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S.T.A.B.L.E.

Pre-transport/Post-resuscitation stabilization care for Infants

PARTICIPANT PREPARATION PACKET



The STABLE program was developed by a team of neonatal experts to provide critical information for maternal/infant healthcare providers in all settings; from the community ER to the high-tech birthing center and NICU including the respiratory and EMS transport teams who may assist in care.

The program strives to improve patient safety and outcomes while assisting the provider in recalling a uniform approach to stabilizing the neonate in the post resuscitation and pre-transport phase.

STABLE: sugar and safe care, temperature, airway, blood pressure, lab work, emotional support as well as quality review and improvement make up the review cases that are covered throughout the program.

The six modules presented throughout the day each contain a short post-test (5-12 questions) to document understanding of the information. These quizzes are presented after each section.

In order to be successful in the program, participants must review the text and complete the pretest in this packet prior to the course. The pretest will be collected and graded at the beginning of class.

We look forward to having you in this educational and exciting program and want you to get the most out of it. Please contact us if we can be of any assistance.

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Visit Our Website... MedicalTraining.cc

STABLE COURSE AGENDA
Neonatal Care

Time	Lesson
8:00am	Registration - Collect pretests
8:30-10:00am	Program Overview Neonatal Stabilization Responsibilities Section 1: Sugar
10:00-10:15am	<i>BREAK</i>
10:15-11:00am	Section 2: Temperature
11:00-12:30pm	Section 3: Airway (1)
12:30-1:15pm	<i>LUNCH</i>
1:15-2:15pm	Section 4: Blood Pressure
2:15-2:30pm	<i>BREAK</i>
2:30-3:00pm	Section 5: Lab work
3:00-3:30pm	Section 6: Emotional Support / Quality Improvement
3:30-4:30pm	Post Assessment Testing / Course Evaluations

Program Objectives

Following the student's home review of the text, pretest completion and the interactive classroom and case review.

Participants should be able to describe the following from each section:

SUGAR AND SAFE CARE

1. Issues of patient safety and error reduction in the delivery of nursing and medical infant care.
2. Infants at increased risk for becoming hypoglycemic and hyperglycemic.
3. Signs and symptoms of hypoglycemia.
4. The initial, appropriate IV fluid therapy to provide for sick infants.
5. The IV glucose treatment of hypoglycemia and when to re-evaluate the blood glucose following treatment.
6. Candidates for placement of an umbilical catheter.
7. Principles for safe use of umbilical venous and arterial catheters.

TEMPERATURE

1. Infants at increased risk for becoming hypothermic.
2. Ways infants lose body heat and protection from cooling.
3. Physiologic responses to hypothermia for premature and term infants.
4. Necessary precautions to observe when rewarming severely hypothermic infants.

AIRWAY

1. How to evaluate the degree of respiratory distress an infant is experiencing.
2. Indications for continuous positive airway pressure (CPAP), positive pressure ventilation (PPV) with bag and mask or endotracheal intubation.
3. How to provide assistance during endotracheal intubation.
4. How to secure an oral endotracheal tube.
5. How to evaluate endotracheal tub location.
6. How to evaluate a blood gas as normal, respiratory, metabolic or mixed acidosis and if compensated.
7. The initial ventilatory support for very low-birth-weight, low-birth-weight and term infants.
8. The signs and symptoms of a pneumothorax, use of transillumination and chest x-ray to evaluate for pneumothoraces and principles of emergent evacuation of a pneumothorax.

BLOOD PRESSURE

1. The causes, presentation and initial treatment of hypovolemic, cardiogenic and septic shock.
2. Physical exam for shock and laboratory tests that assist with recognition and evaluation of shock.
3. Indications for and safe administration of dopamine.

LAB WORK

1. Risk factors that predispose infants.
2. Clinical signs of infection in infants.
3. Laboratory tests indicated for evaluation of infection including the complete blood count and blood culture.
4. Basic white blood cell development and calculation and interpretation of the absolute neutrophil count and immature to total ratio.
5. The relationship of thrombocytopenia to possible sepsis.

EMOTIONAL SUPPORT of the Family

1. The crisis families experience when an infant requires care in a neonatal intensive care unit.
2. Ways neonatal ICU caregivers can facilitate parenting in the NICU and how to support parents.
3. Cultural and gender differences in coping and the grief experience.

QUALITY IMPROVEMENT MODULE

1. Concerns regarding patient safety and methods to reduce medical errors and preventable adverse events.
2. The importance of self-assessment to evaluate the assessment, management, and care provided.

The S.T.A.B.L.E. Program – 6th Edition Learner/Provider Course Pre-Assessment

Please write your name and answers on the answer sheet. For the following multiple-choice questions, choose the **one** best answer. If you are uncertain about an answer, take your best guess.

1. A neonate with a pneumothorax may exhibit which of the following signs?

- 1) Increased work of breathing
- 2) Bradycardia
- 3) Asymmetric appearing chest
- 4) Cyanosis
- 5) Decreased femoral pulses

- a) 1, 2, 4
- b) 1, 3, 5
- c) All are correct

2.

During a routine evaluation of a four-hour-old term infant, the nurse discovers the infant is tachypneic, tachycardic, and hypotonic. The infant's temperature is 38.6°C (101.5°F). A complete blood count (CBC) is ordered with the following results:

WBC	9,200	Lymphocytes	51%
Hemoglobin	15 g/dL	Segmented neutrophils	41%
Hematocrit	46%	Band neutrophils	5%
Platelets	290,000	Monocytes	3%

You discuss the patient and CBC results with the infant's medical staff provider who responds by saying,

"The CBC is normal which reassures me that the baby is fine. I don't think we need to do anything more than keep a close eye on the baby."

Your assessment of this response is:

- a) You agree that close observation is all that is necessary at this time because the CBC and CRP are normal, which reassures you that the infant is well.
- b) You are concerned because the infant's clinical presentation is not being adequately considered; work-up and treatment for possible infection is indicated.
- c) You are concerned because you think a CBC and CRP should also be re-evaluated in 8 to 12 hours.

3. A term infant is breastfeeding when his mother asks you to come and assess him because he vomited. You notice the color of the emesis is lime green. The mother reveals that this is the third time the infant vomited green-colored emesis. The infant's abdomen is not distended, and he is irritable and crying. **Which one of the following should be performed emergently?**
- a) A barium enema to evaluate for colonic obstruction
 - b) A swallow study with contrast to evaluate for trachea-esophageal fistula
 - c) An upper gastrointestinal (UGI) exam to evaluate for malrotation
4. A term infant weighing 1400 grams (3 pounds, 1.5 ounces) is born to an underweight mother. A bedside glucose test at 30 minutes of life is 10 mg/dL (0.6 mmol/L). The infant does not have any apparent signs of hypoglycemia at the time the lab test was drawn. **Which of the following orders is the most appropriate therapy for this infant?**
- a) Gavage feed 7 mLs (equals 5 mLs per kg) of breast milk or formula; recheck the glucose 30 to 60 minutes after the feeding is given.
 - b) Insert an IV then give a 2.8 mL bolus of D10W, followed by an IV infusion of D10W at 80 mLs per kilogram per day; recheck the glucose 15 to 30 minutes after the bolus.
 - c) Send a confirmatory plasma glucose to the lab and if low, insert an IV and give a 2.8 mL bolus of D10W followed by an IV infusion of D10W at 80 mLs per kilogram per day; recheck the glucose 15 to 30 minutes after the bolus.
5. The function of brown fat is to:
- a) Generate heat when it is metabolized.
 - b) Provide a rapidly available source of glucose in the first day of life.
 - c) Provide an insulating layer of fat in the first month of life.
6. An infant is delivered to a healthy woman with good prenatal care. Within minutes of birth, the infant developed respiratory distress (retractions and nasal flaring). Blow-by oxygen, then CPAP was initiated. The infant further deteriorated so bag/mask positive pressure ventilation was given. You observe a shift in the point of maximal impulse (PMI) to the right, a barrel chest, and a sunken abdomen. **Which of the following respiratory illnesses is most likely causing these signs?**
- a) Diaphragmatic hernia
 - b) Tension pneumothorax
 - c) Tracheoesophageal fistula

7. An infant is delivered to a mother whose membranes were ruptured for 24 hours. He is healthy at birth and is breast feeding well; however, the next day, you are concerned because the infant is hypotonic and his exam reveals heart rate 200 beats per minute, respiratory rate 80 per minute, and weak central pulses. **Which of the following physician orders would be appropriate in this case?**

- a) Apply an ice pack to the face to treat supraventricular tachycardia.
- b) CBC with differential, c-reactive protein and blood culture.
- c) Type and cross match, then give 10 mL/kg of packed red blood cells.

8. An infant is delivered via emergency cesarean section because of placental abruption. The physical examination is significant for:

- 1) Heart rate ranging 180 to 200 beats per minute
- 2) Pale skin color
- 3) Prolonged capillary refill time
- 4) Weak brachial and femoral pulses
- 5) Moderate respiratory distress (retractions, grunting, nasal flaring)

Which of the following therapies do you anticipate the physician may order for this infant?

- a) D10W bolus, 10 mL/kg IV
- b) Fresh frozen plasma, 10 mL/kg IV
- c) O-negative packed red blood cells, 10 mL/kg IV

9. Arterial blood gas result: pH 7.35, PCO₂ 23, HCO₃ (bicarbonate) 12. **The correct interpretation of this blood gas is:**

- a) compensated metabolic acidosis
- b) compensated mixed metabolic and respiratory acidosis
- c) compensated respiratory acidosis

10. An infant delivers unexpectedly in the emergency department. The nursery staff is called to help with the stabilization. When your team arrives, you note the following about the infant's appearance: very small chin and jaw, what appears to be an enlarged tongue, and severe retractions. **Based on your assessment, which one of the following interventions should be done immediately?**

- a) Place the infant prone and assess whether additional airway support is required
- b) Insert nasal prongs and provide continuous positive airway pressure (CPAP)
- c) Place the infant supine with a small roll under the shoulders to tip the head back and open the airway

11. A 36-week gestation infant is being treated for suspected sepsis. Complete blood count (CBC) lab tests are obtained eight hours apart. The absolute neutrophil count (ANC) on those CBCs are: 3240, 1050, and 540. **This trend indicates a(n):**
- a) increased percentage of immature white blood cells
 - b) increased risk of neutrophil depletion
 - c) positive response to antibiotic therapy
12. The immature-to-total ratio (I/T ratio) on the same three CBCs in the previous questions are: 0.36, 0.56, and 0.83. **This trend indicates an:**
- a) increasing percentage of immature neutrophils
 - b) increasing percentage of mature neutrophils
 - c) increasing percentage of total neutrophils
13. Which of the following may cause hypovolemic shock?
- 1) Placental abruption
 - 2) Pneumothorax
 - 3) Twin-to-twin transfusion syndrome
- a) 1
 - b) 1, 2
 - c) All are correct
14. Positive pressure ventilation via bag and mask or endotracheal intubation, should be performed without delay if the infant:
- a) has a pneumothorax
 - b) is being transported
 - c) is gasping

15. A two-day old term infant begins to feed poorly and her exam is significant for weak cry, hypotonia, tachypnea, palpable brachial pulses, but absent femoral pulses, and a 6-second capillary refill time. A right radial arterial blood gas is drawn with the following results: pH 7.19, PCO₂ 60, HCO₃ 9.2, and base deficit -16. **This presentation and blood gas correlate with which one of the following diagnoses?**
- a) Ductal-dependent congenital heart disease
 - b) Pneumonia
 - c) Inborn error of metabolism
16. A mother is concerned because her 6-hour old infant is very sleepy and she thinks there is an increase in scalp bruising. The delivery record reveals vacuum assisted delivery and should dystocia. Apgars were 7 at one minute and 8 at five minutes. **Exam findings:** CRT 5 seconds, weak pulses, hypotonic muscle tone, difficulty arousing the baby; weak cry, head circumference 37 cm (34 cm at birth). Swelling is palpated crossing suture lines. **Given this limited information, which of the following should be strongly suspected?**
- a) Caput succedaneum
 - b) Cephalohematoma
 - c) Subgaleal hemorrhage
17. A mother has insulin dependent diabetes and elevated hemoglobin A1c (HbA1c) levels throughout pregnancy. Her term newborn weighs 5.1 kg. **Which one of the following statements is TRUE?**
- a) Hemoglobin A1c reflects the average insulin level during the previous 3 months and transplacentally transferred insulin contributed to the macrosomia.
 - b) Hemoglobin A1c should be interpreted with caution in pregnant women because of the influence of pregnancy hormones on test results.
 - c) The elevated hemoglobin A1c levels and infant's macrocosmic size indicate the mother had poor glucose control during pregnancy.

18. A 41-week gestation infant is delivered after a prolonged labor and vacuum assist for 20 minutes. Amniotic fluid was meconium stained. Apgar scores were 6 at one minute and 9 at five minutes. The infant appeared healthy and remained with his mother. At 3 hours of life, his vital signs are:

Temperature 36.3°C (97.3°F), Heart rate 175, Respiratory rate 65.

The nurse assists the new mother with the infant's bath. Following the bath, he is noted to have acrocyanosis, nasal flaring, grunting, and retractions. His vital signs are now:

Temperature 35.3°C (95.5°F), Heart rate 180, Respiratory rate 70.

This change in clinical status is related to:

- a) Commonly observed changes secondary to cold-stress following a bath, which could improve within 1 to 2 hours.
 - b) Increased metabolic rate and oxygen consumption secondary to hypothermia.
 - c) Signs of shock secondary to subgaleal hemorrhage following the vacuum assist, difficult delivery.
19. Which of the following are appropriate methods for rewarming a hypothermic preterm infant?
- a) Fill gloves with hot water and place along both sides of the infant's body.
 - b) Heat a baby blanket in a microwave for several seconds, and then place the blanket around the infant.
 - c) Place the infant on a chemical thermal mattress and cover the infant with plastic from chin to feet.

20. A mother presents at a community hospital at 30 weeks' gestation, in active labor with profuse vaginal bleeding. An emergency C-section is performed. The arterial cord pH is 6.95. Apgar are: 2 (at one minute), 4 (at five minutes), and 6 (at ten minutes). The infant weighs 1.2 kg. At 25 minutes of life, the arterial blood gas pH is 6.98. A neonatal transport is arranged. **Which ONE of the following statements is true?**

- a) The blood gas pH reveals severe metabolic acidosis, therefore, the infant should be given sodium bicarbonate IV
- b) This infant meets the candidacy requirements for "therapeutic/neuroprotective" hypothermia, therefore, passive cooling should begin before arrival of the transport team
- c) Post-resuscitation stabilization should include protection from heat loss, establishment of IV access, and starting a D10W infusion

21. A pulse pressure is calculated by subtracting the diastolic blood pressure from the systolic blood pressure. **Which statement is true about pulse pressure?**
- a) A low (narrow) pulse pressure may be observed with diastolic run-off lesions
 - b) A narrow pulse pressure may indicate poor cardiac output
 - c) A wide pulse pressure is often observed with peripheral vasoconstriction
22. A 34-week gestation infant has a temperature of 31°C (87.8°F). **Which of the following signs are commonly observed with this body temperature?**
- a) Hypertension, arrhythmia, irritability
 - b) Hypotension, bradycardia, bradypnea
 - c) Lethargy, tachycardia, tachypnea
23. A 40-week gestation infant, born by elective repeat cesarean section, was well until 18 hours of life when he developed respiratory distress, characterized by tachypnea, cyanosis, nasal flaring, grunting, and retractions. 100% oxygen was provided by face mask, however, oxygen saturation failed to rise above 80%. The infant's respiratory distress was severe enough that he required endotracheal intubation and assisted ventilation. **Given this limited history, which the following diagnoses are most likely?**
- a) Bacterial sepsis, congenital heart disease
 - b) Respiratory distress syndrome, pneumothorax
 - c) Trachea-Esophageal fistula, transient tachypnea of the newborn
24. A 3-kilogram infant requires intubation for severe respiratory distress. The endotracheal tube is taped at 12 centimeters at the lip. **The endotracheal tube tip is most likely:**
- a) in good position.
 - b) too high.
 - c) too low.

25. A term infant is delivered in the car ten minutes before arrival at the hospital. When you arrive in the emergency department to assist, you observe the following: The infant is lying on the examination table, limp, naked and cyanotic. He is intubated and receiving positive pressure ventilation. He has gasping respirations and there is no intravenous line in place. **Of the following stabilization options, which one should be performed first?**
- a) Clinically evaluate that the endotracheal tube is in correct position and is well secured, check the heart rate and apply a pulse oximeter
 - b) Insert an umbilical venous catheter, draw a complete blood count (CBC) and blood culture, then give antibiotics
 - c) Move the infant to a radiant warmer, establish intravenous access and obtain a stat chest x-ray
26. Arterial blood gas result: pH 7.18, PCO₂ 63, HCO₃ (bicarbonate) 23. The correct interpretation of this blood gas is:
- a) uncompensated metabolic acidosis
 - b) uncompensated mixed metabolic and respiratory acidosis
 - c) uncompensated respiratory acidosis
27. A term infant has suspected pneumonia and is on a ventilator. The blood gas reveals a severe metabolic and respiratory acidosis and low arterial oxygen tension. Which one of the following statements is **FALSE**?
- a) Blended oxygen should be administered and oxygen saturation should be monitored
 - b) Sodium bicarbonate should be given immediately to treat the acidosis
 - c) Tissue hypoxia may lead to cellular necrosis and subsequent organ damage
28. Pre- and post-ductal saturation monitoring is ordered for an infant with suspected persistent pulmonary hypertension. **Where will the two oximeter probes be placed and what will each probe be measuring?**
- a) Left hand (post-ductal saturation), right foot (pre-ductal saturation)
 - b) Left hand (pre-ductal saturation), right foot (post-ductal saturation)
 - c) Right hand (pre-ductal saturation), left foot (post-ductal saturation)

29. Following a planned home birth, a term female infant is brought to the emergency department at two hours of life because of respiratory distress. The right hand O₂ saturation reading is 70%. When she is undressed for the exam, she begins to cry and her saturation quickly increases to 96%. When she stops crying, her saturation decreases again to the low 70% range. **This pattern of saturation change is typical for which of the following condition?**
- a) Choanal atresia
 - b) Cyanotic congenital heart disease
 - c) Persistent pulmonary hypertension
30. Arterial blood gas result: pH 7.25, PCO₂ 36, HCO₃ (bicarbonate) 15. **The correct interpretation of this blood gas is:**
- a) compensated respiratory acidosis
 - b) uncompensated metabolic acidosis
 - c) uncompensated mixed metabolic and respiratory acidosis
31. Which of the following infants are at increased risk for hypoglycemia due to hyperinsulinism?
- a) An infant born at 27 weeks who is also growth restricted.
 - b) An infant whose birthweight is at the 8th percentile for weight.
 - c) An infant whose birthweight is at the 95th percentile for weight.
32. A term infant is delivered vaginally after a long labor. Membranes were ruptured for 22 hours and the amniotic fluid was clear. The infant required minimal resuscitation and was allowed to remain with her mother. At eight hours of life, her mother called for help because the infant was blue and unresponsive. The infant's exam was significant for hypothermia, hypotonia, tachypnea, and cyanosis. You are most concerned that this infant's symptoms may be secondary to:
- a) bacterial sepsis
 - b) cyanotic congenital heart disease
 - c) respiratory distress syndrome
33. Infants of diabetic mothers are at increased risk for becoming hypoglycemic because they have:
- a) decreased glycogen stores
 - b) increased levels of insulin
 - c) increased utilization of glucose

34. The mother-baby unit is extremely busy today. An infant born several hours ago at 37 weeks gestation has the following vital signs:
Temperature 36.0°C (96.8°F), Heart rate 170, Respiratory rate 65.
- You have a heavy patient load and need to bathe the infant. **Should the infant be bathed at this time?**
- a) No, the vital signs are not in a normal range and the bath should wait
 - b) b) Yes, providing a radiant warmer is used so the infant doesn't get cold
 - c) c) Yes, the vital signs are in an acceptable range and the infant is term
35. Late preterm infants, born between 34 and 36 weeks gestation, are at increased risk for which of the following complications?
- 1) Temperature instability
 - 2) Hypoglycemia
 - 3) Respiratory distress
 - 4) Apnea
 - 5) Hyperbilirubinemia
 - 6) Feeding difficulties
- a) 1, 2, 3
 - b) 4, 5, 6
 - c) All are correct
36. A laboring mother with poor prenatal care is found to have severe hypertension when she is admitted to the hospital. She states she does not take any medications to treat the hypertension (diagnosed 10 years ago). Her infant is born at 39 weeks gestation and has a birthweight at the 4th percentile. At 30 minutes of life, the infant's glucose is 20 mg/dL (1.1 mmol/L). **Your explanation for the hypoglycemia is:**
- a) Chronic intrauterine stress from the maternal hypertension limited the fetus's ability to make and store glycogen for use after birth.
 - b) Medications given during labor increased the maternal glucose level which stimulated insulin production in the fetus.
 - c) The infant is utilizing glucose at an accelerated rate and although he has adequate glycogen stores, he is rapidly depleting those stores.

37. Which statement(s) about hypothermia are **true**?

- 1) Mild hypothermia stimulates norepinephrine release, which increases metabolic rate and brown fat metabolism
- 2) Severe hypothermia slows heart rate and decreases cardiac output which leads to tissue hypoxia and dependence on anaerobic metabolism
- 3) Hypothermia may cause pulmonary vasoconstriction and result in right-to-left shunting through the ductus arteriosus and/or foramen ovale

- a) 1
- b) 1, 2
- c) All are correct

38. Which one of the following infants is at most risk for hypoglycemia **due to increased glucose utilization and depletion of glycogen stores**?

Gestation (weeks)		Diagnosis	Birth weight (percentile)	Arterial blood gas
a)	34	Hyperbilirubinemia	25th	pH 7.40 / PCO ₂ 40 / PO ₂ 60 / HCO ₃ 24
b)	37	Transient tachypnea of the newborn	90th	pH 7.28 / PCO ₂ 48 / PO ₂ 55 / HCO ₃ 22
c)	40	Septic shock	50th	pH 7.15 / PCO ₂ 38 / PO ₂ 20 / HCO ₃ 13

39. Arterial blood gas result: pH 7.03, PCO₂ 55, HCO₃ (bicarbonate) 14. **The correct interpretation of this blood gas is:**

- a) uncompensated metabolic acidosis
- b) uncompensated mixed metabolic and respiratory acidosis
- c) uncompensated respiratory acidosis

40. Bacterial sepsis is suspected in a 3 kilogram (kg) term infant with severe hypotension. The following lines are in place: umbilical artery catheter (UAC), umbilical venous catheter (UVC) and a peripheral IV in the hand. The catheter tips are in good position. **Which one of the following actions increases the risk for patient harm and should be questioned?**

- a) Administer ampicillin and gentamicin via the IV
- b) Give normal saline 30 mLs via the UVC
- c) Infuse Dopamine 10 mcg/kg/minute via the UAC

The S.T.A.B.L.E. Program

6th Edition Pre-Test Answer Sheet

Name (required): _____

Date: Course Location: _____

I am (circle one): MD DO RN NNP PNP CNS RT LPN Nursing Assistant
Corpsman Other: _____

I work most of the time in the: Well Baby Nursery NICU Labor/Delivery Postpartum
Emergency Department Other: _____

Each question is worth 2.5 points. Please mark only one answer for each question. If you change an answer, please cross out your first answer and initial it.

- | | | |
|-----------|-----------|-----------|
| 1) a b c | 15) a b c | 29) a b c |
| 2) a b c | 16) a b c | 30) a b c |
| 3) a b c | 17) a b c | 31) a b c |
| 4) a b c | 18) a b c | 32) a b c |
| 5) a b c | 19) a b c | 33) a b c |
| 6) a b c | 20) a b c | 34) a b c |
| 7) a b c | 21) a b c | 35) a b c |
| 8) a b c | 22) a b c | 36) a b c |
| 9) a b c | 23) a b c | 37) a b c |
| 10) a b c | 24) a b c | 38) a b c |
| 11) a b c | 25) a b c | 39) a b c |
| 12) a b c | 26) a b c | 40) a b c |
| 13) a b c | 27) a b c | |
| 14) a b c | 28) a b c | |