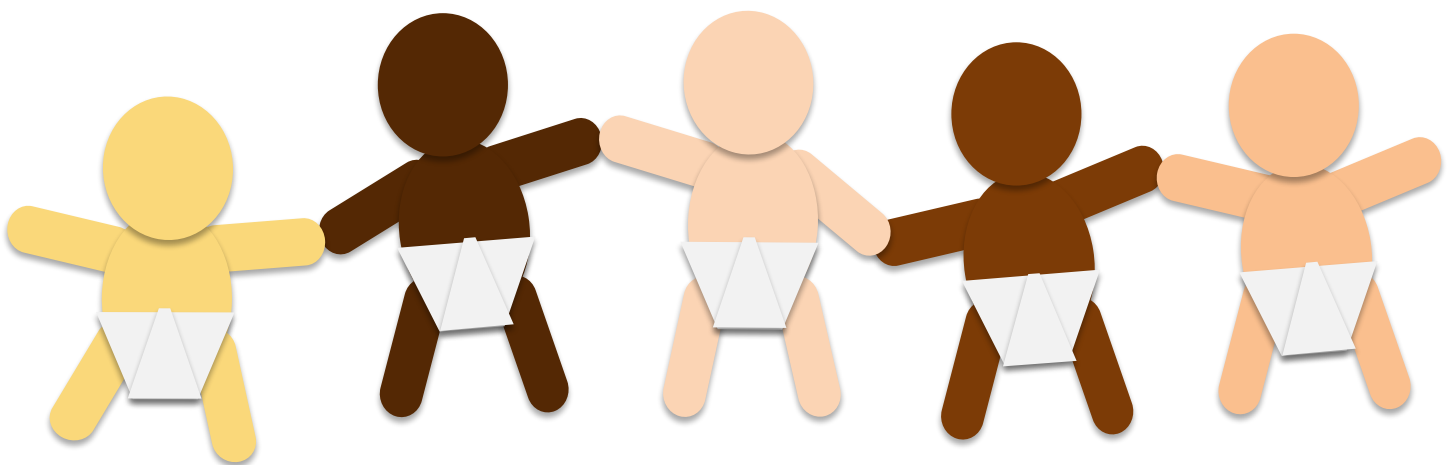


# Pediatric Readiness Simbox

## Neonatal Resuscitation



Emergency Department



### Case Objectives

At the end of this simulation participants will be able to :

1. Apply Crisis Resource Management and teamwork in the care of a newborn (with attention to role designation, directed orders, sharing mental model and closed loop communication with team and family members).
2. Prioritize treatment of potential etiologies to guide stabilization or escalation of care for a newborn baby.
3. Determine the appropriate destination for transfer.

### Equipment

*\*\* Items should be ready for learner use or pulled by learner during simulation*

- Mannequin
- PPE if needed
- Glucometer
- IV supplies
- Fluids
- Pedi length-based tape
- Monitor equipment
- NRP algorithm

### Team Roles

- Primary Nurse
- Physician
- Patient Care Technician
- Radiology Tech
- Social Worker
- Charge Nurse
- Respiratory Therapist
- APP

Helpful tips to navigate through the case progression.

Case Progression

Steps of the case progression and correlate with the interactive buttons in the video.



Expected Learner Actions

- Actions we expect the learners to complete, this is simply a guide.
- Helpful to guide your debriefing.
- If learners have achieved all of the expected actions you can click the next step on the video screen.

**Facilitator States:** Information provided to the learner as they progress through the case.

**Facilitator Response:** Read by the facilitator ONLY when the learner asks.

Scenario Outline

<input type="checkbox"/> Prebrief: Show video or Verbalize	3 mins
<input type="checkbox"/> Scenario Background: Facilitator Read	1 min
<input type="checkbox"/> Prepare for Patient: 2 min countdown <i>** Case specific to EMS arrivals</i>	2 mins
<input type="checkbox"/> Run Case Scenario	10 mins
<input type="checkbox"/> Debrief	15 mins
<input type="checkbox"/> Option: re-run scenario	10 mins

## Prebrief can be done by the video or facilitator read

Basic Assumption: "We believe that everyone participating in our activities is intelligent, capable, cares about doing their best and wants to improve."

[Center for Medical Simulation, Boston MA](#)

### Prebrief

Welcome your team, make introductions:

"This simulated resuscitation is to practice our team's response to an emergency. We will spend about 15 minutes in simulation, then we will debrief for 20 to discuss what went well and what could be improved with input from the team. Even though it is not real, and the manikin can't be harmed, everyone will get the most out of this scenario if we take it as seriously as possible."

### Describe

Describe simulator capabilities, equipment and how to participate:

"Act as you would within your role. You will not get monitor feedback unless your equipment is attached to the patient. Airway equipment should be attached to oxygen, etc. Try to make tasks realistic and timely using your equipment. Please ask for clarifications."

### Demo

DEMO: Closed loop communication.

Know your role and task designation. Use closed loop communication to verify and complete.

Leader: Tech, we need an EKG.

Tech: OK going to get the machine.

Tech: OK, I've got the EKG machine here.

### Disclose

If a safety concern arises during the simulation, I will state:

"Let's take a safety pause."

If a real event happens that is not part of the simulation, I will state:

"This is not a simulation."

Disclose if video recording, privacy and permission.

## Scenario script:

"I will assign each of you roles, including team lead, bedside survey and airway provider and parent liaison. You will hear a brief EMS patch and then see a two minute countdown clock as you prepare for the arrival of the patient. You will now hear the EMS dispatch."

Facilitator states: "ED, ED this is an ALS unit, coming in with a 16 year old in active labor. She has no previous medical problems and was not aware of her pregnancy until earlier today. Her vital signs are stable. PIV established and isotonic fluids initiated. We will arrive in 2 minutes. "

## 2 minute warning

- Team assembles + confirms roles
- Calls for help ie OB, OB unit Charge nurse, NICU team if hospital has one & prepares equipment

- Turn on Warmer immediately if available and set to 100% heat when optimal temp met switch to Servo Mode
- Warm blankets, hat, temperature sensor
- If <32 weeks gestation: plastic bag or wrap, thermal mattress
- Precipitous Delivery Kit: minimum will need cord clamps, sterile gloves, sterile scissors or a scalpel, drape, and towels.

## Airway:

- Stethoscope
- Bulb suction
- 10F or 12F suction catheter attached to warmer suction set to 80-100 mmHg (if warmer unavailable can attach to wall suction, set at 80- 100 mmHg)

## Breathing:

- Pulse oximeter
- Flowmeter set to 10L/min
- Oxygen blender set to 21% (21-30% if <35 weeks' gestation) if available
- Term and preterm sized masks
- Positive pressure ventilation (PPV) device (eg T piece resuscitator (ie: Neopuff group), self inflating bag or flow inflating bag with neonatal mask)

## Intubation Supplies: (May be in drawers of the warmer)

- Laryngoscope with size 00, 0 and 1 straight blades
- Stylet
- Endotracheal tubes (sizes 2.5, 3.0 & 3.5)
- Carbon dioxide (CO2) detector
- Measuring tape and/ or ETT insertion depth table
- Waterproof tape or tube securing device, scissors
- Laryngeal mask or i gel (size 1) and 5 mL syringe

## Circulation:

- Heel stick sampling kit, including alcohol wipe, lancet portable BLS reader
- PIV kit, tapes and saline flush
- UVC/ UAC insertion supplies

## Medications available in department:

- Dextrose 10% (0.1 gm/mL):
  - Bolus: 2 mL/kg of D10W bolus
  - Total daily fluid goal of 60 mL/kg/day
- Normal saline for volume expansion: 10 mL/kg
- Epinephrine 0.1-0.3mL/kg of the 1 mg/10 mL (0.1 mg/mL)
- Other Meds to Consider: Ampicillin, Gentamicin, Naloxone, Prostaglandin E1

"The baby was just delivered in the ambulance bay. Umbilical cord is cut and clamped with sterile scalpel by EMS and is noted to have 3 vessels (2 arteries and 1 vein). The infant is term, floppy, and not crying. OB is tending to the mom. The baby is scooped up by the triage nurse and carried into your resuscitation bay."

## Time 0

- Team starts APGAR timer
- Dries with warm blankets
- Stimulates baby while drying the back
- Estimates weight
- Per NRP algorithm, team asks the following questions:
  - Term?
  - Tone?
  - Crying?

Facilitator states:

"Term? Yes  
Tone? Floppy  
Breathing/crying: No  
Estimated weight: 3 kg"

## Step 1

HR <100  
RR gasping  
Sats not detectable  
CRT > 3sec  
T cold

- Team verbalizes illness state: Newborn in distress
- Warming maneuvers (replace warm/dry blankets, hat)
- Bulb suction: first mouth, then nose
- Starts PPV (40- 60 bpm) with 0.21 FiO2 and PIP of 20-25
- Confirms HR by auscultation
- Places SpO2 and cardiac monitor, temperature probe

"No chest rise visualized. No air entry can be heard when auscultating the chest. HR still below 100."

## Step 2

HR 70  
RR gasping, irregular  
Sats: not detectable  
CRT > 3sec  
T cold

- Team verbalizes illness state: No chest rise with PPV
  - Anticipates airway management by discussing "MR SOPA": "MR" before "SOPA"
- Mask adjustment (consider 2-handed technique)  
Reposition airway (neutral or slightly extended)
- Suction mouth and nose (bulb or catheter)  
Open mouth (lift jaw forward)  
Pressure increase (in 5-10 mmHg increments to max of 40 mmHg)  
Alternative airway (ask for ETT and laryngeal mask)

"I can see symmetric chest rise and hear equal air entry after mask adjustment and airway repositioning. Heart rate is rising >100. Tone improving. However the oxygen saturation is still 50% on 0.21 FiO2."

## Step 3

HR >100  
RR 40-60 (per PPV)  
Sat 50%  
CRT 3sec

- Team notes improvement in heart rate with PPV (on monitor and/or by auscultation)
- Notes SpO2 below NRP goal
- Asks for increase in FiO2
- Adds PEEP 5-6 mm Hg if able
- Replaces warm/dry blankets, hat

### SAMPLE history

Prenatal history: P1G0001, no maternal medical problems, unknown gestational age, but mother thinks close to term. No prenatal care since 2nd trimester since mother lost her job and insurance. Precipitous delivery. No maternal peripartum fevers or bleeding.

Family history: No known family history of congenital cardiac disease.

Social history: Denies substance use.

#### Step 4

HR 130  
RR 40-60  
Sat 85%  
CRT 2 sec

*"Occasional respiratory effort without PPV but good chest rise with PPV. Saturations improving to 85% on FiO2 of 1. HR > 100. Color improving."*

- Team discusses NRP algorithm: SpO2 and HR at goal
- Starts weaning FiO2
- Places ET/CO2 on mask, if not already placed
- Requests stat blood sugar

*"Improved color, tone. Equal air entry and stable sats despite weaning the FiO2. Blood glucose is 30."*

#### Step 5

HR 140  
BP 50/30  
RR 40-60  
Sat 90% on 0.3  
FiO2

- Team notes hypoglycemia
- Attempts IV access
- Orders D10W bolus at 2 mL/kg
- Asks for temperature and blood pressure

*"IV access in. Administering the D10W bolus. Significantly improved respiratory effort and breathing."*

#### Wrap

- Team leader hands off to receiving NICU/ PICU/ Floor team
- Updates family

After team performs handoff, state "This concludes the simulation" and move to debrief.

[Link to resource page: educational content](#)

	Observed/verbalized/documented?	Yes	No	Notes
Pediatric Readiness	Proper weight in kg			
	Pediatric Assessment Triangle			
	Vital signs assessed AND re-assessed (including BP)			
	Precalculated med dosing tool used			
	Family permitted to stay in room AND updated by team (if present)			
	Required pediatric equipment located and functioning			
	Pain assessed			
	Mental status assessed using scale (GCS, AVPU, PAT)			
	Activation of transport			
Teamwork	Roles designated			
	Closed loop communication throughout			
	Effective handoff to receiving team			
Newborn	Warm, dry, stimulation and clear airway with in 30 sec			
	Positive pressure ventilation initiated AFTER warm/dry/stim (within 1 minute)			
	Place pulse ox on RUE and place ECG leads			
	Take ventilation corrective steps MR SOPA (Mask adjust, Reposition, Suction, Open mouth Pressure increase, Advanced airway)			
	Verbalize re-evaluation of ventilation (increased HR, improved O2 saturations)			
	Check bedside glucose			



## Components of a Debrief (Based on 3Ds + PEARLS)

"The purpose of this debrief is to discuss areas of great performance and discover areas for improvement. It is not a blame session- everyone is here to do their best."

Defuse  
1-2 min

Solicit emotions and reactions:  
"Reactions?"; "Let's take a moment to gather our thoughts."

Discover  
7-8 min

Clarify facts:  
"Can a teammate share a short summary of the case?"  
"Were there other thoughts?"



Explore Performance:  
"What went well?"  
"What could be improved?"

Use observations of learner experiences to highlight strengths of the team and individuals, while asking learners for their thoughts, observations and reflections.

Deepen  
1-2 min

Identify patient care priorities. Then provide focused feedback and specific areas of opportunity for improvement. Elicit any other outstanding issues or concerns.

Summary  
1-2 min

Identify take-home points to apply to future practice: Round the room reflections and thanks for participation.

This page provides possible questions to elicit teaching points during the debrief. We are tailoring content for each objective. These questions are not meant to replace your team's discussion, but can help to steer the debriefing session.

#### DESCRIBE SIGNS/ SYMPTOMS OF SHOCK IN A NEONATE

- Learners should approach a sick neonate in a standardized fashion.
- Airway, breathing, and circulation should be assessed immediately.
- Interventions such as airway repositioning/ adjuncts, PPV should be started concurrently, if required.
- After A, B, C have been addressed, the patient should be evaluated for disability and exposed for a thorough head to toe exam and a blood sugar level should be obtained.
- Labs/imaging should be ordered and antibiotics and fluids administered in a timely fashion.
- Learners should consider the different types of shock and how to treat each condition.

#### CONSTRUCT A DIFFERENTIAL DIAGNOSIS FOR PERSISTENT HYPOXEMIA IN THE NEWBORN



The differential diagnosis of a persistently cyanotic and hypoxic neonate despite appropriate NRP is broad and includes, but is not limited to:

- **Neurologic:** hypoxic-ischemic encephalopathy (HIE), intraventricular hemorrhage (IVH), seizures, stroke.
- **Respiratory:** respiratory distress syndrome, meconium aspiration syndrome (MAS), pneumonia, pneumothorax, pleural effusion, persistent pulmonary hypertension of the newborn (PPHN), pulmonary hypoplasia secondary to a variety of other causes.
- **Congenital anomalies:** congenital diaphragmatic hernia, congenital cystic adenomatoid malformation (CCAM), tracheoesophageal fistula (TEF).
- **Infectious:** sepsis - consider in setting of chorioamnionitis, Group B Strep, TORCH infections (toxoplasmosis, syphilis, varicella-zoster, parvovirus B19, rubella, cytomegalovirus, herpes infection).
- **Electrolyte disturbance or metabolic abnormality,** hypoglycemia in infant of diabetic mother.
- **Toxic exposures:** maternal narcotic (consider giving naloxone), alcohol or anesthetics.
- **Hematologic:** fetomaternal hemorrhage (order blood products).
- **Congenital heart disease (CHD):** cyanotic CHD or ductal-dependent CHD (critical right heart obstructive lesions, critical left heart lesions, and parallel circulations such as transposition of the great arteries TGA). Obtain pre- and post- ductal saturations and consider giving prostaglandin E<sub>1</sub> (PGE<sub>1</sub>) in consultation with a pediatric cardiology and NICU team.

Knowledge:  
NRP guidelines

Learners should approach a newborn delivery in a standardized fashion with emphasis on airway and breathing

Team briefing and equipment check

Term? Tone?  
Breathing?

YES

NO

Warm and maintain normal temp  
Position airway  
Clear secretions (if needed)  
Dry  
Stimulate

Apnea, gasping or  
HR < 100 bpm?

NO

YES

PPV  
SpO2 monitor  
Consider ECG monitor

HR < 100  
bpm?

YES

Check chest movement  
Ventilation corrective steps if needed  
ETT/ laryngeal mask if needed

HR < 60  
bpm?

YES

Intubate if not already done  
Chest compressions  
100% FiO2  
ECG monitor

HR < 60  
bpm?

YES

IV epinephrine  
If HR consistently < 60 bpm consider  
hypovolemia or pneumothorax

Can remain with mother for routine care

- Warm and maintain normal temperature, skin to skin
- Position airway
- Clear secretions (if needed)
- Dry
- Ongoing evaluation

### Pre-ductal SpO2 target

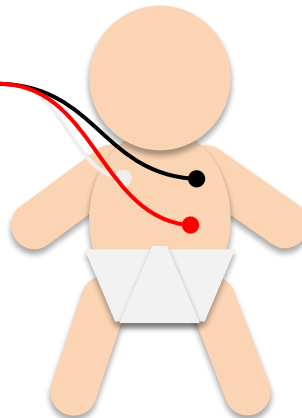
1 min	60%- 65%
2 min	65%-70%
3 min	70%-75%
4 min	75%-80%
5 min	80%-85%
10 min	85%-95%

### MR SOPA Corrective Steps

M R	Mask adjustment, Reposition Airway
S O	Suction mouth + nose, Open mouth
P	Pressure Increase
A	Alternative airway (ETT/ laryngeal mask)

### Endotracheal Intubation

GA (wks)	Depth of insertion (at lips)	Wt (g)	ETT size (mm)
23-24	5.5	500-600	Size 2.5 <1,000 or <28 wks
25-26	6.0	700-800	
27-29	6.5	900-1,000	Size 3.0 1,000-2,000 g or 28-34 wks
30-32	7.0	1,100- 1,400	
33-34	7.5	1,500- 1,800	Size 3.5 >2,000 or >34 wks
35-37	8.0	1,900- 2,400	
38-40	8.5	2,500- 3,100	
41-43	9.0	3,200- 4,200	3.5-4.0



### Medication

### Dose/ Route

### Precautions

Epinephrine  
1: 10,000  
(0.1 mg/mL)



0.1- 0.3 mL/kg IV

Give rapidly and follow with 0.5- 1 mL normal saline flush  
Repeat every 3 to 5 minutes if HR < 60 with chest compressions

Volume expanders  
Normal saline  
O negative blood

10 mL/kg IV

If not responding to resuscitation/ signs of shock/ history of blood loss

## PODCAST

Ben Lawton. The ideal paediatric resuscitation, Don't Forget the Bubbles, 2017.  
Available at: [The ideal paediatric resuscitation](#)

## VIDEOS

Bobbi Byrne, MD, Marya Strand, MD. 3x3 Method for Placing Emergency Umbilical Venous Catheters. Available at: [NRP Neonatal Resuscitation Emergency UVC Epinephrine public](#)

<https://globalhealthmedia.org/portfolio-items/helping-babies-breathe-at-birth//>

[Delivery Room Management for Small Babies](#)

[7th Edition NRP Abrupton Mock Code](#)

[Neonatal Resuscitation Simulation-Nursing Education](#)

[Neonatal Resuscitation adjacent to the OR Covid 19 Precautions](#)

[Emergency - Newborn Resuscitation](#)

[PPV scenario](#)

[PPV and ECC](#)

## ALGORITHMS

NPR: Weiner, Gary M., et al, Textbook of Neonatal resuscitation (NRP), 2019.

Helping babies breathe: [Helping Babies Breathe \(HBB\)](#) HBB teaches the initial steps of neonatal resuscitation to be accomplished within

Thank you for participating in the simulation.

Please complete the facilitator and participant surveys by clicking on the links or scanning the QR codes below:

## Facilitator Survey



## Participant Survey



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