

Baby Saver III

Preparation for Neonatal Resuscitation Program



Nurses Educational Opportunities

An American Heart Association Training Site

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Baby Saver III

2011, 6th Edition Neonatal Resuscitation

Introduction

There are 9 lessons in the 2011th 6^h edition of the Neonatal Resuscitation Program. They are as follows:

- Lesson 1 – Overview and Principles of Resuscitation
- Lesson 2 – Initial Steps in Resuscitation
- Lesson 3 – Use of the Resuscitation Devices with PPV
- Lesson 4 – Chest Compressions
- Lesson 5 – Endotracheal Intubation
- Lesson 6 – Medications
- Lesson 7 – Special Considerations
- Lesson 8 – Resuscitation of Babies Born Preterm
- Lesson 9 – Ethics and Care of the End of Life

The standard-length NRP Provider Course consist of the above 9 lessons; however, you will need to work through only those lessons appropriate to your level of responsibility. If you have any questions about the level of your responsibilities during resuscitation, please consult your supervisor.

Successful completion of this course includes an online written examination that is required before participants attend the classroom portion of the NRP course. Participants will be prompted to print a Certificate of Completion that they must bring to class and present to the instructor to be eligible for a Course Completion Card. Learners must attend the classroom portion of their NRP course within 30 days of completing the online examination.

To successfully complete the course, participants must pass then demonstrate mastery of resuscitation skills within their scope of practice with simulated resuscitation scenarios. A sample Mega Code is provided for you at the end of this pamphlet.

Details about the online testing is on our web page www.nursesed.net If you want to study with the new text you must go online to the AAP web page and purchase the book and have it mailed to you. You will find it to your advantage to review this study guide prior to taking the test. You may refer to it during the testing. Read the questions slowly and carefully Be alert to questions that state “which is not” and “which is false.”

Upon completion of the online test, make an appointment with the NEO site of your choice, bring the print out of online test and NEO’s instructors will assist you with your skills evaluation..

Objectives:

Upon completion of the neonatal resuscitation study guide the participant will be able to:

- ♥ Verbalize the risk factors that can help predict which babies will require resuscitation
- ♥ Verbalize and demonstrate the need to resuscitate
- ♥ Verbalize and demonstrate the use of the flow-inflating bag, self-inflating bag, and the T-piece resuscitator.
- ♥ Verbalize and demonstrate effective chest compressions
- ♥ Verbalize and demonstrate intubation or assisting intubation if applicable for your job
- ♥ Verbalize the medications used in neonatal resuscitation with the indications, route and dose for each
- ♥ Verbalize the special considerations and subsequent management of infants beyond the immediate newborn period or outside the hospital delivery room.
- ♥ Verbalize the risk factor of infants born premature and the strategies to consider in their care
- ♥ Verbalize the ethical principles associated with end of life situations.

Study Guide for 2011 NRP, 6th edition

The Neonatal Resuscitation Program (NRP) will help you learn the skills needed to resuscitate newborns. The Baby Saver III study guide reflects the 2011, 6th edition NRP updates provided by the American Academy of Pediatrics in conjunction with the American Heart Association.

Lesson I – Overview and Principles of Resuscitation

Approximately **10% of all newborns require some assistance** to begin breathing at birth and about **1% will need extensive resuscitative measures. Careful examination of risk factors may not identify all babies at risk for resuscitation.** When resuscitation is **anticipated** additional personnel should be present in the delivery room at the time of the delivery. **One skilled person is required of all deliveries and 2 skilled persons for high risk deliveries. When twins are expected 4 skilled persons are required.** Keep in mind that **all newborns require initial assessment** to determine whether resuscitation is required. **Chest compressions and medications are rarely needed when resuscitation is required.**

There are 3 questions you should ask yourself to help you decide the need of resuscitation:

- ♥ **Is the baby term**
- ♥ **Is the baby breathing and crying**
- ♥ **Does the baby have good muscle tone**

The most important **resuscitative action is effective ventilation** of the newborns lungs. Air that fills the alveoli contains 21% oxygen, and causes the **pulmonary arterioles to relax** so that oxygen can be absorbed from the alveoli and distributed to all organs.

At every delivery, you should anticipate the need for advanced resuscitation and be prepared and present at the hospital. For this reason, every birth should be attended by at least 1 person skilled in neonatal resuscitation whose only responsibility is the management of the newborn.

When a fetus/newborn first becomes deprived of oxygen, an initial period of rapid breathing is followed by primary apnea. Primary apnea can be resolved by tactile stimulation. If oxygen deprivation continues, secondary apnea ensues. The heart rate continues to fall, and the blood pressure falls. Secondary apnea cannot be reversed with stimulation and assisted ventilation. **Therefore, the deciding factor to determine primary versus secondary apnea is the response to tactile stimulation. The infant in secondary apnea will require positive pressure ventilation to initiate spontaneous breathing. Restoration of adequate ventilation usually will result in rapid improvement in heart rate.**

Normal transition occurs with relaxation of blood vessels in the lungs leading to decrease in resistance to blood flow

Premature babies present unique challenges. They are:

- ♥ **Fragile brain capillaries that bleed easily.**
- ♥ **Lungs deficient in surfactant making ventilation more difficult.**
- ♥ **Poor temperature control and they get cold easily.**
- ♥ **Higher risk of infection.**

Resuscitation should proceed rapidly.. The initial steps of resuscitation are as follows:

- ♥ **Provide warmth**
- ♥ **Position the head and clear the airway**
- ♥ **Dry and stimulate the baby to breath**
- ♥ **Evaluate respirations.**

The three signs of effective resuscitation are as follows:

- ♥ **Respirations**

- ♥ **Heart rate**
- ♥ **Assessment of oxygenation**

If the baby is apnic or has a heart rate less than 100 bpm

- ♥ **Start PPV**
- ♥ **Apply an oximeter probe on the babies right hand for preductile saturation.**

If the baby has a heart rate less than 60 bpm

- ♥ **Begin chest compressions with coordinated PPV**

Difficulties can occur in the transition because of inadequate ventilation and poor respiratory effort.

Lesson I

Review Questions:

1. About _____% of newborns will require some assistance to begin regular breathing. (10%)
2. About _____% of newborns will require extensive resuscitation to survive. (1%)
3. Careful identification of risk factors during pregnancy and labor can identify all babies who will require resuscitation. (False)
4. Chest compressions and medications are _____ needed when resuscitating newborns. (rarely)
5. Before the birth, the alveoli in a baby's lungs are _____ and filled with _____ (collapsed) (fluid)
6. The air that fills the baby's lungs during normal transition contains _____% of oxygen. (21%)
7. The air in the baby's lungs causes the pulmonary arterioles to _____ so that the oxygen can be absorbed from alveoli and distributed to all organs. (relax)
8. If baby does not begin breathing in response to stimulation, you should assume she is in _____ apnea and you should provide _____ (secondary) (PPV)

9. If the baby enters the stage of secondary apnea, her heart rate will _____ and her BP will _____ (fall) (fall)
10. Restoration of adequate ventilation usually will result in a _____ improvement of heart rate. (rapid)
11. Resuscitation _____ be delayed until the 1-minute Apgar score is available. (should not)
12. Premature babies have unique challenges during resuscitation because of _____ (fragile brain capillaries that may bleed) _____ (lungs deficient in surfactant) _____ (poor temperature control) _____ (higher likelihood of infection) _____ (all of the above)
13. Apnea or heart rate below _____ (100)
Provide _____ (oxygen) and apply _____ (oximeter probe).
Heart rate then drops to _____ (60)
take _____ (corrective measures – MR SOPA)
If heart rate continues below _____ (60) start chest compressions and insert an _____ (IV or UVC) and give _____ (epinephrine)
14. Every delivery should be attended with at least _____ skilled persons. (1)
15. At least _____ skilled persons should be present with high risk delivery. (2)
16. Equipment _____ be unpacked if a newborn is anticipated to be depressed. (should)
17. Since the baby required continuous supplemental oxygen, she should receive _____ care. (post-resuscitation)
18. When twins are expected, there should be _____ people present the delivery room to form the resuscitation team prepared to resuscitate. (4)

Lesson II – Initial Steps in Resuscitation

Check for Meconium in the amniotic fluid

- ♥ If meconium is present and the infant is **vigorous (good muscle tone, strong respiratory effort, and heart rate greater than 100 bpm)** **clear the secretions with bulb syringe from the mouth and nose immediately** and continue with resuscitation.
- ♥ If meconium is present and the infant is **not** vigorous, the infant's trachea needs to be suctioned. **When a suction catheter is used to clear the oropharynx of meconium before inserting the endotracheal tube, the appropriate size is 12 F to 14 F catheter.**

Begin the initial steps of resuscitation by asking yourself: Is the infant term? Is the infant breathing? Does the infant have good muscle tone?

- ♥ Open the airway by placing the infant in the **sniffing position and if needed suction with a bulb syringe – mouth first and then the nose.**
- ♥ Provide tactile stimulation by **slapping the soles of the feet or gently (not vigorously) rubbing the back**
- ♥ If the infant does not **immediately** respond, proceed to **PPV with an FIO₂ of 21%, place oximeter probe on the right hand for preductile saturations. The oximeter will provide you with minute by minute saturations. Do not expect the saturation to be greater than 60% initially. It will take at least 10 minutes for healthy newborns to increase their saturations to >90%. At 2 minutes of life, expect the O₂ saturations to be only greater than 65%.**
- ♥ Target preductile sats are as follows:
 - 1 min = 60-65%
 - 2 min = 65-70%
 - 3 min = 70-75%

4 min = 75-80%
5 min = 80-85%
10 min = 85-95%

Refer to these target sats frequently during your exam

- ♥ Use a pulse oximeter when:
 - Resuscitation is anticipated.
 - PPV is required for more than a few minutes
 - Central cyanosis is present
 - Supplemental oxygen is administered
 - You need to confirm your perception of cyanosis.
- ♥ Check the heart rate by counting the beats in 6 seconds and multiply by 10. If the heart rate is less than 60 bpm, begin chest compressions.
- ♥ After completing the initial steps of providing warmth, positioning the infant in the sniffing position, clearing the airway and evaluate the infants response with the following:
 - ♥ **Respirations** with good chest movement. **Gasping respirations are ineffective and require PPV.**
 - ♥ **Heart rate** should be greater than 100 bmp by counting the heart beats in 6 seconds a multiplying by 10.
 - ♥ **Color** with pink lips and pink trunk. There should not be central cyanosis which indicates hypoxemia. If central cyanosis exist, **free-flow supplemental oxygen or CPAP (continuous positive airway pressure) is required.**

Supplemental oxygen can be provided in the following ways:

- ♥ Holding the oxygen tubing cupped closely over the infants mouth and nose.
- ♥ **Closely hold the mask of a flow-inflating bag or T-piece resuscitator over the infants mouth and nose.**
- ♥ If supplemental oxygen is required for longer than a few minutes, the oxygen needs to be heated and humidified.

The test will require you to take these guidelines and incorporate them into an intervention from a scenario.

Lesson II – Review Questions

1. A newborn who is born at term, has no meconium in the amniotic fluid or on the skin, is breathing well, and has good muscle tone _____ (does not) need resuscitation.
2. A newborn with meconium fluid who is **not vigorous** _____ (will) need to have his trachea suctioned via an endotracheal tube. A newborn with meconium in the amniotic fluid who **is vigorous** _____ (will not) need to have his trachea suctioned via an endotracheal tube.
3. When deciding which babies need tracheal suctioning, the term “vigorous” is defined by what 3 characteristics?
 - _____ (HR>100 bpm)
 - _____ (Strong respiratory effort)
 - _____ (Good muscle tone)
4. When a suction catheter is used to clear the oropharynx of meconium before inserting an endotracheal tube, the appropriate size is _____ (12F) or _____ (14F).
5. The position of the head prior to suctioning is the _____ (sniffing) position.
6. A newborn is covered with meconium, is breathing well, has normal muscle tone, has a heart rate of 120 bpm, and is pink. The correct action is to _____ (suction the mouth and nose with a bulb syringe) or _____ (suction catheter).

7. In suctioning a baby's nose and mouth, the rule is to first suction the _____ (mouth) and then the _____ (nose).
8. The correct way to stimulate a newborn is _____ (rub the back gently) and _____ (slap the sole of the feet).
9. If the baby is in secondary apnea, stimulation of the baby _____ (will not) stimulate breathing.
10. A newborn is still not breathing after a few seconds of stimulation. The next step should be to administer _____ (PPV).
11. A newborn has poor muscle tone, labored breathing, and cyanosis. Your initial steps are:
 - _____ (place the infant on a radiant warmer)
 - _____ (remove all wet linens)
 - _____ (suction the mouth and nose)
 - _____ (consider CPAP or free-flow O2)
 - _____ (apply a pulse oximeter probe)
 - _____ (dry and stimulate)
12. There are three ways to give free-flow oxygen.
 - _____ (Holding the oxygen tubing cupped closely over the infants mouth and nose)
 - _____ (Closely hold the mask of a flow-inflating bag or T-piece resuscitator held over the infant's mouth and nose.)
 - _____ (Holding an oxygen mask firmly over the infant's face)
13. Oxygen saturation should be expected to be only _____ (>65%) by 2 minutes of life.
14. If you need to give supplemental oxygen for longer than a few minutes, the oxygen should be _____ (heated) and _____ (humidified).
15. You have stimulated a newborn and suctioned her mouth. It is now 30 seconds after birth, and she is still apneic and pale Her heart rate is 80 beats

per minute. Your next action is to _____ (provide PPV).

16. You count a newborns heart rate for 6 seconds and count 6 beats. The heart rate is _____ (60).
17. An oximeter will show both SPO₂ and _____ (heart rate).

Lesson III – Use of Resuscitation Devices for Positive Pressure Ventilation

As noted in Lesson I, the single most important step in resuscitation is effective **ventilation of the lungs**. **Effective ventilations are defined by the presence of bilateral breath sounds, chest movement and increase in heart rate**. To evaluate effective ventilation, the infant should have a rise and fall of the chest during bag/mask ventilation. The indications for positive-pressure ventilations are:

- ♥ **Apnea/gasping**
- ♥ **Heart rate less than 100 bmp even if breathing**
- ♥ **Persistent central cyanosis**
- ♥ **Low SPO₂ despite free-flow oxygen**

The most important indicator of successful PPV is a heart rate that is rising. If PPV is effective the following are the indicators:

- ♥ **Heart rate rises over 100 bmp**
- ♥ **Improvement of oxygen saturation**
- ♥ **Sustained spontaneous respirations**

If there is no audible bilateral breath sounds and you see no rise and fall of the chest intervention is required. To correct inadequate ventilation you may use the mnemonic MR SOPA to determine the interventions that may be helpful:

- M = Mask adjustment**
- R = Reposition the airway**
- S = Suction the mouth and nose**
- O = Open the mouth**

P = Pressure increase

A = Airway alternative

If the infant does not improve with your resuscitation effort, MR SOPA is always your first priority. Refer to this often for your test.

The AAP recommends resuscitation of newborns may begin with room air PPV; resuscitation of preterm newborns may begin with a somewhat higher oxygen concentration. Pulse oximetry is used to help adjust the amount of supplemental oxygen to avoid giving too much or too little oxygen concentration.

While someone is doing PPV, the second member should be

- ♥ applying the pulse oximeter probe to the right hand
- ♥ listening for the rise in heart rate
- ♥ watching for rising oxygen saturation

To provide a varying degree of FIO₂, a blender connected to the ventilation device is required. If an oxygen blender is not available, start PPV with 21% oxygen (room air) while you obtain an air-oxygen source and oximeter. Using a pulse oximeter supplemental oxygen concentrations should be adjusted to achieve the target values for pre-ductal saturations

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

Ventilations should be 40-60 breaths per minute. Do not over inflate the lungs which may result in pneumothorax. The initial pressure should be 20 cm H₂O.

Providing positive pressure ventilation for greater than a few minutes requires the insertion of an orogastric tube. The orogastric tube needs to be inserted the distance from the bridge of nose to the

ear and then half way between the umbilicus and the xyphoid process.)

There are now three types of resuscitative devices.

- ♥ Flow-inflating bags
- ♥ Self-inflating bags
- ♥ T-Piece Resuscitators

The flow-inflating bags have the following characteristics:

- ♥ They fill only when gas from a compressed source flows into it.
- ♥ They are dependent of an oxygen source
- ♥ Must have a tight mask-to-face seal to inflate
- ♥ Have a flow-control valve to regulate the pressure.
- ♥ Looks like a deflated balloon when not in use.
- ♥ **Can be used to administer free-flow oxygen and CPAP (continuous positive airway pressure)**

The flow-inflating bag will not work if:

- ♥ The bag is not properly sealed over the newborns nose and mouth.
- ♥ There is a hole in the bag
- ♥ The flow-control valve is open too far.
- ♥ The pressure gauge is missing.

The self-inflating bags have the following characteristics:

- ♥ They will fill spontaneously after they are squeezed
- ♥ Remain inflated at all times
- ♥ Must have a tight mask-to-face to inflate the lungs
- ♥ Can deliver PPV without a compressed gas source but must be connected to a gas source to deliver supplemental oxygen
- ♥ **Cannot be used to deliver free flow oxygen or CPAP**
- ♥ An oxygen reservoir must be attached to deliver high concentrations of oxygen. Without the reservoir, the bag

delivers a **maximum of only about 40% oxygen** which may be insufficient for resuscitation.

The T-piece resuscitators

- ♥ **Allows consistent pressure when ventilating**
- ♥ Depends on a compressed gas source
- ♥ Must have a tight seal mask-to-face to inflate the lungs
- ♥ Require selection of a maximum pressure, peak inspiratory pressure (PIP) and positive end expiratory pressure (PEEP)
- ♥ May require adjustment of PEEP during resuscitation to achieve physiologic improvement.
- ♥ Provides PPV when the operator alternately occludes and opens the PEEP cap
- ♥ Can be used to deliver free-flow oxygen or CPAP
- ♥ **Safety Feature = Pressure Gauge and Pressure Relief Control Valve.**

In conclusion: An infant that is apnic – provide PPV - apply an oximeter - listen for rising HR – watch for rising O2 sats.



Lesson III Review Questions

1. Flow-inflating bags _____(will not) work without a compressed gas source.
- 2 A baby is born apneic and cyanotic. You clear her airway

and stimulate her. Thirty seconds after birth, she has not improved. The next step is to _____(begin PPV).

3. The single most important and most effective step in neonatal resuscitation is _____(ventilating the lungs).
4. Identify the flow-inflating bag by a _____(deflated balloon-like appearance).
Identify the self-inflating bag by an _____(oxygen reservoir).
Identify the T-piece resuscitator by _____(the pressure gauges).
5. Masks of different sizes _____(do) need to be available at every delivery.
6. Self-inflating bags require the attachment of a(n) _____(oxygen reservoir) to deliver a high concentration of oxygen.
7. A T-piece resuscitator _____(will not) work without a gas source.
8. Neonatal bags are _____(much smaller) than adult bags.
9. The safety feature of a self-inflating bag is the _____(Pop-off valve) and the _____(pressure gauge).
The safety feature of the flow-inflating bag is the _____(pressure gauge).
The safety feature of the T-piece resuscitator is the _____(pressure relief control valve) and the _____(pressure gauge).
10. Free-flow oxygen can be delivered reliably through the mask attached to the _____(flow inflating bag) and _____(the T-piece resuscitator).
11. When giving free-flow oxygen with a flow-inflating bag and mask, it is necessary to place the mask _____(loosely) on the baby's face to allow some gas to escape around the edges of the mask.
- 12 Before an anticipated resuscitation, the ventilation device should be connected to a _____(blender), which

enables you to provide oxygen in any concentration from room air up to 100% oxygen.

- 13 Resuscitation of the term newborn may begin with _____ (21%) oxygen. The inspired oxygen concentration used during resuscitation is guided by the use of _____ (oximeter) which measures oxygen saturation.
14. The proper position for PPV is the _____ (sniffing position).
15. The correct positions to assist in PPV are _____ (at the side) or _____ (at the head) to use a resuscitation device effectively.
16. You must hold the resuscitative device so that you can see newborns _____ (chest) and _____ (abdomen).
17. An anatomically shaped mask should be positioned with the _____ (pointed) end over the newborn's nose.
18. If you notice that the baby's chest looks as if he is taking a deep breath, you are _____ (overinflating) the lungs and it is possible that a pneumothorax may occur.
19. When ventilating a baby, you should provide positive-pressure ventilation at a rate of _____ (40) to _____ (60) breaths per minute.
20. Begin positive pressure ventilations with an initial inspiratory pressure of _____ (20) cm H₂O.
21. MR SOPA stands for:
M _____ (Mask adjustment)
R _____ (Reposition the airway)
S _____ (Suction the mouth and nose)
O _____ (Open the mouth)
P _____ (Pressure increase)
A _____ (Airway alternative)
22. Your assistant assesses effectiveness of positive-pressure by first assessing the _____ (heart rate) and _____ (oximetry) and listening for _____ (breath sounds) If these signs are not acceptable, you should look for _____ (chest movement).

23. A properly fitting mask fits over the _____ (nose) and the _____ (mouth) with the _____ (pointed end over the nose)
24. You have started positive-pressure ventilation on an apneic newborn. The heart rate is not rising, oxygen saturation is not improving, and your assistant does not hear bilateral breath sounds. List three possibilities of what may be wrong.

_____ (secretions may need to be suctioned)
25. If, after performing the ventilation corrective sequence and making appropriate adjustments, you are unable to obtain a rising heart rate or bilateral breath sound or see chest movement with PPV, you usually will have to insert an _____ (ET tube) or a _____ (LMA).
26. You have administered PPV with bilateral breath sounds and chest movement for 30 seconds. What do you do if the baby's heart rate is below 60 bpm?

_____ (begin chest compression and consider intubation)
What do you do if the heart rate is more than 60 bpm and less than 100 bpm but steadily improving with effective PPV?

_____ (adjust oxygen, gradually, decrease pressure as heart rate improves, insert orogastric tube, continue monitoring).
What do you do if the heart rate is more than 60 bpm and less than 100 bpm and not improving with effective PPV? _____ (repeat MR SOPA and consider intubation)
27. Assisted ventilation may be discontinued when _____ (heart rate is above 100 bpm) and _____ (the baby is breathing).
28. If you must continue with PPV with a mask for more than several minutes, an _____ (orogastric

tube) should be inserted to act as a vent for the gas in the stomach during the remainder of the resuscitation.

29. The orogastric tube needs to be inserted _____ (the distance from the bridge of nose to the ear and then to half way between the umbilicus and the xiphoid process.)

Lesson IV – Chest Compressions

The heart lies in the chest between the lower third of the sternum and the spine. Compressing the sternum compresses the heart against the spine and increases the pressure in the chest causing the blood to be circulated to the vital organs. The following are the guidelines for providing chest compressions:

- ♥ Always provide PPV or 30 seconds and then check the heart rate. Give 30 breaths and 90 compressions in a minutes time.
- ♥ Chest compressions are indicated when the heart rate remains less than 60 beats per minute despite 30 seconds of effective positive-pressure ventilation to circulate blood to the vital organs.
- ♥ Once the HR is below 60 bpm the oximeter may not work. You should increase the oxygen concentration to 100% until return of the oximeter reading. Once the oximeter is reading, then adjust to FIO₂ according to the preductile sats.
 - 1 min = 60-65%
 - 2 min = 65-70%
 - 3 min = 70-75 %
 - 4 min = 75-80%
 - 5 min = 80-85%
 - 10 min = 85-95%
- ♥ Three chest compressions should be well coordinated and given by interposing positive pressure ventilation.

- ♥ There are two acceptable techniques for providing chest compressions, the 2-finger technique and the thumb technique. The thumb technique is preferred.

- ♥ Chest compressions should be:
 - Given to a depth of one third the distance from the anterior to the posterior of the infant's chest.

Administered with supplemental oxygen during chest compression.

Applied to the lower third of the sternum, which lies between the xiphoid and a line drawn between the nipples. (**One finger's width below the nipple line.**) The compressor coordinates the resuscitation by counting out-loud "**One-and-Two-and -Three-and Breath-and.....**"

Allowed to have full recoil during the relaxation phase.

Performed with the thumbs or fingers remaining in contact with the chest at all times

Performed with the downward stroke being shorter than the release.

Well coordinated with positive-pressure ventilations.

Given for 45-60 seconds before pausing to reassess.

Guidelines for chest compressions are as follows:

If the heart rate is greater than 60 bpm

- ♥ Discontinue chest compressions and continue ventilations at 40-60 ventilation/min

If the heart rate is greater than 100 bpm

- ♥ Discontinue chest compressions and gradually discontinue ventilation if the infant is breathing spontaneously.

If the heart rate is less than 60 bpm

- ♥ Consider Intubate the infant if not already done. Intubation provides a more reliable method of ventilations.
- ♥ Give epinephrine, preferably intravenously with an emergent UVC line.

The thumb technique is preferred because of this technique may be superior in generating peak systolic and coronary artery perfusion pressure.

Complication of chest compressions include fractured ribs and injury to the liver.

Lesson IV

Chest Compressions

1. A newborn is apneic and bradycardic. Her airway is cleared and she is stimulated. At 30 seconds, PPV is begun. At 60 seconds her heart rate is 80 bpm. chest compressions _____(should not) be started. PPV ventilations _____(should be) continued.
2. A newborn is apneic and bradycardic . She remains apneic, despite having her airway cleared, being stimulated, receiving 30 seconds of PPV and ensuring that all ventilation techniques are optimal. Nevertheless, her heart rate is only 40 bpm. Chest compressions _____(should be) started. PPV _____(should be) continued.
3. The heart rate is 40 bmp as determined by auscultation, and the oximeter has stopped working. Chest compressions have begun, but the baby is still receiving room air oxygen. What should be done about oxygen delivery? _____(increase oxygen concentration to 100%)
4. During the compression phase of chest compressions, the

sternum compresses the heart, which causes blood to be pumped from the heart and into the _____(arteries). In the release phase, blood enters the heart from the _____(veins).

5. Chest compressions should be _____(applied to the lower third of the sternum, which lies between the xyphoid and a line drawn between the nipples.)
6. The preferred method of delivering chest compressions is _____(the thumb) technique.
7. If you anticipate that the baby will need medication by the umbilical route, you can continue chest compressions by one of the following actions: _____(the thumb technique) or the _____(two finger technique).
8. The correct depth of chest compressions is approximately _____(one third the anterior to posterior diameter of the chest).
9. The correct method of release of chest compressions is _____(fingers remaining in contact with the chest).
10. What phrase is used to time and coordinate chest compressions and ventilations? _____(One-and-Two-and-Three-and-Breath).
11. The ratio of chest compressions to ventilations is ____ (3) to ____ (1)
12. During PPV without chest compressions the rate of breaths per minute is ____ 40) to ____ (60) bmp.
13. During PPV and chest compressions, the rate of “events” per minute is _____(120) “events.”
14. The count of “One-and-Two-and-Three-and-Breath” should take about _____(2) seconds.
15. A baby has required ventilations and chest compressions. After 30 seconds of chest compressions, you stop and count 8 heartbeats in 6 seconds. The baby’s heart now ____ (80) bpm

You should _____ (stop) chest compressions.

16. A baby has required chest compressions and is being ventilated with bag and mask. The chest is not moving well. You stop and count 4 heartbeats in 6 seconds. The baby's heart rate is now _____ (40) bpm. You may want to consider _____ (UVC insertion), _____ and _____ (ET tube) and _____ administer epinephrine.

Lesson V - Endotracheal Intubation

Indications for endotracheal tube intubation are as follows:

- ♥ **To suction the trachea in the presence of meconium when the newborn is not vigorous.**
- ♥ **To improve efficacy of ventilation if mask ventilation is ineffective**
- ♥ **To improve efficacy of ventilation if mask ventilation is required for more than a few minutes.**
- ♥ To facilitate coordination of chest compressions and ventilation and to maximize the efficiency of each ventilation.
- ♥ To improve ventilation in special conditions, **such a extreme prematurity, surfactant administration, ineffective ventilations or suspected diaphragmatic hernia.**

Preparation of endotracheal intubation includes the following:

- ♥ Selection of the laryngoscopy blade
 - # 1 is used for term infants
(>37 weeks but <40 weeks)
 - # 0 is used for preterm infants (<37 weeks)**
 - # 00 is used for extremely preterm infantsStraight rather than curved blades are preferred

- ♥ Selection of the size of the endotracheal tube
 - 2.5mm ET - for the infant less than 1,000 gram – below 28 weeks
 - 3.0mm ET - for the infant 1,000-2,000 grams – between 28-34 weeks**
 - 3.5mm ET - for the infant 2,000-3,000 grams – between 34-38 weeks
 - 3.5-4.0mm ET - for the infant above 3,000 grams – above 38 weeks
- ♥ Depth selection of the endotracheal tube is done by
 1. Adding 6 to the weight of the infant in kg.
 - 1 kg + 6 = 7 cm depth
 - 2 kg + 6 = 8 cm depth**
 - 3 kg + 6 = 9 cm depth
 - 4 kg + 6 = 10 cm depth
- ♥ The steps in intubation are as follows:
 - Position and oxygenate the infant for intubation by:
 - Stabilizing the head in the sniffing position**
 - Providing free flow oxygen during intubation**
 - Lifting the laryngoscope rather than rocking**
 - Look for landmarks. The ET tube is inserted into the glottis which is the hole between the vocal cords.**
 - Insert the tube into the right side of the mouth with the curve of the tube lying on the horizontal plane so the tube curves from left to right.**
 - Withdrawing the laryngoscopy if the esophagus is visualize**
 - Allowing only 30 seconds to complete endotracheal intubation and if unsuccessful in 30 seconds discontinue efforts and oxygenate the infant with positive pressure ventilations.**

The following indications confirm endotracheal tube placement in the trachea and not the esophagus:

- ♥ Improved vital signs (HR, color/oximeter, and activity)
- ♥ Vapor in the tube when the stylett is withdrawn
- ♥ No epigastric gurgling with bag/mask ventilation
- ♥ Bilateral breath sounds with bag/mask ventilation
- ♥ CO₂ detector indicates the presence of CO₂
- ♥ Direct visualization
- ♥ Chest x-ray if the tube will be left in place

Only trained personal should attempt endotracheal intubation.

The laryngeal mask airway is now considered an acceptable means of intubating an infant. Laryngeal mask airways can be helpful when an infant presents with the following situations:

- ♥ **Congenital anomalies involving the mouth, lip or palate, that make achieving a good seal with bag and mask is difficult.**
- ♥ Anomalies of the mouth, tongue, pharynx, or neck that make it difficult to visualize the larynx with a laryngoscope.
- ♥ **When PPV fails to achieve effective ventilations and ET tube intubation is not possible.**

Laryngeal mask airways are not helpful with the following situations:

- ♥ The device cannot be used to suction meconium
- ♥ Current LMA's are too large for premature infants.
- ♥ If you need to use high ventilation pressure, air may leak through an insufficient seal
- ♥ There is insufficient evidence that ventilations with compressions are adequate with the LMA
- ♥ There is insufficient evidence that medications can be delivered with the LMA
- ♥ **There is insufficient evidence that prolonged assissted ventilations are adequate with the LMA**

Lesson V

Review Questions:

1. A newborn with meconium and depressed respirations _____(will) require suctioning via an endotracheal tube before other resuscitation measures are started.
2. A newborn receiving ventilations by mask is not improving after 2 minutes of apparently good technique. Despite ventilation corrective steps, the heart rate is not rising and there is poor chest movement. Endotracheal intubation _____(should be) considered.
3. For babies weighing less than 1,000 grams the inside of the diameter of the endotracheal tube should be _____(2.5)
4. The preferred blade size for use in term newborns is No. _____(1). The preferred blade size for use in preterm newborns is No. _____(0) and for extremely newborns is No. _____(00).
5. When viewing the oral cavity prior to intubation you must be able to visualize the _____ (the glottis – “the hole”) and the _____(vocal cords).
6. Both right – and left-handed people should hold the laryngoscope in the _____(left) hand.
7. You should try to take no longer than _____(30) seconds to complete endotracheal intubation.
8. If you have not completed endotracheal intubation within the time limit, what should you do? _____(remove the laryngoscope, ventilate with PPV by mask, and try again)
9. The correct way to lift the laryngoscope to expose the

- pharyngeal area is _____ (lift in the direction of the handle rather than rocking)
10. You have the glottis in view, but the vocal cords are closed. You _____ (should) wait until they are open to insert the tube.
 11. What 2 guidelines are helpful for determining the depth that the endotracheal tube be insert into the baby's trachea?
 _____ (to level of the vocal cord guide)
 _____ ("tip to lip 1-2-3 7-8-9) For a one kg infant the ET tube is inserted to 7 cm mark on the tube For a two kg infant the ET tube is inserted to 8 cm mark on the tube. For a three kg infant the ET tube is inserted to the 9 cm mark on the tube.
 12. You have inserted an endotracheal tube and are giving PPV through it. When you check with a stethoscope and you hear bilateral breath sounds on both sides of the baby's chest, with equal intensity on each side and no air entering the stomach. The tube is _____ (likely) correctly placed.
 13. X-ray tube place will show the ET tip to be in the trachea midway between the vocal cords and the carina. On the x-ray, the tip should be visible at the level of the _____ (clavicles), or slightly lower.
 14. You have inserted an endotracheal tube and giving PPV through it. When you check with your stethoscope you hear no breath sounds on either side of the chest and you hear air entering the stomach . The tube is placed the _____ (esophagus).
 15. You have inserted an endotracheal tube and giving PPV through it. When you check with your stethoscope you hear breath sounds over the

right side, but not the left. When you check the tip-to-lip measurement, the first number seen at the lip is higher than expected, You should _____ (withdraw) the tube slightly and listen with the stethoscope again.

16. A baby is born at term following abruption of the placenta and is not improving despite PPV by mask. You have tried intubating the trachea but have not been successful Help has not arrived. A reasonable next step would be to insert a _____ (LMA)
17. An extremely low birthweight baby is born and requires assisted ventilation. Insertion of an LMA would be a reasonable alternative to intubation. (false) An LMA is too large for an extremely low birthweight baby.

Lesson VI – Medications

The most significant and commonly used drug in neonatal resuscitation is epinephrine to increase heart rate and contractility **and improves coronary artery pressure.**

Epinephrine can be administered with the following routes:
IV through an Umbilical Venous Catheter
ET

The indication for epinephrine are is as follows:
Persistent heart rate less than 60 beats per minute despite 30 seconds of positive pressure ventilations and followed by an additional 30 seconds of chest compressions.

The concentration of epinephrine is **1:10,000**

The route of epinephrine is **preferably UVC but can be given ET while preparing for UVC placement**

The dose of epinephrine is as follows:

0.1 to 0.3 ml/kg for the IV route

0.5 to 1 ml/kg for the ET route

For the test, you will need to calculate doses.

The rate of administering epinephrine is rapidly.

The intravascular route is recommended as the best choice.

Allow **60 seconds** before rechecking the HR

Often infants will be born hypovolemic and will not respond to adequate ventilation and cardiac compressions. Babies who are hypovolemic may appear pale and have weak pulses. They may have a persistently low heart rate.

The signs of hypovolemia are as follows:

- ♥ **Pale skin color**
- ♥ **Weak pulse**
- ♥ **Persistently low pulse rate**
- ♥ **No improvement in circulation despite resuscitation effort.**

Acceptable solutions for volume expansion are the following:

- ♥ **Normal Saline (0.9% NaCl)**
- ♥ **Ringer's Lactate**
- ♥ **Type O Rh-negative packed red blood cells**

The above volume expanders are given at 10 cc/kg of body weight.

The following are examples of doses:

2.5 kg = 25 cc

3.0 kg = 30 cc

3.2 kg = 32 cc

3.8 kg = 38 cc

Volume expanders are given slowly – over 5-10 minutes

The route should be UVC (insert the UVC in the large vessel and just far enough to get blood return.)

Lesson VI

Review Questions:

1. Fewer than _____(1%) of babies requiring resuscitation will need epinephrine to stimulate their hearts.
2. As soon as you suspect that medications may be needed during a resuscitation, one member of the team should begin to insert a _____(UVC) to deliver drugs.
3. Effective ventilation and coordinated chest compressions have been performed for 45-60 seconds, the trachea has been intubated, and the baby's heart rate is below 60 bpm. You should give _____(epinephrine) while continuing chest compressions and _____(ventilations).
4. What is the potential problem with administer epinephrine through the tube? _____(Epinephrine is not reliably absorbed in the lungs when given by the ET route)
5. You should follow in intravenous dose with a flush of _____(normal saline) to insure that most of the drug is delivered to the baby and not left in the catheter.
6. Epinephrine _____(increases) the blood pressure and strength of cardiac contractions and _____(increases) rate of cardiac contractions.
7. The recommended concentration of epinephrine for newborns is _____(1:10,000)
8. The recommended dose of epinephrine for newborns is _____(0.1) to _____(0.3 ml/kg) if given intravenously of a 1:10,000 solution. The recommended dose of epinephrine if given endotracheally is _____(0.5) to _____(1 ml/kg) of a 1, 10,000 solution.

9. Epinephrine should be given _____(as quickly as possible)
10. What should you do approximately 1 minute after giving epinephrine? _____(check HR).
11. If the heart rate is below 60 beats per minute, you can repeat the epinephrine ever ___(3) to___(5 min)
12. If the baby's heart rate remains below 60 bpm after you have given epinephrine you should also make sure that ventilation is producing an adequate lung inflation and _____(chest compressions) are done correctly.
13. If the baby appears to be in shock, there is evidence of blood loss, and resuscitation is not resulting in improvement, you should consider giving ___(10 ml/kg) of a _____(volume expander) by what route? _____(IV or UVC)

Lesson VII - Special Considerations

Special situations may occur that can complicate resuscitation. On going problems can also occur after initial resuscitation. They are as follows:

- ♥ **Infant is not improving after endotracheal intubation may be an indications of malposition of the ET tube**
- ♥ **Choanal atresia** which is a nasal airway that did not form properly. It can be ruled out by placing a nasal airway or **suction catheter** through the nares
- ♥ **Infants with congenital diaphragmatic hernia have scaphoid abdomens because abdominal organs have herniated up and into the chest. These**

infants should not be resuscitated with PPV. Immediate intubation is needed and an orogastric tube in place to keep air out of the stomach which may be in the chest cavity.

- ♥ **Unequal breath sounds may be an indication of a pneumothorax and can be detected with transillumination of the chest and treated with needle decompression is required. The infant placed with the affected side superior prior for needle decompression.**
- ♥ **Maternal narcotic administration prior to birth may cause the infant not to breath. You should immediately provide PPV to maintain a heart rate >100 bpm and then consider administration of naloxone (narcan) to the infant. (not the mother!!) Other drugs given to the mother prior to delivery can depress respirations such as magnesium sulfate. Drugs that may have been given through the epidural route may also cause depressed respirations**
- ♥ **Pulmonary Hypoplasia is poorly developed lungs and high inflation pressures will be required to provide adequate ventilation. Severe pulmonary hypoplasia usually is incompatible with survival.**
- ♥ **Pulmonary Hypertension can occur when hypoxemia causes pulmonary constriction.**
- ♥ **Hypoglycemia may occur because energy stores are consumed faster in the absence of oxygen blood glucose levels may drop below normal.**
- ♥ **Hypothermia may be injurious to the baby.**

An infant that has required resuscitation will need close monitoring and management of oxygenation, blood pressure, fluid status, respiratory effort, blood glucose, nutritional issues, and temperature.

If meconium-stained infant has been resuscitated and then develops acute deterioration, a pneumothorax should be suspected. The risk is increased with PPV.

Infants who have been resuscitated may have kidney damage and are likely to need less fluids after resuscitation.

If a 10 day old infant with mechanical ventilation support develops bradycardia and severe desaturation, you should assess and establish adequate ventilation.

Therapeutic hypothermia following perinatal asphyxia should be

- ♥ Used only for babies >36 weeks' gestation.
- ♥ Initiated before 6 hours after birth
- ♥ Used only in centers with specialized programs
- ♥ An infant who has been resuscitated and now has brain damage

Lesson VII

Review Questions.

1. Choanal atresia can be ruled out by what procedure?
_____ (inserting a nasopharyngeal airway)
2. Babies with Robin Syndrome and airway obstruction may be helped by placing a _____ (naso-pharyngeal tube) and positioning them _____ (on their abdomen or prone. Endotracheal intubation of such babies is _____ (difficult).
3. A pneumothorax or a congenital diaphragmatic hernia should be considered if breath sounds are _____ (unequal) on 2 sides of the chest.

4. You should suspect a congenital diaphragmatic hernia if the abdomen is _____ (scaphoid). Such babies should not be resuscitated with _____ (PPV)
5. Persistent bradycardia and low SpO₂ during neonatal resuscitation most likely are caused by _____ (inadequate ventilation)
6. Babies who do not have spontaneous respirations and whose mothers have been given a narcotic drug should receive _____ (PPV) and then if spontaneous respirations do not begin, may be given _____ (naloxone) to confirm the cause of their respiratory depression.
7. After a resuscitation of a term or new term newborn, vascular resistance in the pulmonary circuit is likely to be _____ (high). Adequate oxygenation is likely to cause the pulmonary blood flow _____ (increase.).
8. If a meconium stained baby has been resuscitated and then develops acute respiratory depression a _____ (pneumothorax) should be suspected.
9. A baby who required resuscitation still has low blood pressure and poor perfusion after having been given a blood transfusion for suspected perinatal blood loss. He may require an infusion of _____ (dopamine) to improve his cardiac output and vascular tone.
10. Babies who have been resuscitated may have kidney damage and are likely to need _____ (less) fluids after resuscitation.
11. Because energy stores are consumed faster in the absence of oxygen, blood _____ (glucose) levels may be low following resuscitation
12. List three causes of seizures following resuscitation?

_____ (hypoxic ischemic encephalopathy)_____ (metabolic disturbances like hypoglycemia).
_____(electrolyte abnormality such as hyponatremia or hypocalcemia).

13. A baby with a seizure 10 hours after being resuscitated and with a normal blood glucose and serum electrolyte. What class of drug should be used to treat her seizures?_____ (an anticonvulsant such as Phenobarbital)
14. You will likely to have _____(less) difficulty controlling body temperature of babies requiring resuscitation beyond the immediate newborn period, since they usually will not be wet.
15. The priority of resuscitating babies beyond the immediate newborn period should be _____(establish effective ventilation)
16. If vacuum suction is not available to clear the airway,2 alternative methods are_____(bulb suction) and _____(wiping the airway with a clean cloth).
17. If a 15-day old baby requiring resuscitation had blood loss, vascular access route includes_____(peripheral) and____ (IO)
- 18, A baby was delivered at term by emergency C-section for persistent fetal bradycardia lasting 30 minutes. He required chest compression and now is profoundly obtunded, with absent deep tendon reflexes. What procedure may decrease the subsequent severity of hypoxic-ischemic encephalopathy, if instituted before 6 hours following birth? _____(Therapeutic hypothermia).

Lesson VIII

Resuscitation of Babies Born Premature

Preterm infants are defined as infants born less than 37 weeks gestational age. When birth occurs before term, there are numerous additional challenges that the fetus must overcome to make this difficult transition. The likelihood that the preterm baby will need your help becomes greater as the degree of prematurity increases. The following are factors that place the preterm infant at additional risk for requiring resuscitation.

- ♥ Loose heat easily.
- ♥ Tissues easily damaged from excess oxygen
- ♥ Weak muscles making adequate ventilation more difficult.
- ♥ Lungs deficient in surfactant
- ♥ Immature immune system and vulnerable to infection.
- ♥ Fragile capillaries in the brain.
- ♥ Small blood volume.

Additional personnel as well as additional equipment are needed in resuscitation of a preterm infant. The following are required for the resuscitation of preterm infants:

- ♥ Additional personnel including someone with expertise in performing endotracheal intubation and placement of a UVC.
- ♥ Additional means of maintaining body temperature (polyethylene bags and a portable warming pads)
- ♥ Compressed air source
- ♥ An oxygen blender
- ♥ Pulse oximeter.
- ♥ Premature infants are more vulnerable to hyperoxia and therefore, an oxygen blender and oximeter should be used to achieve an oxygen saturation of 85-95% range during and immediately following

resuscitation. Titrate the infant's SPO₂ to the preductile sats.

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

When assisting ventilations for a preterm infant:

- ♥ **Follow the same criteria for initiating PPV as with term infants.**
- ♥ **Consider using CPAP if the baby is breathing spontaneously with a heart rate >100 bmp but has labored respirations or a low oxygen saturation. Remember CPAP can be given with a flow-inflating bag or a T-piece resuscitator.**
- ♥ **Use PPV if the infant is intubated and use the lowest inflation pressure necessary to achieve an adequate response.**
- ♥ **Consider giving prophylactic surfactant.**

Decrease the risk of brain injury by::

- ♥ **Handilng the infant gently**
- ♥ **Avoid the Trendelenburg position. The best position is table flat.**
- ♥ **Avoid high airway pressures when possible.**
- ♥ **Adjust ventilation gradually based on physical examination, oximeter, and blood gas.**
- ♥ **Avoid rapid intravenous fluid boluses and hypertonic solutions. IV fluids should be given slowly.**

After resuscitation of a preterm infant.

- ♥ **Monitor blood sugar**

- ♥ **Monitor the infant for apnea, bradycardia, and/or oxygen desaturation.**
- ♥ **Monitor and control oxygenation and ventilation**
- ♥ **Consider delaying feeding or initiating feeds cautiously if perinatal compromise was significant.**
- ♥ **Have a high level of suspicion for infection.**

1. List five factors that increase the likelihood of needing resuscitation with preterm babies.

- _____ (Lose heat easily)
- _____ (Tissues easily damaged from excess oxygen)
- _____ (Weak muscles, making it difficult to breath)
- _____ (Lungs deficient in surfactant)
- _____ (Immature immune system)
- _____ (Fragile capillaries in the brain)
- _____ (Small blood volume)

2. A baby is about to be born at 30 week gestation. What additional resources should you assemble?

- _____ (Additional personal)
- _____ (Additional means to control temp)
- _____ (Compress gas source)
- _____ (Oxygen blender)
- _____ (Oximeter)

3. You have turned on the radiant warmer in anticipation of the birth of a 27 week's gestation. What else might you consider to help you maintain this baby's temperature?

- _____ (Increase the temperature of the delivery room)
- _____ (Activate a chemical heating pad)
- _____ (Prepare a plastic bag or wrap)
- _____ (Prepare a transport incubator)

4. A baby is delivered at 30 weeks gestation. She requires

PPV for an initial heart rate of 80 bpm despite tactile stimulation. She responds quickly with rising heart rate and spontaneous respirations. At 2 minutes of life she is breathing, has a heart rate of 140 bpm and is receiving and continuous CPAP with a flow-inflating bag and 50% oxygen. You have attached an oximeter and it now reading 95% and is increasing. You should _____ (decrease the oxygen concentration).

5. CPAP may be given with a _____ (flow-inflating bag)
 _____ (T-piece resuscitator)
 _____ (NOT a self-inflating bag)
6. To decreased the chance of brain hemorrhage, the best position is _____ (table flat)
7. Intravenous fluids should be given _____ (slowly) to preterm infants.
8. List three precautions that should be taken when managing a preterm baby who has required resuscitation?
 _____ (check blood glucose)
 _____ (monitor for apnea and bradycardia)
 _____ (control oxygenation)
 _____ (consider delaying feedings)
 _____ (increase suspicion for infection)

Lesson IX

Ethical Considerations

The ethical principles of neonatal resuscitation are no different from those of any other child or adult. They are as follows:

- ♥ Ethical and current national legal principles no do mandate attempted resuscitation in all circumstances.

- ♥ You may want to talk to the parents about the implication of delivery at early gestational age. “Dating” gestational age is accurate within 3-5 days if applied within the first trimester.
- ♥ You may want to consult the morbidity and mortality statistics with web-based National Institute of Child Health & Human Development Outcomes.
- ♥ Withdrawal of critical care interventions and further institution of comfort care are acceptable if there is an agreement by health care professionals and the parents.
- ♥ The approach to decisions to resuscitate should be guided by the same principles used for adults and older children.
- ♥ Consider that if further resuscitation efforts would be futile, or would merely prolong dying, or would not offer sufficient benefit to justify the burdens imposed, you may want to withhold resuscitation
- ♥ Parents are considered the decision makers for their own babies. To fulfill this roll responsibly, they must be given relevant and accurate information about the risk and benefits of each treatment option.
- ♥ When gestation, birth weight, and/or congenital anomalies are associated with almost certain death or unacceptable high morbidity, resuscitation is not indicated although exceptions may be reasonable to comply with parents wishes.
- ♥ In conditions associated with uncertain prognosis, where there is borderline survival and a high rate of morbidity and where the burden of the child is high. parents desires regarding initiation of resuscitation should be supported.

- ♥ When counseling parents about the birth of babies born at the extremes of prematurely advise them that decisions made about neonatal management before birth may need to be modified in the delivery room, depending on the condition of the baby at birth and the postnatal gestational age assessment. (Tell them that you will try to support their decision, but must wait until you examine the infant after birth to determine what you will do.)
- ♥ Discontinuation of resuscitation efforts should be considered after 10 minutes of absent heart rate. Factors to take into considerations are as follows:
 - Presumed etiology of the arrest
 - The gestational age of the infant
 - The presence or absence of complications
 - The potential of therapeutic hypothermia
 - The parents' previous expressed feeling about acceptable risk and morbidity.
- ♥ An infant about to be delivered is known to have major congenital malformations. The issues that you should cover with the parents are as follows:
 - Review the current obstetric plans and expectations.
 - Explain who will be present and their respective roles.
 - Explain the statistics and your assessment of the infant's chances for survival and possible disability.
 - Determine the parents wishes and expectations.
 - Inform the parents that decisions may need to be modified after you examine the infant.
- ♥ If attempts to resuscitate the infant is unsuccessful

you would explain the situation to the parents and ask if they would like to hold the infant.

- ♥ Appropriate responses to parents that their baby just died after an unsuccessful resuscitation are:
 - “I’m sorry your baby died. She is a beautiful baby.”
 - “I’m sorry, we tried to resuscitate your baby but the resuscitation was unsuccessful and your baby died.”
- ♥ The four principle of medical ethics that apply to parent as well neonates are the following:
 - Beneficence**, *is the act of benefiting others*
 - Nonmaleficence**, *is the act of avoiding harm*
 - Autonomy**, *is the act of respecting individuals right to make choices that affect life*
 - Justice** *refers to the act of treating others truthfully and fairly.*

Lesson IX

Review Questions:

1. Name the four common principles of medical ethics:
 - _____ (autonomy – the right of freedom to make choices)
 - _____ (beneficence – the act to benefit others)
 - _____ (nonmaleficence – avoid harming people unjustifiably)
 - _____ (justice – treat people truthfully)
2. Generally, the parents are considered to be the best “surrogate” decision makers for their own newborn? _____ (True)
3. The parents of a baby about to be born at 23 weeks’

gestation have requested that, if there is any possible brain damage, they do not want any attempt made to resuscitate their baby. What should your reply be? (Tell them you will try to support their decision, but must wait until you examine the baby after birth to determine what you will do.)

4. You have been asked to be present of an impending birth of a baby known from prenatal ultrasound and laboratory assessments to have major congenital malformations. List four issues that should be covered when you meet the parents.
_____(Review the current obstetric plans and expectations.)
_____(Explain who will be present and their respective roles.)
_____(Explain the statistics and your assessment of the infant's chances for survival and possible disability.)
_____(Determine the parents' wishes and expectations.)
_____(Inform the parents that decisions may need to be modified after you examine the infant.)
5. A mother enters the delivery suite in active labor at 34 weeks' gestation after having no prenatal care. She proceeds to deliver a live-born baby with major malformations that appear to be consistent with trisome 18 syndrome. An attempt to resuscitate the baby in the adjacent room is unsuccessful. The following action is the most appropriate. _____(Explain the situation to the parents and ask them if they would like to hold the baby.)
6. The following two replies are appropriate to say to

parents that have newborns that have just died after unsuccessful resuscitation.

_____(“I’m sorry, we tried to resuscitate your baby, but the resuscitation was unsuccessful and your baby died”)

_____(“I’m sorry your baby died. She is a beautiful baby.”)

The following mega code will be presented to you for your skills performance. Read through this presentation and be prepared to respond appropriately. You may not need to assist with intubation or placement of UVC if that is not within your scope of practice. Check with your hospital to determine how many lessons you will need to be proficient.

Basic Mega Code

Instructor presents the scenario

A pregnant woman contacts her obstetrician after noticing a pronounced decrease in fetal movement at 34 weeks' gestation. She is admitted to the labor and delivery unit where persistent fetal bradycardia is noted.

Instructor states “You are called to the delivery room.”

Learner asks for additional information

- What is the gestational age
- Will the delivery be vaginal or C-section
- Did the mother have prenatal care?
- Is there meconium in the amniotic fluid?

Learners may appoint a leader if a team is present and call for additional personal. (RT and an ALS nurse (or team)

Learner performs an equipment check

- Warmer turned on
- Warmed blankets for drying and stimulating
- Catheter suction set at 80-100 mmHg suction
- Bulb syringe
- Prepared bag/mask with oxygen
- Blender
- Pulse oximeter
- OG tube
- ET tubes with stylet
- Laryngoscope with # 0 & #1 blade
- CO₂ detector
- Syringes for medications
- Epinephrine, NS
- Meconium aspiratory
- Scales to weigh the newborn

Instructor: A 34 week gestational age is delivered to be estimated at 3 kg
Instructor hands infant manikin to the team leader

Learner asks for information about breathing and tone

- Is the infant breathing?
- Is the tone good or poor?
- Is the infant crying?
- What is the skin color?

Instructor responds with “There is no chest movement.”

Learner demonstrates how you stimulate this baby to breath?

Learner responds with

- PPV
- Appropriate oxygen concentration
- Places the oximeter probe on the right hand

Instructor states there is no rise and fall of the chest?

Learner responds with MR SOPA

Instructor states the pulse oximeter is not picking up.

Learner responds with

- Increase the FIO₂
- Delegates someone to check umbilical cord pulse

Instructor states there are 5 beats in 6 seconds

Learner states the heart rate is 50 bpm and demonstrates chest compressions interposed with PPV.

Learner delegates the chest compressor to check pulse after 45-60 sec

Instructor states there are 4 beats in 6 seconds.

Learner states the heart rate to be 40 bpm

Learner delegates someone to perform intubation and insert a UVC

Learner states the size of the ET tube to be 3.0
and the use of a size 0 Laryngoscope with light source

Learner states to prepare Epinephrine 1:10,000 with 0.9-3.0 ml

Instructor states the ET tube is inserted

Learner asks

- Is there mist
- There is no epigastric gurgling with BMV
- There are bilateral breath sounds
- The CO₂ detector turned gold

Learner calls for administration of epinephrine and determines the dose.

Learner delegates the ALS nurse to insert a UVC

“Any additional comments”

Learner delegates someone to check the heart rate

Instructor states there are 6 beats in 6 seconds.

Learner states the HR to be 60 bpm and request epinephrine to be administered through the UVC?

Learner calls for administration of epinephrine and determines the dose Epinephrine (0.1 – 0.3 ml/kg) The infant is estimated to have a weight of 3 kg. The dose would therefore be 0.3 to 0.9 ml of a 1:10,000 solutions.

Learner delegates someone to check the heart rate.

Instructor states there is 9 beats in 6 seconds

Learner states that chest compressions be discontinued and PPV continued

Learner states that someone rechecks the heart rate

Instructor states the HR to be 110 bpm.

Instructor states “That ends you scenario. Let’s debrief now.”

Instructor states: “Tell me in a few sentences about this baby.”

A preterm infant was born with respiratory distress, poor muscle tone, and bradycardia

“What were your objectives?”

Maintain airway, breathing and circulation

“Which objectives were met?”

The airway maintained with ET tube

The breathing was maintained with ET tube

The circulation spontaneously

“Which were not?”

None

“What could have gone better?”

Preparation (?)

Team called ((?)

“What would you do differently next time?”

“What did you learn?”

