Module 7 Skill Station: Delivery and Immediate Neonatal Care

Module objectives

Section I- Delivery and immediate neonatal care
• List the elements needed to successfully carry out neonatal resuscitation, including previous preparation, recognizable risk factors associated with the need for neonatal resuscitation, and the equipment necessary for neonatal resuscitation.
• Identify the newborn who is making a normal transition immediately after birth.
• Recognize the newborn who requires resuscitation.
• Describe and apply effective neonatal resuscitation interventions.

Section II- Jaundice
• Assess, classify, and define the treatment of neonatal jaundice.

Objectives of the station
• Identify newborns making a successful early transition, which should be taken to his/her mother to be breast-fed and receive thermal protection, and the newborn that requires any kind of resuscitation intervention.
• Identify the risk factors associated with probable need for neonatal resuscitation.
• Practice initial steps in resuscitation, included the demonstration of thermal protection measures.
• Identify newborns requiring positive pressure ventilation.
• Practice adequate positive pressure ventilation.
• Describe and practice the steps to follow if positive pressure ventilation is ineffective.

Presentation format
Skill station (hands-on practice) in which students will practice decision-making, techniques and skills related to the station objectives, based on clinical cases simulated with manikins.

Duration
90 minutes

Materials
• 2 practice areas allowing the division of participants into 2 groups of 6-8, maximum.
• Scenario/clinical case(s) for each facilitator.
• Material for each group:
  - 1 table, stretcher or working area
  - 1 infant manikin
  - 1 aspiration bulb
  - 1 neonatal bag-valve
  - 1 neonatal mask
  - 2 drapes, pads, sheets or towels
  - Scissors or scalpel (to cut cord)
  - Material to simulate cord ligature

Optional: 1 per each group of 6 to 8 participants or 1 per 2 groups:
  - Intubation head: 1 (one)
  - Laryngoscope with straight blade number 0 and extra batteries
  - Tracheal tube 3.0 or 3.5
  - Suction catheter

Notes for the instructor
Discuss technical and basic information concerning each practical station before the hands-on activity; encourage student participation. For example, the different forms of thermal protection, such as regulating the room temperature, skin-to-skin contact with the mother, covering the head with a cap and the various methods to warm the newborn with cloth (or plastic film for premature babies), can be discussed as part of healthy newborn care or as the first steps for those that require interventions. Examples of cases should be provided for each step.

Specific discussions and demonstrations can be presented in the following sequence:

1. Ask students to describe the elements needed for reception and neonatal resuscitation interventions, as well as the risk factors indicating the potential need for resuscitation (Box 1 and Table 1 of Module 7 – see auxiliary material included).

2. Describe the characteristics of the newborn who does not require resuscitation. Discuss cord care, thermal protection, breast-feeding and continuous observation.

3. Discuss the characteristics of the newborn who requires initial interventions. Show the first steps. The students should return the demonstration and later practice in the context of the case scenario(s).
4. Discuss the factors indicating the need for positive pressure ventilation (PPV). The instructor shows how to perform PPV and then students should practice with a manikin and self-inflating bag and mask before proceeding to the case(s).

5. Discuss the reasons why bag-mask ventilation can be ineffective. Show the steps to improve ventilation (mask seal, reposition head, suction mouth and nose, open mouth, ventilate with higher pressures, alternative airway) and have students practice them.

6. Show a complete resuscitation sequence, from the preparation of the reception area and the equipment, to the positive pressure ventilation with bag-mask without complications. Each student must then show a complete sequence of resuscitation, including bag-mask ventilation, in the context of the case scenario(s).

7. As part of the case scenarios, discuss situations in which the newborn may require a higher level of care. Discuss how to satisfy the immediate needs of the high-risk newborn. Show the steps of thermal protection and continuous respiratory support that may be necessary until transport is successfully completed.

**Key teaching points**

1) Recognition
Three major questions should be asked about every newborn child to define the need for resuscitation:
- Full-term gestation?
- Is the baby breathing or crying?
- Is muscle tone appropriate?
If the baby is full term, shows good respiratory effort and muscle tone, he/she can be dried and placed over the mother’s body for better thermal protection, and breast-feeding can be started under continued monitoring.

2) Resuscitation initial steps
The initial steps in the neonatal resuscitation sequence for the baby with identified risks (preterm, poor or no respiratory effort or poor muscle tone) are:
- Thorough drying and thermal protection
- Proper head positioning
- Airway clearing
- Specific stimulation to breathe
3) Assessment to determine the need for further resuscitation interventions.
   • Respiration – is the baby breathing well?
   • Heart rate
   • Color

4) Indications for positive-pressure ventilation (PPV):
   • Apnea
   • Gasping
   • Heart rate under 100 bpm

5) Chest compressions
   • Chest compressions are initiated and added to PPV if the heart rate persists below 60 bpm after 30 seconds of PPV
Case scenarios

Case 1
Apnea during feeding of the newborn

A mother, whose delivery was assisted in the improvised emergency room and was feeding her baby, calls for help. She tells you that her baby suddenly turned “blue” and stopped breathing, just as she finished feeding him. The baby is apneic, with a heart rate < 100 bpm.

1) Which signs indicate the need for resuscitation?
   - Ineffective breathing
   - Heart rate < 100 bpm

2) Which signs are present in this baby?
The baby shows two signs that indicate the need of immediate resuscitation interventions:
   1. Apnea
   2. Central cyanosis

3) Which intervention is indicated?
Positive-pressure ventilation

4) Which is the right sequence?
Quickly take the baby to an adequate resuscitation area, ask for help, try to warm the baby (with some radiant heater; if the baby is premature, wrap him in plastic film to prevent cold stress during resuscitation) and start resuscitation.
Position the baby adequately to keep the airway open (bearing in mind that his mother said he has just been fed). Start oropharyngeal suction until help arrives.

Required suction equipment:
   - Suction catheter
You suction the baby and take out a moderate amount of colostrum, and the baby starts gasping. Heart rhythm is <100 bpm. You start bag-mask (positive-pressure) ventilation with room air. (If an oxygen source and oximetry are available, initiate positive pressure with room air and add oxygen as guided by pulse oximetry).
After 20 seconds, the baby starts breathing spontaneously, and heart rate increases to 120 bpm. The skin turns pink.

PPV is suspended and the baby remains pink and begins to cry.

ACoRN, Acute Care of at-Risk Newborns. Vancouver, ACoRN Editorial Board, 2006
Case 2
A baby boy is born in a shelter on a chilly winter night, 1 km from your emergency care center. He arrives at the center when he is approximately 15 minutes of age. You are working alone. As the father passes you the baby wrapped in his coat, he tells you he was born 3 weeks early.
You place the baby on the examination table and remove the wet clothing. No meconium is noted while you are drying him.
The baby is breathing spontaneously, has a heart rate of > 130 bpm and is peripherally cyanosed. He appears sleepy.

1) Do you find in your assessment any indication of the need of resuscitation?
   • Assess:
     - Breathing
     - Heart rate
     - Color
   The baby has acrocyanosis. You establish there is no evident sign of the need to start resuscitation and initiate physical examination.
   The baby appears small for 37-week gestation. He is breathing easily with no signs of respiratory distress. As you easily palpate the brachial and femoral pulses, you notice his limbs are cool to touch and he has acrocyanosis. The heart rate is 120 bpm.
   Though the baby is still sleepy, his tone is normal. The axillary temperature is 35.5°C. You wrap the baby’s heel in a warm towel in preparation for a blood glucose test. You also note the baby has not fed yet.
   The blood glucose is within the normal range. You observe that the baby is eager to feed. You decide there are no contraindications to feeding the baby.

2) Which is the cause of the acrocyanosis?
   Body temperature can be interpreted in view of environmental conditions, age and newborn size.

3) Which actions would you take?
   Increment environmental temperature and wrap the child in a dry blanket or a plastic film. OR Place the child skin-to-skin with the mother and facilitate breast feeding. (Try to transport mother and baby together; maintain skin-to-skin contact during transport.)
Case 3
A 2,100 g baby was born by vaginal delivery at 34-week gestation in a shelter. She is brought to the emergency area with mild respiratory distress. Four hours later, the baby has a severe apneic event.

1) Do you find in her assessment any indication of the need for resuscitation interventions?
   • Assess:
     - Breathing
     - Heart rate
     - Color
   The baby is severely apneic.

   *You perform the initial steps of the resuscitation sequence:*
   • Call for help
   • Provide warmth
   • Position the baby
   • Clear the airway (suction)
   • Stimulate
   The baby keeps having apneic events.

   You decide to start PPV (bag-mask). Another member of the team auscultates the chest to determine the adequacy of ventilation and heart rate.
   Heart rate is 140 bpm, bag-and-mask ventilation results in good chest expansion and equal air entry. However, as soon as this support is withdrawn, the baby becomes apneic again.

2) What is the next step?
   Intubation. The baby’s heart rate drops to 80 bpm as you attempt to visualize the vocal cords. The intubation attempt is aborted.

3) What should you do?
   You resume bag-and-mask ventilation. After 30 seconds, heart rate is 140 bpm, but chest expansion is poor despite repositioning and suctioning. **PPV is ineffective**
   A second intubation attempt is successful. There is good chest expansion and breath sounds can be heard on both sides symmetrically. The baby meets no criteria for further resuscitation. You continue ventilation via the endotracheal tube.

4) What care do you need to provide in transport?
   Transport with mother if possible, maintaining thermal protection and ventilation.
Case 4

At 9 AM a 17-year-old woman presents at the emergency care center in a refugee camp. She is pregnant at 35 weeks gestation and relates that last night she felt a gush of fluid from her vagina. She was alone, and in the morning, as fluid was still leaking, she talked with her mother who prompted her to come to the emergency center. In addition, she felt occasional painful uterine contractions. This is her first pregnancy. Throughout her pregnancy she made only one prenatal visit to the hospital which is 2 hours away from the refugee camp. She has no information regarding the results of any tests that were done that day.

She shows mild edema in both feet and blood pressure 130/90 mmHg. Fetal movements and heart rate are normal. Digital exam shows a slightly opened (1-2 cm) cervix.

1) Which data are risk factors suggesting the likely need for neonatal resuscitation or specialized neonatal care?

• Maternal age less than 19 years.
• Pre-labor rupture of membranes.
• Edema and mild hypertension.
• Lack of appropriate prenatal care.

Discuss other potential risk factors (Box 1 and Table 1 of Module 7).

2) What are the most appropriate steps in the management of this patient?

This should be considered a high risk pregnancy. The mother has signs of preeclampsia, including edema and mild hypertension. Thus, it is likely that she will need medical care.

Since active labor has not begun, the patient should be sent to the hospital if transportation is available. Both she and her family should be informed about the risks involved if referral is not accepted.

If appropriate transportation is not available, prepare yourself for a potentially high risk delivery. Be certain that sterile delivery kits are readily available, including a neonatal sized resuscitation bag and an oxygen source. If possible, ask skilled personnel to be present when delivery begins.

Review the equipment required for neonatal assistance and resuscitation.
Case 5
You are sleeping in the middle of the night in your tent near the emergency center in
the refugee camp and you are awakened by your assistant. He tells you that a woman
in advanced labor has arrived at the emergency center. You jump out of your bed and
run to the center. The woman has just delivered a boy with the assistance of a midwife.
The neonate is not crying and is gasping. His four extremities are in extension and
limp. Heart rate is 70 beats per minute. The entire body appears cyanotic.

1) What is your management in this situation?
This neonate requires immediate resuscitation intervention. Dry the baby with clean
cloths and position him on the mother’s abdomen with the head slightly extended.
Clear any secretions and/or maternal blood obstructing the airway (suction mouth, then
nose). Rub the back 2 or 3 times to stimulate breathing. Evaluate breathing. The
infant is not breathing.
Securely clamp the cord and cut it with a sterile blade or scissors. Identify the baby
before removing him from his mother’s side (footprints and mother’s finger print, plus
bracelet if available). Place the baby under a radiant heater if available or on warmed
blankets. Do not use heating pads or hot water bottles to warm the neonate.
Provide positive pressure ventilation with mask and bag. Evaluate chest rise and
improve ventilation if necessary.

2) After 30 seconds of positive pressure ventilation, respirations are absent and
heart rate is 50 beats per minute. What is your next step?
Make sure that ventilation is effective by repeating the steps to improve ventilation,
including increased pressure and an alternative or advanced airway (endotracheal tube
or laryngeal mask). You should start chest compressions, preferably using the two-
thumb technique, while positive pressure ventilation is continued. Coordinate both
interventions to perform 1 breath every 3 compressions. Recommended rate is 90
compressions and 30 breaths per minute. Reassess after 45-60 seconds.

3) If no ventilation device or oxygen source is available, is mouth-to-mouth
respiration recommended?
One of the most important issues in disasters is the safety of rescue and medical
personnel. In this case, if there is no information regarding the infectious status of the
mother before delivery mouth-to-mouth respiration should be avoided since the
exposure to contaminated blood involves high risk for acquiring diseases, such as HIV or hepatitis B infections.

4) **Is oxygen always needed for appropriate resuscitation interventions?**

Use of excessive oxygen should be avoided in the management of neonates. It has been shown that for most cases, positive pressure ventilation using room air is as effective as the delivery of high oxygen concentrations. If available, oxygen can be used when after 90 seconds there is no evident improvement (heart rate < 100 beats per min; ineffective breathing; prolonged cyanosis).
BIRTH

Term gestation? Breathing or crying? Good muscle tone?

NO

Provide warmth
Position: clear airway (as necessary)
Dry stimulate, reposition

Evaluate respiration, heart rate, and color

Apgar or HR < 100

Provide positive pressure ventilation

HR > 60

Provide positive pressure
Administer chest compressions

HR < 60

Check ventilation and chest compressions effectiveness
Consider endotracheal intubation and medication* (if available and appropriate)

YES

Skin-to-skin
Breast-feeding

Breathing

Post-resuscitation care

Approximate time

30 seg

30 seg

30 seg

30 seg

11

*Adrenaline IV 0.01-0.03 mg/kg (intratracheal: more elevated dose, up to 0.1 mg/kg). Adapted from Kattwinkel J, et al. Neonatal Resuscitation Textbook, 5th ed. AHA/AAAA, 2006.
### BOX 1. Risk factors associated with probable need for neonatal resuscitation

#### Before delivery
- Maternal diabetes
- Maternal hypertension
- Anemia or iron deficiency
- Previous fetal/neonatal death
- Preterm gestation
- Multiple gestation
- Polyhydramnios or oligohydramnios
- Pre-labor rupture of membranes (PROM)
- Maternal infection
- Maternal consumption of drugs or medications
- Any other maternal illness
- Diminished fetal activity
- Known fetal malformations
- Absence of prenatal care
- Maternal age <17 or >35 years old

#### During delivery
- Labor at less than 37 completed weeks of pregnancy
- Rapid labor
- Emergency cesarean section or use of forceps
- Prolonged PROM
- Fetal distress (alterations in the fetal heart rate)
- Significant vaginal bleeding
- Placenta abruption
- Prolonged labor
- Nonreactive non-stress test
- Umbilical cord prolapse
- Anticipated low-birth weight
- Anticipated high-birth weight
**TABLE 1. Classification to assess and determine pregnancy risk**

<table>
<thead>
<tr>
<th>Assess signs</th>
<th>Classify as</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>(RED)</td>
<td>Pregnancy with imminent risk</td>
<td>- Refer URGENTLY to hospital of higher level of complexity lying on the left side</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Prevent hypotension</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Treat hypertension</td>
</tr>
<tr>
<td>One of the following signs:</td>
<td></td>
<td>- In case of preterm labor: inhibit contractions and give corticoids</td>
</tr>
<tr>
<td>- Labor &lt; 37 w</td>
<td></td>
<td>- If PROM with fever: give first dose of adequate antibiotic</td>
</tr>
<tr>
<td>- Pregnancy at &gt;41 w</td>
<td></td>
<td>- Administer oxygen if possible</td>
</tr>
<tr>
<td>- Reduced or absent fetal movements</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Severe systemic disease</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Urinary infection with fever</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Uncontrolled diabetes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Vaginal bleeding</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Pre-labor rupture of membrane (PROM) &gt;12 h</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Uncontrolled hypertension and/or edema, blurred vision, loss of consciousness or intense headache</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Changes in fetal heart rate (FHR)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Intense palpation and/or Hb &lt;7 g/dL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Swollen face, hands, and legs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(YELLOW)</td>
<td>High-risk pregnancy</td>
<td>- Refer to specialist clinic</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- If multiple gestation: refer before week 30</td>
</tr>
<tr>
<td>One of the following signs:</td>
<td></td>
<td>- If VDRL positive: start treatment with penicillin benzathine</td>
</tr>
<tr>
<td>- Younger than 19 or older than 35 y of age</td>
<td></td>
<td>- Counsel the mother to follow the indicated treatment</td>
</tr>
<tr>
<td>- Primigravid or grand multiparity</td>
<td></td>
<td>- Vaccines with tetanus toxoid</td>
</tr>
<tr>
<td>- No prenatal care</td>
<td></td>
<td>- Counsel on HIV/AIDS and sexually transmitted diseases (STD)</td>
</tr>
<tr>
<td>- Less than 2 years between pregnancies</td>
<td></td>
<td>- Schedule next visit</td>
</tr>
<tr>
<td>- Uterine height does not correlate with gestational age</td>
<td></td>
<td>- Counsel on nutrition, pregnancy care, and breastfeeding</td>
</tr>
<tr>
<td>- Previous miscarriage</td>
<td></td>
<td>- Teach danger signs</td>
</tr>
<tr>
<td>- History of preterm delivery, low birth weight, or malformations</td>
<td></td>
<td>- Plan referral with the family in advance, according to risk factors and feasibility of the solutions</td>
</tr>
<tr>
<td>- History of recurrent abortions, fetal or early neonatal death</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Controlled systemic disease</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Urinary infection, without fever</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Controlled diabetes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Palpable and/or Hb &lt;8-10 g/dL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Vaginal discharge</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- On therapeutic medications</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Alcoholism, drug addiction, or smoker</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Controlled hypertension</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Inadequate weight gain</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Abnormal fetal presentation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Multiple gestation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- 5th negative mother</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- VDRL, HIV or HBV positive</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(GREEN)</td>
<td>Low-risk pregnancy</td>
<td>- Teach danger signs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Plan delivery in the health care facility with the family</td>
</tr>
<tr>
<td>One of the following signs:</td>
<td></td>
<td>- Follow up during pregnancy</td>
</tr>
<tr>
<td>- Pregnancy with no immediate or high risk</td>
<td></td>
<td>- Offer counseling on nutrition, prenatal care, peripartum, breastfeeding, and vaccinations for the infant</td>
</tr>
<tr>
<td>(GREEN)</td>
<td></td>
<td>- Offer counseling on HIV/AIDS-STD</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Tell the mother to follow the prescribed treatment</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Supplement with iron, folic acid, and multivitamins</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Start or complete tetanus vaccination with tetanus toxoid</td>
</tr>
</tbody>
</table>