILY MAINTENANCE

Wipe the glucometer with 70% alcohol using gauze or a cotton swab before first use and between patients. Do not submerge device or drip alcohol onto glucometer strip reading slot.

PREVENTIVE MAINTENANCE

Perform calibration OR a quality control test on glucometers with control solution every week or when changing glucometer strip containers to ensure consistent results.

If the glucometer is not turning on

- Try inserting a glucometer strip until you feel a “click”

If the glucometer is still not turning on

- Try charging the glucometer or replacing the batteries
- Check the expiration date of your glucometer strips. If the strips are expired, try using non-expired strips
- If results are still inconsistent perform a quality control test using control solution

1) Allow the strip to absorb a drop of the control solution
2) The control solution should test as a “Pass”

CONTACT A TECHNICIAN OR MAINTENANCE DEPARTMENT IF DEVICE CONTINUES TO NOT WORK PROPERLY AFTER ADDRESSING THE COMMON ISSUES
Glucometers provide a rapid approximate measurement of whole blood glucose to help direct treatment.

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Glucose levels in all newborn patients should not fall below 2.5 mmol/L (45 mg/dL).

To calculate mmol/L from mg/dL: \( \text{mmol/L} = \frac{\text{mg/dL}}{18} \)
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**COMPLICATIONS**
- Bruising
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- Pain
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- False readings

- Ensure the glucometer is accurate for neonatal blood glucose range
- Blood glucose samples should never be taken from the finger of a neonate

**DISINFECTION & INFECTION PREVENTION**
- Clean hands with soap and water or alcohol before and after handling glucometer materials that will be used on patients
- Always wipe the glucometer with 70% alcohol between patients
- Dispose of strip in hazardous waste container
- Dispose of used lancet in sharps container

**Refer to the General Infection Prevention Module**
REPAIR & MAINTENANCE

Glucometer

Glucometer and strips should be stored in a clean, dry, and secure area. Keep strips container tightly closed when not in use. Care should be taken to ensure that glucometers and strips remain in the ward and are accessible for use when required.

DAILY MAINTENANCE

Wipe the glucometer with alcohol using gauze or a cotton swab before first use and between patients.
Do not submerge device or drip 70% alcohol onto glucometer strip reading slot.

PREVENTIVE MAINTENANCE

Perform calibration OR a quality control test on glucometers with control solution every week or when changing glucometer strip containers to ensure consistent results.

If the glucometer is not turning on

Try inserting a glucometer strip until you feel a “click”

If the glucometer is still not turning on

Replace the batteries

If the glucometer is providing results consistently incompatible with the patients’ conditions

Check the expiration date of your glucometer strips. If the strips are expired, try using non-expired strips
If results are still inconsistent perform a quality control test using control solution

1) Allow the strip to absorb a drop of the control solution

2) Compare results to QC results range

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

**Bubble CPAP**

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.

Assess and manage using the TRY algorithm.

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**ASSESS WHICH PATIENT TO PUT ON CPAP**

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

<table>
<thead>
<tr>
<th>T</th>
<th>O</th>
<th>N</th>
<th>E</th>
<th>is good</th>
</tr>
</thead>
</table>
| R | E | S | P | R | I | T | O | R | Y | D | I | S | T | R | E | S | T | I | O | N | S | \( \text{SpO}_2 \) is less than 90% on \( O_2 \) \( 1 \text{ L/min} \)

YES 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

**NO bCPAP**

Put on \( O_2 \) \( 1 \text{ L/min} \) if \( \text{SpO}_2 \) is less than 90% in room air

Weight is more than 1.5 kg

HR is greater than 60 bpm

\( \text{SpO}_2 \) is less than 90% in room air

Premature, less than 30 weeks

Weight is between 1–1.5 kg

Early bCPAP

**START bCPAP**

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**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.

C. 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

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.

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

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)

MANAGE & MONITOR PATIENT
Routinely 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 ($\text{FiO}_2$) 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
- $\text{O}_2$ saturations less than 90%
- Persistent increased work of breathing

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**bCPAP water level: 6 cm**

- Oxygen: 3 L/min
- Blended Flow: 6 L/min
- FiO$_2$: 50%

---

**O$_2$ saturations greater than 90%?**

- **Yes**

- **No**

  - Increase FiO$_2$ to 70%
    - Oxygen: +1 L/min

  - After 4 hours: $\text{O}_2$ saturations greater than 90%?
    - **Yes**
    - Substantial indrawings or work of breathing?
      - **Yes**
      - Baby is responding to treatment
        - Continue management
      - **No**
    - **No**

  - Increase FiO$_2$ & maintain pressure
    - FiO$_2$: 80%
    - Oxygen: 4.5 L/min
    - bCPAP water level: 6 cm
    - Blended flow: 6 L/min

  - Maintain FiO$_2$ & increase pressure
    - FiO$_2$: 70%
    - Oxygen: 5 L/min
    - bCPAP water level: 7 cm
    - Blended flow: 7 L/min

---

**O$_2$ saturations greater than 90%?**

- **Yes**

- **No**

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

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**ALWAYS CHECK CONNECTIONS BEFORE INCREASING TREATMENT!**

- Is the water bubbling?
- Does the baby need suctioning?
- Reassess baby 15 min after settings change

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**NEST360**

**Respiratory Support — Bubble CPAP (Pumani)**

**Clinical Job Aid**
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

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**WEANING TREATMENT**

**Bubble CPAP**

**Does patient meet weaning criteria?**

- **no** → Keep on bCPAP

- **yes**

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%

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
   - If water level of 5 cm OR 20% FiO₂ is reached while alternating Maintain water level or FiO₂ and continue to decrease other settings

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

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Blended Flow

<table>
<thead>
<tr>
<th>FiO₂</th>
<th>O₂ flow rate (L/min)</th>
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<tbody>
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<td>90%</td>
<td>4.5 5 6 7 8 9 10</td>
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<tr>
<td>80%</td>
<td>4 4.5 5.5 6 7 7.5</td>
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<tr>
<td>70%</td>
<td>3.5 4 5 5.5 6 7</td>
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<tr>
<td>60%</td>
<td>3 3.5 4.5 5 5.5 6</td>
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<tr>
<td>50%</td>
<td>2.5 3 3.5 4 4.5 5</td>
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</table>

Blended Flow

<table>
<thead>
<tr>
<th>FiO₂</th>
<th>O₂ flow rate (L/min)</th>
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<tbody>
<tr>
<td>40%</td>
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</tr>
<tr>
<td>30%</td>
<td>1 1 1.5 2 2 2.5</td>
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<tr>
<td>20%</td>
<td>0 0 0 0 0 0</td>
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</table>
**REPAIR & MAINTENANCE**

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

**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.

**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.

**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

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

Flow Splitter

A flow splitter divides oxygen from one source to several patients at independent low flow rates (0.1–2 L/min)

USE FOR
Nearly all sick infants may benefit from oxygen therapy

STANDARD OF CARE
Target SpO2 is
- 90–95% for patients on O2
- 90–100% for patients off O2

PREPARE DEVICE
Open all flow splitter regulators
Connect flow splitter tubing from oxygen source to flow splitter inlet port
Turn on oxygen source

CHECK DEVICE
Read flow meter at eye level and measure at the middle of the ball

ADJUST DEVICE
Set oxygen source flow to provide a flow of at least 1 L/min oxygen more than the total requirement from all ports in use
When you alter one valve flow, check that the others have not moved and you adjusted the right valve for the intended newborn

PREPARE PATIENT
Follow handwashing protocol
Wear gloves if needed
Ports can be used in any order
Set required flow for the intended newborn
Connect tubing and place the cannula with appropriately sized nasal prongs on the patient

MONITOR PATIENT
Monitor using a pulse oximeter
Adjust flow regulator up and down until patient saturations reach 90–95%
Assess RR, HR, work of breathing, and nostril patency while on oxygen therapy

COMPLICATIONS
- Dangerous device positioning
- Inappropriate flow delivery
- No flow coming out of splitter

DISINFECTION & INFECTION PREVENTION
- Clean hands with soap and water or alcohol before and after handling materials that will be used on a patient
- Begin reprocessing oxygen tubing according to ward guidelines immediately after use
- Clean unit housing and regulators with 70% alcohol after every use
- Refer to the General Infection Prevention Module

Any concentration of oxygen administered without appropriate monitoring of blood oxygen saturation can cause harm
Units should be mounted and secured in a location where nursing staff can regulate and view flow meters easily. If improperly secured, flow splitters may fall on to patients, causing permanent or fatal damage.

**PREVENTIVE MAINTENANCE**

The flow splitter should be connected to an oxygen source and used for at least 15 minutes once a week. Each regulator should be allowed to flow at its maximum flow for this period of time.

**DAILY MAINTENANCE**

Always wipe the flow splitter and oxygen source with alcohol using gauze or cotton swabs before first use and between patients.

**REPAIR & MAINTENANCE**

**Flow Splitter**

- If there is no flow from all ports of the flow splitter:
  - Check that the oxygen source is on and that oxygen is flowing from the outlet port.
  - Check that the flow splitter tubing is securely connected to the oxygen source.

- If there is no flow from one port of the flow splitter, but other ports are functional:
  - Check the outlet port of the flow splitter for visible blockages like dirt or other debris.
  - If debris is visible, use a test tube brush or thin rod covered with gauze to remove.
  - Disinfect port with alcohol after debris has been removed.
  - Check with your hand that oxygen is now flowing.

- If oxygen is flowing from the flow splitter port, but not from the oxygen tubing or nasal prongs:
  - Visually check the tubing for kinks, blockages or bends.
  - If you see any of these obstructions, replace the tubing or nasal prongs.
  - Test flow coming from nasal prongs in water.

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

**Oxygen Concentrator**

Oxygen concentrators produce 85-95.5% oxygen from ambient air using two sieve beds

**USE FOR**

Nearly all sick infants may benefit from oxygen therapy

**STANDARD OF CARE**

Target SpO2 is
- 90–95% for patients on O2
- 90–100% for patients off O2

**TURN ON DEVICE**

Plug in concentrator and turn on device

Allow to run for 5 minutes OR until indicator light shows appropriate concentrations of oxygen are reached

**PREPARE DEVICE**

Adjust regulators to desired oxygen flow level

A. Connect correctly sized nasal prongs or tubing to oxygen port

B. Check that flow comes out of nasal prongs

**PREPARE PATIENT**

Follow hand washing protocol, wear gloves if needed

Assess nasal patency, suction if secretions are present

Insert nasal prongs and place gauze under tubing to protect skin

Secure tubing with tape

**MONITOR PATIENT**

Monitor using a pulse oximeter

Adjust regulator flow up and down. Patient saturation goal is 90–95%

Assess RR, HR, work of breathing, and nostril patency while on oxygen therapy

If oxygen flow is more than 1 L/min and saturations less than 90%, consider switching to CPAP

**COMPLICATIONS**

- Hypoxia
- Hyperoxia
- Nasal blockage
- Necrotic septum

Target saturations for infants on oxygen are 90–95%. Any amount of oxygen given without appropriate monitoring of oxygen saturations can cause harm.

**DISINFECTION & INFECTION PREVENTION**

- Clean hands with soap and water or alcohol before and after handling materials that will be used on patients
- Begin reprocessing oxygen tubing according to ward guidelines immediately after use
- Clean oxygen concentrator unit housing and regulators using gauze and 70% alcohol after every use

Refer to the General Infection Prevention Module
Oxygen Concentrator

Units should be located 30–35 cm away from the nearest wall to ensure that air can freely flow into the oxygen concentrator.

**DAILY MAINTENANCE**

Always wipe the oxygen concentrator with alcohol using gauze or a cotton swab before first use and between patients.

**PREVENTIVE MAINTENANCE**

Fine particle and gross particle filters should be checked weekly.

Oxygen concentrator should be turned on and allowed to run for at least 15 minutes every week if it has not been in use.

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If the oxygen concentrator is **not turning on**

- Check that the power cable is plugged into a socket.
- Check that socket is turned on and has electricity.
- Push the reset button.

If the oxygen concentrator is turning on but **there is no flow**

- Connect nozzle to oxygen port.
- Check port for debris or blockages.
  - If debris is seen, clean using a cotton bud or forceps wrapped in gauze and soaked in alcohol.

If the low oxygen concentration alarm is on

- Check the gross particle filter for dust and debris.
- If dirty, replace filter with spare, clean filter.
- Check if set flow rate (L/min) is within maximum machine specifications.
  - If the set flow rate exceeds capacity, lower flow rate to within capacity limits.

When it’s time to **clean the filter**

- Turn off the device, then remove the back of the unit.
- If available, replace dirty filters with clean ones and turn back on for use.
  - **Gross particle filter:** Place in lukewarm, soapy water. Rinse with clean water and place in shaded area until completely dry.
  - **Fine particle filter:** Do not wash this filter in water. It should be checked weekly by the maintenance department.

If alarm still sounds after reducing within capacity limits OR fine particle filter appears dirty, contact the maintenance department.

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

Oxygen concentrators produce 85–95.5% oxygen from ambient air using two sieve beds.

**USE FOR**
Nearly all sick infants may benefit from oxygen therapy.

**STANDARD OF CARE**
Target SpO2 is:
- 90–95% for patients on O2
- 90–100% for patients off O2

**ASSESSMENT & PREPARATION**

1. **TURN ON DEVICE**
   - Plug in concentrator and turn on device
   - Allow to run for 5 minutes OR until indicator light shows appropriate concentrations of oxygen are reached.

2. **PREPARE DEVICE**
   - Adjust regulators to desired oxygen flow level
     - A. Connect correctly sized nasal prongs or tubing to oxygen port
     - B. Check that flow comes out of nasal prongs.

3. **PREPARE PATIENT**
   - Follow hand washing protocol, wear gloves if needed.
   - Assess nasal patency, suction if secretions are present.
   - Insert nasal prongs and place gauze under tubing to protect skin.
   - Secure tubing with tape.

4. **MONITOR PATIENT**
   - Monitor using a pulse oximeter.
   - Adjust regulator flow up and down.
   - Patient saturation goal is 90–95%.
   - Assess RR, HR, work of breathing, and nostril patency while on oxygen therapy.
   - If oxygen flow is more than 1 L/min and saturations less than 90%, consider switching to CPAP.

**COMPLICATIONS**
- Hypoxia
- Hyperoxia
- Nasal blockage
- Necrotic septum

Target saturations for infants on oxygen are 90–95%. Any amount of oxygen given without appropriate monitoring of oxygen saturations can cause harm.

**DISINFECTION & INFECTION PREVENTION**
- Clean hands with soap and water or alcohol before and after handling materials that will be used on patients.
- Begin reprocessing oxygen tubing according to ward guidelines immediately after use.
- Clean oxygen concentrator unit housing and regulators using gauze and 70% alcohol after every use.
- Refer to the General Infection Prevention Module.
REPAIR & MAINTENANCE

Oxygen Concentrator

Units should be located 30-35 cm away from the nearest wall to ensure that air can freely flow into the oxygen concentrator.

DAILY MAINTENANCE

Always wipe the oxygen concentrator with alcohol using gauze or a cotton swab before first use and between patients.

If the oxygen concentrator is not turning on

- Check that the power cable is plugged into a socket
- Check that socket is turned on and has electricity
- Push the reset button

If the oxygen concentrator is turning on but there is no flow

- Connect nozzle to oxygen port
- Check port for debris or blockages
- If debris is seen, clean using a cotton bud or forceps wrapped in gauze and soaked in alcohol

PREVENTIVE MAINTENANCE

Fine particle and gross particle filters should be checked weekly.

- Oxygen concentrator should be turned on and allowed to run for at least 15 minutes every week if it has not been in use.

When it’s time to clean the filter

- Turn off the device, then remove the back of the unit
- If available, replace dirty filters with clean ones and turn back on for use

Gross particle filter: Place in lukewarm, soapy water. Rinse with clean water and place in shaded area until completely dry

Fine particle filter: Do not wash this filter in water. It should be checked weekly by the maintenance department.

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

Pulse oximeters measure oxygen saturation and heart rate using red light.

**USE FOR**
- Routine assessment of all infants on admission
- All sick or at risk patients or those being treated with oxygen therapy, bCPAP, or ventilation

**STANDARD OF CARE**
Target SpO₂ is:
- 90–95% for patients on O₂
- 90–100% for patients off O₂

Pulse oximeters do not give meaningful clinical information below their accuracy threshold of 70%.

1. **CHECK COMPONENTS**
   - Check the shapes of the pulse oximeter port and external probe sensor before connecting the probe.

2. **PREPARE DEVICE**
   - Turn on device by pressing and holding the power button for at least 5 seconds.
   - Confirm patient setting is set to **baby mode**.
   - The probe must display a flashing red light.

3. **PREPARE PATIENT**
   - Follow hand washing protocol.
   - Position patient in a neutral position.
   - Select a well perfused location on patient’s wrist or foot.
   - Place probe light side down on wrist or foot.
   - Ensure that light and photodetector are opposite each other.
   - Wrap the rubber strap around wrist or foot and gently tighten.

4. **USING THE PULSE OXIMETER**
   - Allow the patient’s trace to establish. It should look like the example below:

5. **REMOVE PATIENT FROM DEVICE**
   - Loosen and unthread rubber connecting strap.

**COMPLICATIONS**
- Misdiagnosis due to poor trace
- Patient movement and poorly fitting probes can hinder measurement
- Strong light interference leading to incorrect results
- Pressure sores or skin damage

- If SpO₂ is less than 90%, the patient should be considered for supplemental oxygen therapy.

**DISINFECTION & INFECTION PREVENTION**
- Clean hands with soap and water or alcohol before and after handling materials that will be used on a patient.
- Always wipe the pulse oximeter & probe with 70% alcohol between patients.
- Do not submerge pulse oximeter in alcohol.
- Never place pulse oximeter in the bed with patient.

Refer to the General Infection Prevention Module.
**Pulse Oximeter**

The device should be kept on a charger when not in use to ensure power in the event of a power outage.

### DAILY MAINTENANCE

Always wipe the pulse oximeter with 70% alcohol using gauze or a cotton swab before first use and between patients.

### PREVENTIVE MAINTENANCE

Weekly, turn on device and check for a red light on the probe, then connect a clip probe and test readings on your finger for normal saturations (above 90%).

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#### If the pulse oximeter is not turning on

- Press and hold the power button for at least 5 seconds.
- Check the battery level. If low, plug in the device to charge or get new batteries.

#### If the pulse oximeter is turning on but is not displaying a trace

- Check the probe for a flashing red light. If there is no light, check that the probe is properly connected to the pulse oximeter.
- If the probe is connected and no light is showing, try replacing the probe.
- If the probe is connected and the red light is showing, but no probe is detected or no trace is displayed, replace with a different probe.

#### If the pulse oximeter is turning on but taking time to stabilise the trace

- Check that no powerful light sources are shining on the pulse oximeter probe.
- Confirm that the patient is not moving and the probe is still securely attached.
- Confirm the probe is dry and clean.
- Choose an extremity that is warm, dry, and well perfused.
- Wait at least 1 minute for the signal to stabilise before trying an alternate extremity.

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Contact a technician or maintenance department if device continues to not work properly after addressing the common issues.
**Pulse Oximeter**

Pulse oximeters measure oxygen saturation and heart rate using red light.

**USE FOR**
- Routine assessment of all infants on admission
- All sick or at risk patients or those being treated with oxygen therapy, bCPAP, or ventilation

**STANDARD OF CARE**
Target SpO₂ is:
- 90–95% for patients on O₂
- 90–100% for patients off O₂

Pulse oximeters do not give meaningful clinical information below their accuracy threshold of 70%.

1. **CHECK COMPONENTS**
   Check the shapes of the pulse oximeter port and external probe sensor before connecting the probe.

2. **PREPARE DEVICE**
   Turn on device by pressing and holding the power button for at least 5 seconds.
   The probe must display a flashing red light.

3. **PREPARE PATIENT**
   **Follow hand washing protocol**
   Position patient in a neutral position.
   Select a well perfused location on patient’s wrist or foot.
   - Place probe light side down on wrist or foot.
   - Ensure that light and photodetector are opposite each other.
   Wrap the rubber strap around wrist or foot and gently tighten.

4. **USING THE PULSE OXIMETER**
   Allow the patient’s trace to establish. It should look like the example below:
   - **normal signal**
   - **check skin for blood flow**
   - **motion artefact**
   - **noise artefact**

5. **REMOVE PATIENT FROM DEVICE**
   Loosen and unthread rubber connecting strap.

**COMPLICATIONS**
- Misdiagnosis due to poor trace
- Patient movement and poorly fitting probes can hinder measurement
- Strong light interference leading to incorrect results
- Pressure sores or skin damage

If SpO₂ is less than 90%, the patient should be considered for supplemental oxygen therapy.

**DISINFECTION & INFECTION PREVENTION**
- Clean hands with soap and water or alcohol before and after handling materials that will be used on a patient.
- Always wipe the pulse oximeter & probe with 70% alcohol between patients.
- Do not submerge pulse oximeter in alcohol.
- Never place pulse oximeter in the bed with patient.

Refer to the General Infection Prevention Module.
**Pulse Oximeter**

The device should be kept on a charger when not in use to ensure power in the event of a power outage.

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### DAILY MAINTENANCE

- Always wipe the pulse oximeter with 70% alcohol using gauze or a cotton swab before first use and between patients.

### PREVENTIVE MAINTENANCE

- Weekly, turn on device and check for a red light on the probe, then connect a clip probe and test readings on your finger for normal saturations (above 90%).

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**If the pulse oximeter is not turning on**

- Press and hold the power button for at least 5 seconds.
- Check the battery level. If low, plug in the device to charge or get new batteries.

**If the pulse oximeter is turning on but is not displaying a trace**

- Check the probe for a flashing red light. If there is no light, check that the probe is properly connected to the pulse oximeter.
- If the probe is connected and no light is showing try replacing the probe.
- If the probe is connected and the red light is showing, but no probe is detected or no trace is displayed, replace with a different probe.

**If the pulse oximeter is turning on but is not displaying a trace**

- Check that no powerful light sources are shining on the pulse oximeter probe.
- Confirm that the patient is not moving and the probe is still securely attached.
- Choose an extremity that is warm, dry, and well perfused.
- Wait at least 1 minute for the signal to stabilise before trying an alternate extremity.

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

Suction Pump

Suction pumps use a negative vacuum created by an internal pump to remove blood or secretions from oral and nasopharyngeal cavities.

USE FOR
Patients with secretions or blood in the mouth, nostrils, and upper airways

STANDARD OF CARE
Neonates should be suctioned between -60 to -100 mmHg for less than 10 seconds.

PREPARE DEVICE
A. Connect the patient suction tubing to the collection reservoir port labelled “patient”
B. Plug the power cable into the wall if needed and turn on suction pump
C. Adjust the suction vacuum to desired level then test the suction by suctioning water from a small container

PREPARE PATIENT
Follow hand washing protocol and put on gloves
Inspect patient’s oral and nasopharyngeal cavities for secretions or blood
With the suction catheter measure suction depth from the nose to the ear and halfway back, mark distance with a small piece of tape

SUCTION PATIENT
Place patient in a neutral position
Pinch or occlude catheter and insert gently into mouth or nostril to point marked with tape
Release pinch or occlusion as you withdraw catheter slowly, gently rotating until completely removed
Rinse catheter with water and repeat process in other nostril

REMOVE PATIENT FROM DEVICE
Gently withdraw suction catheter from patient’s oral or nasopharyngeal cavity
Safely dispose of reservoir contents and patient suction catheter

COMPLICATIONS
• Hypoxia
• Trauma
• Vomiting
• Vagal stimulation

Gently suction infant for NO MORE than 10 seconds. Allow infant to recover before suctioning again.

DISINFECTION & INFECTION PREVENTION
• Clean hands with soap and water or alcohol before and after handling materials that will be used on a patient
• All tubing must be disinfected IMMEDIATELY after use otherwise bleach re-processing may be inadequate for disinfection
• Ensure all items are new or have been cleaned before use
• Disinfect suction pump housing and pressure gauge control with 70% alcohol

Refer to the General Infection Prevention Module
**Suction Pump**

Suction consumables should be kept nearby for easy access in case of emergency.

### DAILY MAINTENANCE

If a suction pump is battery powered, it should be taken off its charger only as necessary to ensure that it is charged for use in the event of a power blackout.

If the suction pump is not turning on:
- Check that the machine’s power cable is firmly secured and power at the socket is on.

If the suction pump stops suctioning:
- Check that the float valve is installed in the lid of the collection reservoir and in the correct orientation.
- Ensure collection reservoir is not full. If full, empty and continue the procedure.

### PREVENTIVE MAINTENANCE

The suction pump should be turned on and allowed to run for at least 15 minutes every week if it has not been in use.

Cleaning the machine routinely for **infection prevention**:
- Yankauer sucker and patient catheter must be cleared of debris by suctioning clean water following each use.
- Patient suction tubing to the reservoir must be cleaned immediately between every patient (see diagram below).

- **Wipe down daily with 70% alcohol**
- **Empty before full**
- **Clean when dirty**
- **Change when dirty**
- **Rinse between patients**
- **Ideally dispose after use**
- **Dispose after use**

**Contact a technician or maintenance department if device continues to not work properly after addressing the common issues.**
Suction Pump

PREPARE PATIENT
Follow hand washing protocol and put on gloves.
Inspect patient’s oral and nasopharyngeal cavities for secretions or blood.

With the suction catheter measure suction depth from the nose to the ear and halfway back, mark distance with a small piece of tape.

SUCTION PATIENT
Place patient in a neutral position.
A. Pinch or occlude catheter and insert gently into mouth or nostril to point marked with tape.
B. Release pinch or occlusion as you withdraw catheter slowly, gently rotating until completely removed.

Rinse catheter with water and repeat process in other nostril.

REMOVE PATIENT FROM DEVICE
Gently withdraw suction catheter from patient’s oral or nasopharyngeal cavity.
Safely dispose of reservoir contents and patient suction catheter.

DISINFECTION & INFECTION PREVENTION
- Clean hands with soap and water or alcohol before and after handling materials that will be used on a patient.
- All tubing must be disinfected IMMEDIATELY after use. Otherwise, bleaching re-processing may be inadequate for disinfection.
- Ensure all items are new or have been cleaned before use.
- Disinfect suction pump housing and pressure gauge control with 70% alcohol.

Gently suction infant for NO MORE than 10 seconds. Allow infant to recover before suctioning again."

PREPARE DEVICE
Connect the patient suction tubing to the collection reservoir port labelled “patient”.
Plug the power cable into the wall and turn on suction pump.
Adjust the suction vacuum to desired level then test the suction by suctioning water from a small container.

STANDARD OF CARE
Neonates should be suctioned between -60 to -100 mmHg for less than 10 seconds.
Suction Pump

Suction consumables should be kept nearby for easy access in case of emergency.

**REPAIR & MAINTENANCE**

**DAILY MAINTENANCE**
If a suction pump is battery powered, it should be taken off its charger only as necessary to ensure that it is charged for use in the event of a power blackout.

**PREVENTIVE MAINTENANCE**
The suction pump should be turned on and allowed to run for at least 15 minutes every week if it has not been in use.

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**If the suction pump is not turning on**

- Check that the machine’s power cable is firmly secured and power at the socket is on.

**If the suction pump stops suctioning**

- Check that the float valve is installed in the lid of the collection reservoir and in the correct orientation.
- Empty after use.

**Cleaning the machine routinely for infection prevention**

- Yankauer sucker and patient catheter must be cleared of debris by suctioning clean water following each use.
- Patient suction tubing to the reservoir must be cleaned immediately between every patient (see diagram below).

---

**DAILY MAINTENANCE**

**If the suction pump is not turning on**

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**Cleaning the machine routinely for infection prevention**

- Yankauer sucker and patient catheter must be cleared of debris by suctioning clean water following each use.
- Patient suction tubing to the reservoir must be cleaned immediately between every patient (see diagram below).

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**CONTACT A TECHNICIAN OR MAINTENANCE DEPARTMENT IF DEVICE CONTINUES TO NOT WORK PROPERLY AFTER ADDRESSING THE COMMON ISSUES**
Radiant Warmers use overhead heating elements to provide radiating heat and prevent hypothermia.

**USE FOR**
- Resuscitation
- Patient assessment & stabilisation
- Hypothermia treatment
- Undertaking invasive procedures

**STANDARD OF CARE**
A normal neonatal temperature is 36.5°C to 37.5°C.

**ASSESS PATIENT**
Select appropriate mode:
- **Prewarm** provides constant low heat to warm cot bedding before patient is placed on the device.
- **Automatic** (servo or baby mode) adjusts heating to maintain patient’s temperature within normal range. Servo/automatic mode should always be used with a temperature probe.
- **Manual** provides constant heat set by the user.

**PREPARE DEVICE**

1. **A** Select manual setting at 25% OR prewarm setting to warm cot bedding
2. **B** Plug temperature probe into temperature probe port
3. **C** Hold temperature probe in hand directly under heating element to check for heat

**PREPARE PATIENT**

1. **A** Position patient in middle of cot, being careful to keep any tubing in place
2. **B** Place temperature probe directly on the patient’s liver and secure with tape

**MONITOR TREATMENT**
Monitor patient’s temperature 5 minutes after starting on radiant warmer and pay close attention to these alarms:
- **Temperature:** recorded temperatures below OR above the safe range for the patient
- **System failure:** problem with system no longer providing heat OR no longer monitoring the patient
- **Probe failure:** temperature probe is not secured appropriately OR the probe has malfunctioned
- **Power failure:** mains power to device has been disconnected or failed

**REMOVE PATIENT FROM DEVICE**
Power off and unplug radiant warmer
Move infant to KMC, incubator or swaddle as appropriate
**Disinfect and wipe** temperature probe, control panel, power button, cot including walls and mattress and base with 70% alcohol
Check patient’s temperature after **30 minutes** to ensure normal body temperature is maintained

**COMPLICATIONS**
- hyperthermia and heat stress
- hypothermia and cold stress
- sensor site trauma
- Baby falling from radiant warmer

Temperature less than 36°C is an independent risk factor for death in newborns.
Never leave patients unattended during treatment in manual mode!

**DISINFECTION & INFECTION PREVENTION**
- Clean hands with soap and water or alcohol before and after handling materials that will be used on a patient
- Ensure bedding, both sides of the mattress, the cot and probes have been cleaned before use
- Store all probe cables by wrapping loosely and securing in a clean, dry location
- Ideally use device and temperature probe on ONE PATIENT at a time
- Refer to the General Infection Prevention Module
Radiant Warmer

Radiant warmers should be plugged into their own socket with a surge protector if available. Warmers should be away from any windows to avoid air currents providing the potential for additional convective heat loss. Windows are preferably kept closed.

DAILY MAINTENANCE

Always wipe the radiant warmer and probe with alcohol using gauze before first use and between patients.

If the radiant warmer is not turning on

- Check the power cable is firmly plugged in and the power switch on the back of the device is turned on.
- If the radiant warmer does not turn on replace the power cable.

If the radiant warmer display is turning on but is not heating properly

- If power failure alarm is showing on the display, check power switch, power source and cable.

  ![Image of a temperature probe reading 36.2°C]

- If in manual mode, make sure power setting is set to a value above 0%.

  ![Image of power setting options: 0%, 25%]

- If system failure alarm is showing, contact your maintenance department.

  ![Image of a system failure alarm]

If the radiant warmer display is turning on but temperature probe is not reading patient’s temperature

- Hold the temperature probe in the palm of your hand and watch temperature reading to see if it changes.

  ![Image of a temperature probe reading 36.5°C]

- If the temperature does not change replace the probe.

- If probe alarm is showing, replace probe with a spare or contact your maintenance department.

  ![Image of a probe alarm]

PREVENTIVE MAINTENANCE

Test heating elements and temperature probe weekly.

- Do weekly power loss alarm tests: while the radiant warmer is plugged in and turned on, turn off power at wall socket.

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

**Radiant Warmer**

Radiant warmers use overhead heating elements to provide radiating heat and prevent hypothermia.

**Use for**
- Resuscitation
- Patient assessment & stabilisation
- Hypothermia treatment
- Undertaking invasive procedures

**Standard of Care**
A normal neonatal temperature is 36.5°C to 37.5°C.

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**Assess Patient**

Select appropriate mode:
- **Prewarm** provides constant low heat to warm cot bedding before patient is placed on the device.
- **Automatic** (servo or baby mode) adjusts heating to maintain patient’s temperature within normal range. Servo/automatic mode should always be used with a temperature probe.
- **Manual** provides constant heat set by the user.

**Prepare Device**

A. Select manual setting at 25% OR prewarm setting to warm cot bedding.
B. Plug temperature probe into temperature probe port.
C. Hold temperature probe in hand directly under heating element to check for heat.

**Prepare Patient**

Follow handwashing protocol.
Select servo/automatic mode.
A. Position patient in middle of cot, being careful to keep any tubing in place.
B. Place temperature probe directly on the patient’s liver and secure with tape.

**Monitor Treatment**

Monitor patient’s temperature 5 minutes after starting on radiant warmer and pay close attention to these alarms:
- **Temperature:** recorded temperatures below OR above the safe range for the patient.
- **System failure:** problem with system no longer providing heat OR no longer monitoring the patient.
- **Probe failure:** temperature probe is not secured appropriately OR the probe has malfunctioned.
- **Power failure:** mains power to device has been disconnected or failed.

**Remove Patient from Device**

Power off and unplug radiant warmer.
Move infant to KMC, incubator or swaddle as appropriate.
**Disinfect and wipe** temperature probe, control panel, power button, cot including walls and mattress and floor with 70% alcohol.
Check patient’s temperature after 30 minutes to ensure normal body temperature is maintained.

**Complications**
- Hyperthermia and heat stress.
- Hypothermia and cold stress.
- Sensor site trauma.
- Baby falling from radiant warmer.

Temperature less than 36°C is an independent risk factor for death in newborns.

Never leave patients unattended during treatment in manual mode.

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**Disinfection & Infection Prevention**

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- Ensure bedding, both sides of the mattress, the cot and probes have been cleaned before use.
- Store all probe cables by wrapping loosely and securing in a clean, dry location.
- Ideally use device and temperature probe on ONE PATIENT at a time.
- Refer to the General Infection Prevention Module.
REPAIR & MAINTENANCE

Radiant Warmer

Radiant warmers should be plugged into their own socket with a surge protector if available. Warmers should be away from any windows to avoid air currents providing the potential for additional convective heat loss. Windows are preferably kept closed.

**DAILY MAINTENANCE**
Always wipe the radiant warmer and probe with alcohol using gauze before first use and between patients

**PREVENTIVE MAINTENANCE**
Test heating elements and temperature probe weekly
Do weekly power loss alarm tests: while the radiant warmer is plugged in and turned on, turn off power at wall socket

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**If the radiant warmer is not turning on**
Check the power cable is firmly plugged in and the power switch on the back of the device is turned on
If the radiant warmer does not turn on replace the power cable

**If the radiant warmer display is turning on but is not heating properly**
If **power failure alarm** is showing on display, check power switch, power source and cable
If in **manual mode**, make sure power setting is set to a value above 0%
If **system failure alarm** is showing contact your maintenance department

**If the radiant warmer display is turning on but temperature probe is not reading patient’s temperature**
Hold the temperature probe in the palm of your hand and watch temperature reading to see if it changes
If the temperature does not change replace the probe

If **probe alarm** is showing, replace probe with a spare or contact your maintenance department

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