Newborn in need of ppv and intubation

**Target group**: Healthcare providers with responsibilities in labor, delivery, and neonatal resuscitation **Number of participants:** 2-3 participants **Simulation time**: 10 minutes **Debriefing time**: 15-20 minutes

# Curricular Information

## Learning objectives

After completion of the simulation and debriefing session, the participants will be able to:

* Recognize low heart rate in a newborn when performing initial assessment
* Recognize the immediate need of positive-pressure ventilation
* Perform ventilation corrective steps when observing lack of chest rise
* Perform endotracheal intubation to secure free airways

## Scenario focus

The scenario presents a single, full-term baby boy, delivered vaginally after a pregnancy with late stage hypertension. The newborn appears limp and the learner should immediately clamp the cord and perform initial steps at the radiant warmer. Following this, the learner should recognize a low heart rate, and immediately start positive-pressure ventilation (PPV), followed by ventilation corrective steps including intubation.

## Scenario progression

The simulation starts right after delivery where the newborn is limp and apneic at initial assessment. HR is 76/min. The cord should be clamped immediately, and the boy moved to the radiant warmer for initial interventions.

Suctioning and drying the newborn has no effect, and the team should start PPV immediately. Ventilation will not move the chest, despite ventilation corrective steps, until endotracheal intubation has been performed and saturation will decline to 68% over 1 minute. After 15 seconds of continuous ventilation with ET intubation, the heart rate starts to rise and after 1 minute the newborn gets tone. Vital signs will improve during the next minute, and oxygen saturation will end at 92% 4 minutes after intubation.

If the participants stop PPV, the newborn’s improvement will stop, and he will start deteriorating slowly until PPV is started again.

At start of the scenario, the instructor can use the event “No timely treatment” to prompt the participants to intervene. This event will start a deterioration trend of the vital signs until the initial interventions are performed.

## Debriefing

When the simulation is over, it is recommended that a facilitator-led debriefing be completed to discuss topics related to the learning objectives. The Event Log in Session Viewer provides suggested debriefing questions. Central discussion points could be:

* The signs and symptoms of this baby needing assisted ventilation
* Different techniques for achieving chest rise
* Indications for and against endotracheal intubation in this case

## References

Wyllie J, Perlman JM, Kattwinkel J, Wyckoff MH, Aziz K, Guinsburg R, Kim H-S, Liley HG, Mildenhall L, Simon WM, Szyld E, Tamura M, Velaphi S, on behalf of the Neonatal Resuscitation Chapter Collaborators. Part 7: Neonatal resuscitation: 2015 International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science With Treatment Recommendations. Resuscitation 2015;95:e169–e201, at <https://www.resuscitationjournal.com/article/S0300-9572(15)00366-4/fulltext>

# Setup and Preparation

## Equipment

* Baby hat
* Blankets
* Bulb syringe
* CO2 detector
* ECG-leads
* Endotracheal tubes (sizes 2.5, 3.0, 3.5)
* Flowmeter
* Laryngeal mask (size 1) and 5-ml syringe
* Laryngoscope with size 0 and 1 straight blades
* Measuring tape
* Oxygen blender
* Patient monitor
* Pulse oximeter
* Radiant warmer
* Scissors
* Segment of simulated umbilical cord
* Stethoscope
* Target oxygen saturation table
* Towels
* T-piece resuscitator or simple mask and equipment for providing PPV
* Umbilical cord clamp
* Waterproof tape or tube-securing device

## Setup before simulation

* Setup the room to look as a normal delivery room with all equipment ready and the radiant warmer plugged in.
* Insert the standard umbilical cord segment into the abdomen of SimNewB, unclamped.

## Learner Brief

*The learner brief should be read out loud to the learners before the simulation starts.*

The simulation starts right after the delivery. Please, take a moment to appoint a team leader and agree on your designated roles.

You have just assisted a 39-years-old woman in delivering a single full-term boy after membranes ruptured 4 hours ago with meconium-stained fluid. The mother had hypertension during the last month of her pregnancy, and it is her first pregnancy. You are now ready to make your initial assessment of the newborn.

Before the start of the simulation, please orient yourself to the birthing room and the available equipment.

# Customization of the scenario

The scenario may form the basis for creating new scenarios with other or additional learning objectives. Making changes to an existing scenario requires careful consideration of what interventions you expect the learners to demonstrate, and what changes you will need to make to learning objectives, progression of scenario, programming and support material. It is, however, a quick way to increase your pool of scenarios because you can reuse much of the patient information and several elements in the scenario programming and support material.

For inspiration, here are some suggestions to how this scenario can be customized:

|  |  |
| --- | --- |
| **New learning objectives** | **Changes to the scenario** |
| Adding to the fidelity | To create a more realistic setting, you can add extra props like:   * Bloodstained towels * Gloves * Simulated amniotic fluid * Simulated blood   You can also add a mother giving birth or a relative acted by standardized participants or fellow participants. This person should be instructed to play nervous and attentive without taking over the simulation with too much disturbance. |
| Including learning objectives on suctioning the trachea | If you wish to train in suctioning of secretions from the trachea after intubation, you can add your choice of a meconium aspirator to the equipment list. Change the programming not to remove the airway block until suctioning is completed and add your desired trigger events. |
| Including learning objectives on laryngeal mask | If you want to train in the insertion of a laryngeal mask, you can change the trigger event to a laryngeal airway mask and change the patient story to a newborn with mouth abnormalities that prevent a proper face mask seal. |
| Including learning objectives on team communication | If you wish to train in team communication during resuscitation, you can add your desired events for logging of team communication in the programming. |
| Including learning objectives on prenatal preparation | For training in prenatal preparation, you can add time before the delivery for the participant to gather information to help anticipate any risk factors, to brief any additional team members if needed, and to check equipment. Remember to change the Learner Brief accordingly and add a pre-birth state to the programming with your desired preparation events. |