

Resuscitation with Positive-pressure Ventilation and CPAP

Educational Focus

Scenario Outline

This case presents a labor and birth complicated by meconium-stained amniotic fluid and a Category III fetal heart rate tracing. Learners are expected to prepare for the cesarean birth by asking the 4 pre-birth questions, assembling a resuscitation team based on assessment of perinatal risk, performing the equipment check, and coordinating the plan for delayed cord clamping with OB provider. Initial steps of newborn care are performed immediately, followed by positive-pressure ventilation. This newborn benefits from supplemental oxygen and CPAP for labored respirations. An orogastric tube is inserted to keep the stomach decompressed during CPAP. Learners are expected to be familiar with the setup and proper use of the T-piece resuscitator and/or the flow-inflating bag to administer CPAP.

Learning Objectives

Upon completion of the simulation, the learners will be able to:

- Demonstrate the correct interventions following the birth of a non-vigorous infant delivered through meconium-stained amniotic fluid
- Identify the newborn that requires PPV
- Demonstrate correct technique for administering PPV
- Demonstrate the steps for assessing response to PPV

- Demonstrate the ventilation corrective steps (MR. SOPA)
- Demonstrate correct technique for administering supplemental free-flow oxygen
- Identify indications and method for discontinuing PPV
- Demonstrate correct technique for administering CPAP
- Demonstrate correct technique for inserting an orogastric (OG) tube

Debriefing Points

Points for discussion during debriefing could include:

- Indications for administering PPV
- Indications for administering supplemental oxygen and CPAP
- Technique for administering CPAP
- Use of NRP Key Behavioral Skills

Reference Materials

Textbook of Neonatal Resuscitation, 8th edition, Lesson 3: Initial Steps of Newborn Care

Textbook of Neonatal Resuscitation, 8th edition, Lesson 4: Positive-Pressure Ventilation

Setup & Simulation

Equipment

For setup:

- Damp, lightly blood- and meconium-stained blanket or towel
- Segment of simulated umbilical cord
- Simulated amniotic fluid or water
- Simulated blood
- Simulated meconium

For use during simulation:

- All items included in the NRP Quick Equipment Checklist
- Umbilical cord clamp

Setup & Preparation

- Setting: Operating room.
- Moisten the simulator's skin with simulated amniotic fluid, meconium, and blood and insert the umbilical cord segment into the abdomen
- Wrap the simulator in a damp, lightly blood- and meconium-stained blanket or towel, without a diaper, and place it under a blanket or towel on the mother's abdomen.

Learner Brief

Provide this information to the participants as they enter the simulation:

You've been asked to attend a cesarean birth of a term infant with category III fetal heart rate tracing. The obstetric provider is present and the baby is about to be delivered. Please prepare for the birth.

Additional Information

Provide this information to the participants, if asked during simulation:

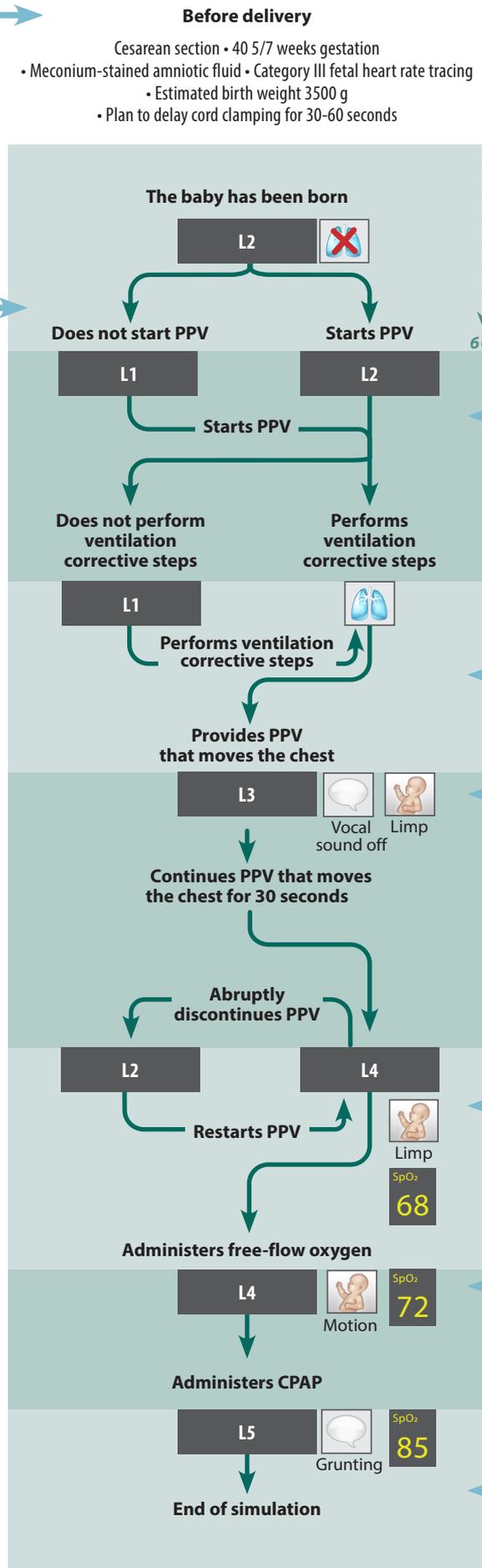
Gestational age:	40 5/7 weeks
Amniotic fluid:	Meconium-stained
Additional risk factors:	We're also seeing a Category III fetal heart rate tracing. We're setting up for an emergency c-section. The mother has a functioning epidural in place, so we won't need general anesthesia.
Estimated fetal weight:	3500 g (7 lb 11 oz).
Umbilical cord management plan:	Plan to delay cord clamping for 30-60 seconds if baby is vigorous

CRITICAL PERFORMANCE STEPS

- ❑ **Ask the 4 pre-birth questions to assess perinatal risk:**
 - What is the expected gestational age?
 - Is the amniotic fluid clear?
 - Are there additional risk factors?
 - What is our umbilical cord management plan?
- ❑ **Conduct pre-birth team briefing:**
 - Assemble team based on perinatal risk
 - Identify leader
 - Assign tasks
- ❑ **Perform equipment check**
- ❑ **Apply gloves and personal protective equipment**

- ❑ **Ask the 3 rapid evaluation questions:**
 - Term?
 - Good muscle tone?
 - Breathing or crying?
- ❑ **Move infant to radiant warmer for initial steps:**
 - Provide warmth, dry (and remove wet linen), put hat on baby's head, and stimulate
 - Position head and neck in sniffing position
 - Clear secretions from mouth and nose with bulb syringe, anticipating PPV
- ❑ **Evaluate breathing**
- ❑ **Initiate PPV with 21% oxygen within 60 seconds of birth**

Scenario Progression



CRITICAL PERFORMANCE STEPS

- ❑ **Attach pulse oximeter sensor to right hand or wrist**
- ❑ **Request cardiac monitor** (optional)
- ❑ **Document resuscitation events.** The scribe may note 30-60 second time intervals for checking HR and oxygen saturation
- ❑ **Check HR after the first 15 seconds of PPV**
- ❑ **Announce, "HR is less than 100 bpm, not increasing, and chest is not moving."**
- ❑ **Start ventilation corrective steps (MR. SOPA):**
 - Mask Adjustment, Reposition head into sniffing position.
 - Attempt PPV (for 5 breaths). If no chest movement:
 - Suction mouth and nose, Open mouth. Attempt PPV (for 5 breaths). If no chest movement:
 - Increase peak inspiratory Pressure by 5-10 cm H₂O (to maximum of 40 cm H₂O) Attempt PPV for 5 breaths after each pressure increase.

Note! The instructor may decide how many ventilation corrective steps the learners should go through before airway obstruction is turned off, but it should be off when pressure is increased at the latest, to keep focus on administering PPV via face-mask.
- ❑ **When chest movement is achieved, announce, "Chest is moving NOW. Continue PPV for 30 seconds."**
- ❑ **Monitor HR and oxygen saturation**
- ❑ **Continue PPV that moves the chest for 30 seconds**
- ❑ **Adjust oxygen concentration per target oxygen saturation table**
- ❑ **Re-assess HR, after 30 seconds of PPV that moves the chest**
- ❑ **Stimulate infant and gradually decrease PPV rate and pressure as the infant begins spontaneous breathing**
- ❑ **Discontinue PPV when HR is consistently more than 100 bpm and infant has spontaneous respirations**
- ❑ **Provide free-flow oxygen to maintain oxygen saturation in target range**
- ❑ **Re-assess HR, oxygen saturation, and respiratory status**
- ❑ **Administer CPAP at 5 cm H₂O pressure via flow-inflating bag or T-piece resuscitator**
- ❑ **Insert orogastric tube to decompress the stomach during CPAP**
- ❑ **Wean and discontinue supplemental oxygen when saturation reaches and maintains target range**
- ❑ **Continue CPAP**
- ❑ **Continue ongoing evaluation of newborn's respirations, HR, oxygen saturation, tone, activity, and temperature**
- ❑ **Plan appropriate post-resuscitation care**
- ❑ **Communicate effectively with the medical team and mother**
- ❑ **Perform post-resuscitation debriefing**