Baby is Out!

Guy Peifer
Definition

- Newborn: within the first few hours after birth
- Neonate: within the first month after birth
Should We Be Worried?

- When was the last time you responded to a newborn resuscitation?
- 10% of deliveries require additional interventions.
- Complications and mortality and morbidity increase as weight and age decrease.
Situations That Cause Concern….

- Multiple Gestation
- Age during pregnancy <16yo, >35yo
- >42 weeks gestation
- Pre-existing medical condition (HTN, Preeclampsia, Diabetes)
- Decreased fetal movement
Some More Situations That Cause Concern….

- Early rupture of amniotic sac
- Lack of prenatal care
- Prior history of fetal difficulties
- Drug or alcohol use during pregnancy
- Maternal Infections
- Known high risk OB patient
- Bleeding during pregnancy
Newborn versus Neonate

- Newborn stabilization:
  - Warming
  - Positioning
  - Clearing the airway
  - Drying, stimulating breathing

- Neonatal resuscitation:
  - Airway
  - Breathing
  - Circulation
Additional resuscitation steps

- Supplemental oxygen
- Positive pressure ventilatory assistance
- Chest compressions
- Medications
- Intubation
The First Breath and The Transition

- Triggered by mild hypoxia and hypercapnia.
- Pulmonary vascular resistance drops as the lungs fill with air.
- More blood flows to the lungs.
The Blood Flow....before and after
What happens if the Breathing is Delayed?

- Delayed transition
- Hypoxia
- Brain injury
- Death
Causes of Delayed Transition…

- Hypoxia
- Meconium Aspiration
- Blood Aspiration
- Hypothermia
- Pneumonia
- Hypotension
- Sepsis
- Asphyxia (Nuchal Cord)
Here it Comes….Get Ready

• Obtain patient history
• Prepare delivery area
  • Minimum needs:
    • Warm, dry blankets
    • Bulb syringe
    • Two small clamps or ties
    • A pair of clean scissors
  • Anything else?
Arrival of the Newborn

- Use blankets to warm and dry the newborn.
- Confirm ABCs.
- Place on mother’s chest.
- Suction mouth, then nose.
- Keep newborn at level of mother.
Arrival of the Newborn

- Clamp and cut the umbilical cord.
- Do an initial rapid assessment.
- Newborn is at risk for hypo/hyperthermia.
- Position the newborn, clear secretions, and assess the respiratory effort.
Arrival of the Newborn

• If the newborn begins to turn pink in the first 5 minutes:
  • Maintain ongoing observation.
  • Continue thermoregulation with direct skin-to-skin contact with mother.
The Apgar Score

- Helps record condition at birth
- If score is less than seven, redo every 5 minutes until 20 minutes after birth.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Description</th>
<th>Score</th>
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<tbody>
<tr>
<td>Appearance–skin color</td>
<td>Completely pink</td>
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<tr>
<td></td>
<td>Body pink, extremities blue</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Centrally blue, pale</td>
<td>0</td>
</tr>
<tr>
<td>Pulse rate</td>
<td>&gt; 100</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>&lt; 100, &gt; 0</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Absent</td>
<td>0</td>
</tr>
<tr>
<td>Grimace–irritability</td>
<td>Cries</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Grimaces</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>No response</td>
<td>0</td>
</tr>
<tr>
<td>Activity–muscle tone</td>
<td>Active motion</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Some flexion of extremities</td>
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</tr>
<tr>
<td></td>
<td>Limp</td>
<td>0</td>
</tr>
<tr>
<td>Respiratory–effort</td>
<td>Strong cry</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Slow and irregular</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Absent</td>
<td>0</td>
</tr>
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</table>
Algorithm for Neonatal Resuscitation

1. **Time frame**
   - Term gestation?
   - Amniotic fluid clear?
   - Breathing or crying?
   - Good muscle tone?

2. **30-sec mark**
   - Provide warmth
     - Position; clear airway (as necessary)
     - Dry, stimulate, reposition
   - HR ≤ 100, gasping, or apneic

3. **60-sec mark**
   - Provide positive-pressure ventilation
     - SpO₂ monitoring

4. **90-sec mark**
   - Administer chest compressions
     - Provide positive-pressure ventilation
   - HR ≤ 60

5. **Routine care**
   - Warmth
   - Clear airway
   - Dry
   - Ongoing evaluation

6. **Labored breathing or persistent cyanosis**
   - Clear airway
   - SpO₂ monitoring
   - Consider CPAP

7. **Post-resuscitation care**
   - Ensure correct ventilation
   - Consider hypovolemia pneumothorax

8. **Post-resuscitation care**
   - Administer IV epinephrine
Drying and Stimulation

- Nasal suctioning stimulates breathing.
  - Position on the back or side in sniffing position.
  - If airway is not clear, suction with the head turned to the side.
- Flick the soles of the feet and rub the back.
Airway Management

- Free-flow oxygen
  - If cyanotic or pale, provide oxygen.
  - If PPV is not indicated, oxygen can initially be delivered through:
    - Oxygen mask
    - Oxygen tubing
Airway Management

• Oral airways
  • Conditions:
    • Bilateral choanal atresia
    • Pierre Robin sequence
    • Macroglossia
    • Craniofacial defects
  • In all these cases (except bilateral choanal atresia), an ET tube is inserted down a nostril.
Airway Management

• Bag-mask ventilation
  • Indicated if newborn:
    • Is apneic
    • Has inadequate respiratory effort
    • Has a pulse rate of less than 100 beats/min after stimulation efforts
Airway Management

• Bag-mask ventilation (cont’d)
  • Correct ventilation time: 40 to 60 breaths/min
  • Causes of ineffective bag-mask ventilation:
    • Inadequate mask seal on the face
    • Incorrect head position
    • Copious secretions
    • Pneumothorax
    • Equipment malfunction
Airway Management

• Intubation
  • Indications:
    • Meconium-stained fluid, nonvigorouss newborn
    • Congenital diaphragmatic hernia
    • ET administration of epinephrine needed
    • Prolonged PPV needed
    • Craniofacial defects impeding airway
Meconium-Stained Amniotic Fluid

- Assessment and management
  - If depressed:
    - Clear meconium from airway.
    - Intubate trachea.
    - Suction ET tube while withdrawing from the trachea.
Meconium Aspirator
Circulation

• Chest compressions
  • Indicated if pulse rate remains at less than 60 beats/min after resuscitation efforts
  • Two people needed
Circulation

- Chest compressions (cont’d)
  - Two techniques:
    - Thumb technique
    - Two-finger technique
Circulation

• Chest compressions (cont’d)
  • Rate: 120 minute
  • Ratio: 3 compressions/1 ventilation
  • Depth: one third of the anteroposterior diameter
    • 0.5” to 0.75”
  • Do not deliver simultaneously with artificial ventilation.
Circulation

• Chest compressions (cont’d)
  • If pulse rate is above 60 beats/min:
    • Chest compressions can be stopped.
    • Continue ventilation at 40 to 60 breaths/min.
    • Recheck pulse rate after 30 seconds.
  • If rate goes above 100 beats/min, gradually slow the rate and decrease PPV pressure.
Circulation

• Vascular access
  • Umbilical vein can be catheterized.
  • Clean the cord with antiseptic.
  • Attach a syringe and stopcock to an umbilical vein line catheter and prefill.
  • Cut the cord with a scalpel.
Pharmacologic Interventions

- Rarely needed in newborn resuscitation
- Medication dosages based on weight
Bradycardia

- Hypoxia?

- Often will respond to PPV
- Epinephrine administration is indicated for pulse rate of less than 60 beats/min.
  - Check pulse rate 1 minute after administration.
  - May repeat dose every 3 to 5 minutes
Low Blood Volume

• Fluid resuscitation may be needed.
• Signs of hypovolemia include:
  • Pallor
  • Persistently low pulse rate
  • Weak pulses
  • No improvement in circulatory status after resuscitation efforts
Low Blood Volume

- Fluid bolus in a newborn is 10 mL/kg given IV every 5 to 10 minutes of:
  - Saline
  - Lactated Ringer’s
  - D5 1/2NS after third bolus of NS or LR
Acidosis

- Suspect if bradycardia persists after:
  - Adequate ventilations
  - Chest compressions
  - Volume expansion
Respiratory Depression from Narcotics

- Respiratory suppression from use of narcotics:
  - Provide ventilator support.
  - Transport immediately.

- Respiratory depression from acute treatment with narcotics:
  - Administer 0.1 mg/kg of naloxone.

**got naloxone?**
Hypoglycemia

- Neurologic symptoms:
  - Decreased stimuli response
  - Hypotonia
  - Apnea
  - Poor feeding
  - Seizures

- Obtain baseline vital signs and oxygen saturation readings.
Hypoglycemia

- If blood glucose level is less than 40 mg/dL:
  - Give IV bolus of 10% dextrose solution.
  - 5ml/kg
  - Recheck level in about 10 minutes.
Family and Transport Considerations

• Transport to nearest facility once newborn is stabilized as much as possible.
  • Provide ongoing communication with the family.
  • During transport, monitor the newborn.
Family and Transport Considerations

- Transport of a high-risk newborn:
  - Physician at referring hospital initiates request.
  - Mode of transportation is chosen.
  - Transport team is mobilized and equipment assembled.
  - On arrival, transport team continues to stabilize the newborn.
Family and Transport Considerations

- Conditions that should be treated before leaving the referring hospital:
  - Hypoxemia
  - Acidosis
  - Hypoglycemia
  - Hypovolemic
Apnea

- Respiratory pause greater than 20 seconds
  - Can lead to hypoxemia and bradycardia
  - Often follows hypoxia or hypothermia
  - Newborn needs respiratory support to minimize brain and organ damage.
Bradycardia

- Most frequently occurs in newborns due to inadequate ventilation
  - Often responds to effective PPV
- Morbidity and mortality are determined by underlying cause and how quickly it is corrected.
Bradycardia

• Assessment and management
  • Heart rate less than 100 beats/min: provide PPV.
  • If still less than 60 beats/min:
    • Begin chest compressions.
  • If still less than 60 beats/min:
    • Administer epinephrine.
  • Repeat every 3 to 5 minutes for persistent bradycardia.
Pneumothorax

- Can occur if:
  - Infant inhales meconium
  - Lung is weakened by infection
- Signs of significant pneumothorax:
  - Severe respiratory distress unresponsive to PPV
  - Unilateral decreased breath sounds
Diaphragmatic Hernia

• An abnormal opening in the diaphragm

• Signs and symptoms include:
  • Respiratory distress
  • Heart sounds shifted to the right
  • Bowel sounds heard in the chest
Respiratory Distress and Cyanosis

- Single most common cause is prematurity
  - Respiratory causes
  - Other causes:
    - Shunting of blood across the patent ductus arteriosus and patent foramen ovale
    - Central nervous system depression
    - Septic shock and severe metabolic acidosis
    - Cardiac anomalies
Respiratory Distress and Cyanosis

- Assessment and management
  - Ensure patent airway.
  - Check breathing is adequate.
  - Check pulse is present.
  - Assess respirations.
  - Ask about increased symptoms with feeding.
Respiratory Distress and Cyanosis

• Assessment and management (cont’d)
  • Treatment includes:
    • Establishing patent airway
    • Ensuring adequate oxygen delivery
    • Establishing effective ventilation
    • Ensuring adequate circulation
Premature and Low Birth Weight Infants

- Premature—delivered before 37 weeks of gestation
  - Increased mortality
  - Associated morbidities
Premature and Low Birth Weight Infants

• Low birth weight—newborns weighing less than 5½ lb (2,500 g)
• Morbidity and mortality are related to degree of prematurity.

• To optimize survival in the field:
  • Provide cardiorespiratory support.
  • Provide thermoneutral environment.
  • Use only minimum pressure necessary to move chest when providing PPV.
Premature and Low Birth Weight Infants

• Assessment and management
  • Management focuses on:
    • Clearing airway
    • Gentle stimulation
    • Providing supplemental oxygen and PPV if needed
    • Providing chest compressions
    • Maintaining a warm environment
Seizures in the Newborn

- Most distinctive sign of neurologic disease
- Identified by direct observation in the field
  - Diagnosis is confirmed in the hospital.
- Usually related to an underlying abnormality
- Prolonged seizures may cause brain injury.
Seizures in the Newborn

- Types of seizures:
  - Subtle seizure
  - Tonic seizure
  - Focal clonic seizure
  - Myoclonic seizure

**Table 8 Causes of Neonatal Seizures**

- Hypoxic ischemic encephalopathy
- Intracranial infections (meningitis)
- Hypoglycemia
- Other metabolic disturbances
- Epileptic syndromes
- Intracranial hemorrhage
- Development defects
- Hypocalcemia
- Meningitis
- Encephalopathy
- Drug withdrawal
Hypoglycemia

• Assessment and management
  • Symptoms may be nonspecific.
  • Check blood glucose level and vital signs.
  • Manage hypoglycemia after ABCs.
  • Maintain normal body temperature.
Vomiting

- Common in newborns
- Persistent in first 24 hours may indicate:
  - Upper digestive tract obstruction
  - Increased intracranial pressure
- Vomitus aspiration may cause respiratory insufficiency or airway obstruction.
Vomiting

- Sudden, unexpected, and forceful vomiting may occur in conjunction with:
  - Asphyxia
  - Meningitis
  - Hydrocephalus
Vomiting

- Assessment and management
  - Start management with ABCs.
  - Consider decompressing the stomach.
  - May need fluid resuscitation if dehydrated
  - Place newborn on the side when transporting.
Diarrhea

• Excessive loss of electrolytes and fluid in the stool
• Causes include:
  • Poisoning
  • Gastroenteritis
  • Lactose intolerance
Diarrhea

• Assessment and management
  • Estimate:
    • Number and volume of loose stools
    • Decreased urinary output
    • Degree of dehydration
  • Patient management begins with ABCs.
Neonatal Jaundice

• Assessment and management
  • Transport is essential.
  • Start on IV fluids if neonate shows significant clinical jaundice.
  • Communicate with medical control.
Thermoregulation

- Thermoregulation limited in newborns
  - Average normal temperature of newborn—37°C (99.5°F)
  - Range for neonate—36.6°C to 37.2°C (97.9°F to 99°F)
Thermoregulation

- Heat loss occurs through:
  - Evaporation
  - Convection
  - Conduction
  - Radiation
Fever

- Rectal temperature greater than 38°C (100.4 °F)
- Newborn may not always present with fever in an illness or infection
- May be caused by overheating or dehydration.
Fever

• Limited ability to control their temperature.
• Signs and symptoms include:
  • Irritability
  • Somnolence
  • Decreased feeding
  • Warm to touch
Fever

- Assessment and management
  - Examine for rashes.
  - Obtain history.
  - Note increased respiratory rate.
- Obtain vital signs and ensure adequate oxygenation and ventilation.

Courtesy of CDC.
Hypothermia

- Drop in body temperature to less than 25°C (95°F)
- Newborns are sensitive to environmental conditions, especially after delivery.
- Investigate for infection.
Hypothermia

- Assessment and management
  - Hypothermic newborns may be:
    - Cool to the touch
    - Pale with acrocyanosis
  - Presentation may include:
    - Decreased respiratory effort
    - Apnea
    - Sclerema
Hypothermia

- Assessment and management (cont’d)
  - Preventive measures include:
    - Warming hands before touching the newborn
    - Drying thoroughly after birth
    - Placing a cap on the head.
    - Placing the newborn “skin-to-skin” with mother
Common Birth Injuries in the Newborn

- Birth trauma injuries include:
  - Those involving instruments during delivery
  - Excessive molding of the head
  - Caput succedaneum
  - Cephalhematoma
Common Birth Injuries in the Newborn

• Clavicle—most frequently fractured bone
  • Examination will show:
    • Crepitus
    • Palpable bony irregularity
    • Possible lack of arm movement on affected side
Common Birth Injuries in the Newborn

- Long bone fracture may present as loss of spontaneous arm or leg movement.
- Hypoxia and shock could be caused by birth trauma.
Assessment and Management of Cardiac Conditions in Newborns

- Rapid detection and transport are mandatory.
- Communication with medical control is critical.
Summary

• Initial steps of neonatal resuscitation include positioning and clearing the airway, stimulating the newborn to breathe, and assessing heart rate and oxygenation.

• Short- and long-term outcomes are linked to initial stabilization efforts.
Summary

• At birth, a fetus transitions from receiving oxygen from the placenta to oxygen from breathing.

• During delivery, obtain a patient history and prepare the environment and equipment you may need for neonatal resuscitation.

• The initial rapid assessment of the newborn may be done simultaneously with any interventions.
Summary

• The Apgar score determines the need for and effectiveness of resuscitation.

• Follow the neonatal resuscitation algorithm developed by the American Academy of Pediatrics and the American Heart Association.

• Thermoregulation is limited in the newborn, so take an active role in keeping body temperature in the normal range.
Summary

• If the newborn does not respond in 30 seconds after initial stabilization efforts, further intervention is needed.

• If the newborn is cyanotic or pale, administer free-flow oxygen. If the newborn has an airway obstruction, insert an oral airway. If newborn is apneic, has inadequate respiratory effort, or is bradycardic, perform bag-mask ventilation. If this does not work, endotracheal intubation is required.
Summary

- If prolonged bag-mask ventilation is used, gastric decompression with an orogastric tube is indicated.
- Perform chest compressions if the pulse rate remains below 60 beats/min.
- Emergent vascular access is necessary if fluid administration is needed for circulation support or if resuscitations medications or therapeutic drugs are to be given IV.
Summary

- Most newborns are resuscitated with effective ventilation support, but medications may be needed in some instances.
- Transport to the nearest facility once the newborn is stabilized as much as possible.
- Ongoing communication with family is necessary.
Summary

• Bradycardia in a newborn is usually from hypoxia, which can normally be reversed with effective positive-pressure ventilation.
• There is a high risk of morbidity if a newborn is delivered through meconium-stained amniotic fluid.
• Diaphragmatic hernia is an abnormal opening in the diaphragm.
Summary

• If born before 37 weeks gestation, newborns are considered premature.
• Seizures are distinctive of neurologic disease in the newborn.
• Nonbilious vomiting is common in newborns. Keep the face turned to one side to prevent further aspiration.
Summary

• If the infant has diarrhea, estimate the number and volume of loose stools, decreased urinary output, and degree of dehydration.

• If fever is suspected, observe for rashes. Obtain a careful history and vital signs. Ensure adequate oxygenation and ventilation.
Summary

• Birth trauma includes avoidable and unavoidable injuries resulting from mechanical forces during delivery. A difficult birth or injury can occur because of the newborn’s size or position during labor and delivery.

• Cardiac emergencies in newborns can come from various congenital heart diseases or malformations.
Credits

• Jones & Bartlett Learning