

IN THE NAME OF GOD

Resuscitation and stabilization of Babies Born Preterm

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❑ Preterm newborns are at **increased risk for requiring resuscitation and assistance** with transition after birth.

❑ Preterm newborns are at **increased risk of complications** because of rapid heat loss, immature organ systems, small blood volume, and vulnerability to hypoglycemia.

- Additional resources (including :
 - 1- Skilled personnel
 - 2- Polyethylene plastic bag or wrap, a hat, thermal mattress
 - 3-Temperature sensor and cover for a servo-controlled radiant warmer
 - 4- Preterm-sized masks and endotracheal tubes
 - 5-Positive-pressure device that can provide positive-end expiratory pressure [**PEEP**] and continuous positive airway pressure [**CPAP**], and surfactant) should be available.
- The temperature in the room where resuscitation takes place should be **23° C to 25° C** (74° F-77° F).
- If the baby is less than approximately 32 weeks' gestation, a polyethylene plastic bag or wrap and a thermal mattress should be prepared.

- ❑ If positive-pressure ventilation (PPV) is required, use the lowest inflation pressure necessary to achieve and maintain an adequate heart rate response. **it is preferable to use a device that can provide PEEP.**
- ❑ ***Consider using CPAP immediately after birth if the baby is*** breathing spontaneously with a heart rate of at least 100 beats per minute (bpm) but has labored respirations or low oxygen saturation.
- ❑ To **decrease the risk of neurologic injury**, handle the baby gently, avoid positioning the baby's legs higher than the head, avoid high PPV or CPAP pressures, use a pulse oximeter and blood gases to adjust ventilation and oxygen concentration, and avoid rapid intravenous fluid infusions.

Why do preterm babies have a higher risk of complications?

- ❑ Thin skin, decreased subcutaneous fat, large surface area relative to body mass, and limited metabolic response to cold lead to rapid heat loss.
- ❑ Weak chest muscles, poorly compliant (stiff) lungs, and flexible ribs decrease the efficiency of spontaneous breathing efforts.

- ❑ Immature lungs that lack surfactant are more difficult to ventilate and are at greater risk of injury from PPV.
- ❑ Immature tissues are more easily damaged by oxygen.
- ❑ Infection of the amniotic fluid and placenta (chorioamnionitis) may initiate preterm labor, and the baby's immature immune system increases the risk of developing severe infections such as pneumonia, sepsis, and meningitis.

- ❑ A smaller blood volume increases the risk of hypovolemia from blood loss.
- ❑ Immature blood vessels in the brain cannot adjust to rapid changes in blood flow, which may cause bleeding or damage from insufficient blood supply.
- ❑ Limited metabolic reserves and immature compensatory mechanisms increase the risk of hypoglycemia after birth.

How do you keep the preterm newborn warm?

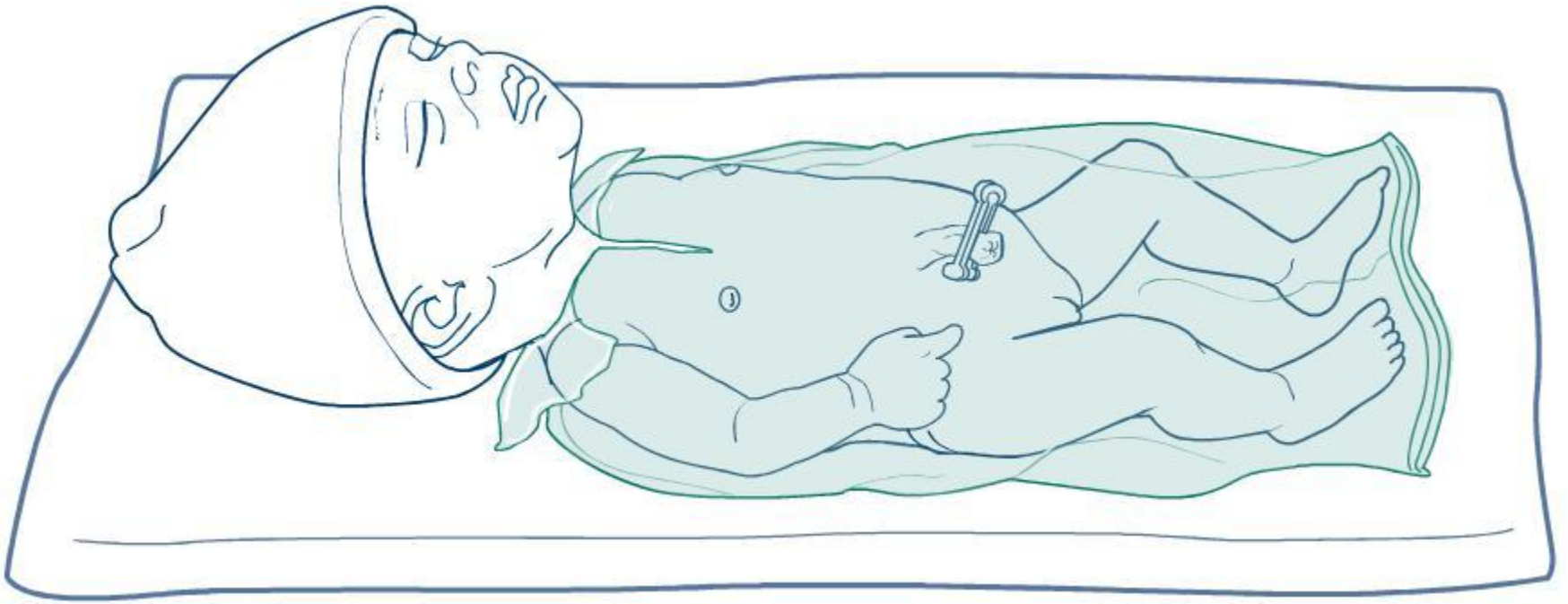
- Preterm newborns have a high risk of developing **hypothermia (body temperature below 36.5° C)** and complications from cold stress.
- While drying with warm towels, skin-to-skin contact, and early breastfeeding may be sufficient to maintain normal temperature for term newborns and some vigorous late-preterm newborns, additional measures are required for more premature newborns and those requiring assistance after birth.
- When a preterm birth is expected, anticipate that temperature regulation will be challenging and prepare for it.

- ❑ The chance that a preterm baby will require resuscitation is significantly higher than for a baby born at full term. This is true even for late-preterm babies born at 34 through 36 weeks' gestation.
- ❑ If the baby is anticipated to be less than 32 weeks' gestation, prepare **a polyethylene bag or wrap and a thermal mattress**.
- ❑ A **servo-controlled radiant warmer** with a temperature sensor helps to maintain the baby's temperature within the normal range.
- ❑ An **oxygen blender and a pulse oximeter** with an appropriately-sized sensor should be available for all preterm births.
- ❑ A **cardiac monitor with 3 chest leads or limb leads** provides a rapid and reliable method of continuously displaying the baby's heart rate if the pulse oximeter has difficulty acquiring a signal.

- ❑ A **resuscitation device capable of providing PEEP and CPAP**, such as a T-piece resuscitator or flow-inflating bag, is preferred.
- ❑ A **preterm-sized resuscitation mask, size 0 laryngoscope blade (size 00 optional), and appropriate-sized endotracheal tubes (3.0 mm and 2.5 mm)** should be prepared.
- ❑ Consider **having surfactant** available if the baby is expected to be less than 30 weeks' gestation.
- ❑ A **pre-warmed transport incubator** with blended oxygen and a pulse oximeter is important for maintaining the baby's temperature and oxygenation within the target range if the baby will be moved after the initial stabilization

- ❑ Set the temperature in the room where the baby will be resuscitated and receive initial care to approximately **23° C to 25° C (74° F to 77° F)**.
- ❑ Preheat the radiant warmer well before the time of birth.
- ❑ After delivery, quickly place a hat on the baby's head.
- ❑ Use a **pre-warmed transport incubator** if the baby will be moved after initial care is completed.
- ❑ **Maintain the baby's axillary temperature between 36.5 ° C and 37.5° C .**

Use of a Plastic Bag



Use of a Plastic Bag



Additional steps for thermoregulation of babies less than 32 weeks' gestation

- ☐ Use a thermal mattress as an additional heat source.
- ☐ Wrap the baby in a polyethylene plastic bag or wrap.
- ☐ Monitor the baby's temperature frequently because overheating has been described while using a combination of warming methods.

How do you assist ventilation?

- ❑ Preterm babies have immature lungs that may be difficult to ventilate and are more susceptible to injury from PPV.
- ❑ Use the same criteria for initiating PPV with a preterm baby that you have learned for a term baby (apnea, or gasping, or heart rate less than 100 bpm within 60 seconds of birth despite the initial steps).

special considerations for assisting ventilation of preterm babies

- ☐ If the baby is breathing spontaneously and has a heart rate of at least 100 bpm, but has labored respirations or oxygen saturation below the target range, administration of CPAP may be helpful.
- ☐ Using early CPAP, you may be able to avoid the need for intubation and mechanical ventilation.
- ☐ **CPAP alone is NOT appropriate therapy for a baby who is not breathing or whose heart rate is less than 100 bpm.**

- ☐ **If PPV is required, use the lowest inflation pressure necessary to achieve and maintain a heart rate greater than 100 bpm.**
- ☐ The baby's heart rate response is the best indicator of effective ventilation.
- ☐ An initial inflation pressure of 20 to 25 cm H₂O is adequate for most preterm newborns.
- ☐ The volume of air required to ventilate a preterm baby's lungs is very small and may not result in perceptible chest movement.
- ☐ Use the lowest inflation pressure necessary to maintain a heart rate of at least 100 bpm and gradually improve oxygen saturation.

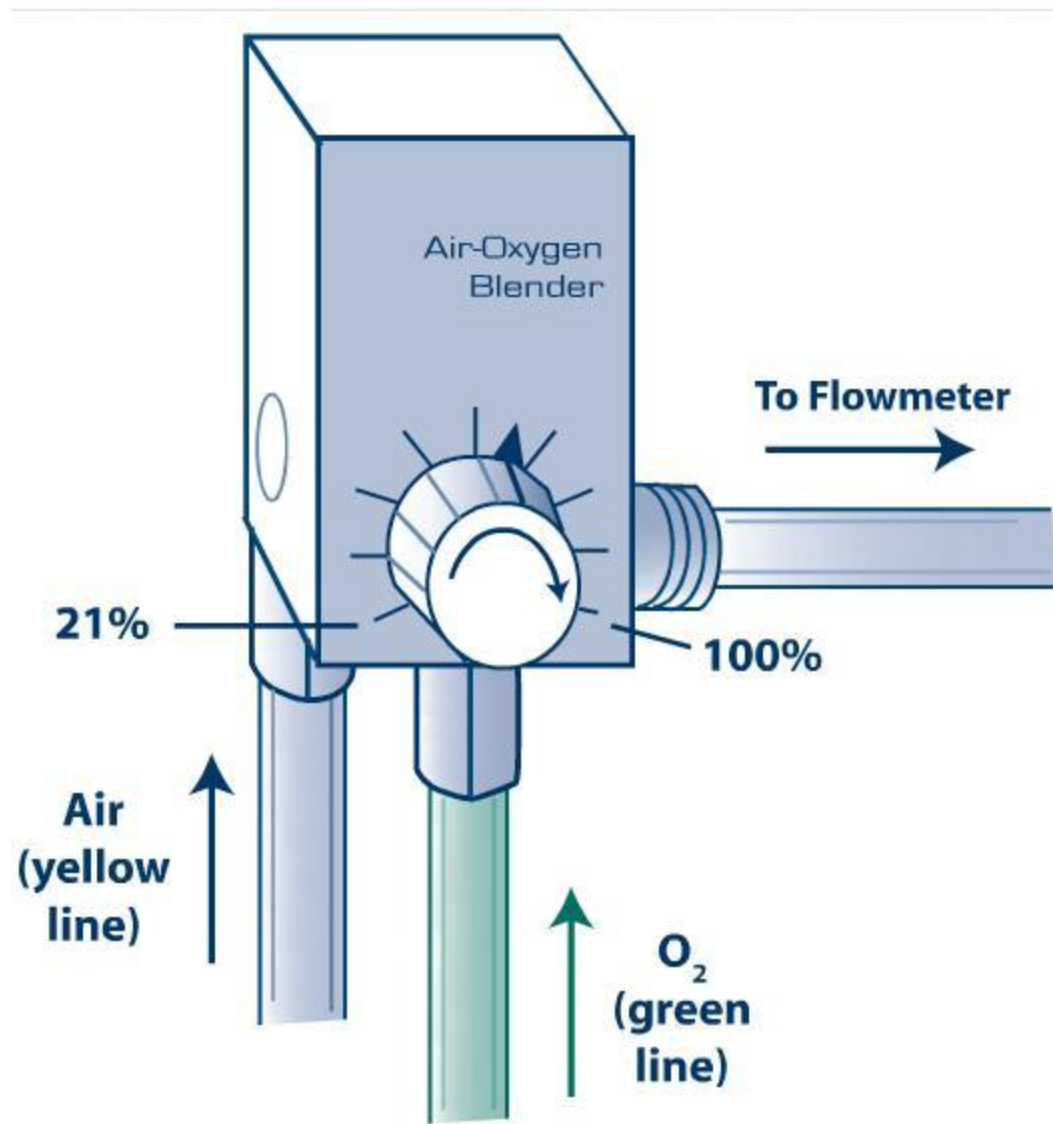
- ❑ The maximum inflation pressure used for a baby born at term may be too high for preterm newborn.
- ❑ Use your judgment when increasing ventilation pressure; however, it is reasonable to **limit face-mask ventilation to a maximum inflation pressure of 30 cm H₂O .**
- ❑ If face-mask ventilation at this pressure does not result in clinical improvement, providing ventilation through an endotracheal tube may improve the efficacy of PPV and allow you to decrease the ventilating pressure.
- ❑ Airway obstruction and face-mask leak are common problems during face-mask ventilation with preterm newborns, and very small changes in the head and neck position may lead to significant changes in ventilation.

- ❑ If PPV is required, it is preferable to use a device that can provide PEEP.
- ❑ Using **PEEP (5 cm H₂O)** helps the baby's lungs to remain inflated between positive-pressure breaths. This is particularly important if you are using an endotracheal tube for ventilation.
- ❑ Both the **T-piece resuscitator and flow-inflating bag** can provide PEEP during ventilation through either a face mask or an endotracheal tube.
- ❑ If a PEEP valve is attached, a self-inflating bag may provide PEEP during endotracheal tube ventilation. It is difficult to maintain PEEP during face-mask ventilation with most self-inflating bags.

**Consider administering surfactant
if the baby requires intubation
for respiratory distress or is
extremely preterm.**

Oxygen Administration

- Premature babies are more vulnerable to hyperoxia/reperfusion.
- Resuscitation with a pulse oximeter and an oxygen blender is recommended.
- Oxygen blender, and pulse oximeter are especially critical for babies born at <32 weeks' gestation.



❖ If the heart rate does not respond by increasing rapidly to greater than 100 bpm, the baby likely is not being adequately ventilated. Correct the **ventilation** problem and **adjust the oxygen concentration** delivered to match the goals listed in the next slide.

Targeted Pre-ductal Spo₂ After Birth

1 min	60%-65%
2 min	65%-70%
3 min	70%-75%
4 min	75%-80%
5 min	80%-85%
10 min	85%-95%

Initial Oxygen Concentration for PPV

≥ 35 weeks'
GA

21% oxygen

< 35 weeks'
GA

21%-30%
oxygen

How much oxygen should you use?

- ❑ When stabilizing a preterm baby, it is important to balance the desire to rapidly correct low oxygen saturation against avoiding exposure to excessive levels of oxygen.
- ❑ The current recommendation is to **initiate resuscitation of preterm newborns (less than 35 weeks' gestational age) with 21 % to 30% oxygen** and use a pulse oximeter and oxygen blender to maintain oxygen saturation within the same target range described for full-term newborns.

What can you do to decrease the chances of neurologic injury in preterm newborns?

- ☐ Handle the baby gently
- ☐ Do not position the baby's legs higher than the head (**Trendelenburg position**).
- ☐ Avoid using high pressure during PPV or CPAP
- ☐ Use a pulse oximeter and blood gases to monitor and adjust ventilation and oxygen concentration.
- ☐ Do not rapidly infuse intravenous fluids.

What special precautions should be taken after the initial stabilization period?

- ☐ Monitor the baby's temperature
- ☐ Monitor blood glucose
- ☐ Monitor the baby for apnea and bradycardia

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