Neonatal Resuscitation and Stabilization

Jennifer McDaniel, BS, RRT-NPS
Thermoregulation
Strategies for Resuscitation

• Dry infant - reduce evaporative heat loss
• Place on a blanket - reduce conductive heat loss
• Radient warmer - counteracts radiant heat loss
• Protect from air currents - reduces convective heat loss
ABCs of Resuscitation

• **A – Establish an open airway**
  - Position the newborn
  - Suction the mouth, nose, and (sometimes) trachea
  - Intubate if needed

• **B – Initiate breathing**
  - Tactile stimulation
  - Positive pressure breathing (Bag and mask or ET tube)

• **C – Maintain circulation**
  - Chest compressions
  - Medications
Overview of Resuscitation
Maintenance of Airway

• Positioning
  – Slight Trendelenberg
  – Slight neck extension
  – Elevation of shoulders ¾ to 1 inch

• Suctioning
  – Mouth first, then nasal passages
  – Meconium
    • Early suctioning on perineum upon presentation of head
    • Immediate intubation following birth with suction to ETT (100 mm Hg for 3-5 seconds)
    • Repeat until clear
    • Apply PPV after clearance of meconium

• Dilemma: need for PPV vs. suctioning in severely depressed infant with meconium
Evaluation

- Respiratory effort: normal vs. gasping or apnea
  - Brief period of tactile stimulation: slapping of flicking the soles of feet or rubbing back, with blowby oxygen
  - PPV
- Heart rate: <100 bpm, PPV
- Color: central cyanosis treated with O\textsubscript{2}
Positive Pressure Ventilation (PPV)

- **Indications**
  - Apnea or gasping respirations
  - Heart rate <100 bpm

- **Requirements**
  - High FiO₂, 0.9 – 1.0
  - Proper fitting mask
  - Proper functioning bag (flow inflating or self inflating)

- **Pressures**
  - Initially as high as 30-40 cm H₂O to initiate chest expansion
  - 15-20 cm H₂O after ventilation established

- **Rate**: 40-60 bpm for 15 to 30 seconds, then evaluation for response to PPV

- Orogastric tube for abdominal decompression if bag/mask ventilation prolonged (> 2 minutes)
Evaluation of Heart Rate (HR)

• Methods
  – Stethoscope
  – Umbilical pulse

• >100 bpm: observe for return of spontaneous ventilation

• 60 and 100 bpm and increasing: continue PPV until >100 bpm

• <80 bpm and not increasing, start chest compressions

• <60 bpm, start chest compressions

• During PPV assure 100% O₂, chest excursions and adequate breath sounds
Chest Compressions
Chest Compressions

• Position: Lower third of sternum, below the nipple line
• Depth: ½ to ¾ inch – 1/3 to ½ depth of chest
• 15:2 (two rescuers); 30:2 (single rescuer)
• Evaluate after initial 30 seconds and repeat ~ every 30 seconds
• Discontinue if heart rate >80 bpm
Intubation

• **Indications**
  – Bag and mask ventilation is difficult or ineffective
  – PPV is prolonged
  – Presence of meconium in amniotic fluid

• **Blade size**
  – Term = 1
  – Premature = 0
## Endotracheal Tube Sizes

<table>
<thead>
<tr>
<th>Tube Size</th>
<th>Weight</th>
<th>Gestational Age</th>
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</thead>
<tbody>
<tr>
<td>2.5 mm ID</td>
<td>&lt;1 Kg</td>
<td>&lt;28 weeks</td>
</tr>
<tr>
<td>3.0 mm ID</td>
<td>1-2 Kg</td>
<td>28-34 weeks</td>
</tr>
<tr>
<td>3.5 mm ID</td>
<td>2-3 Kg</td>
<td>34-38 weeks</td>
</tr>
<tr>
<td>4.0 mm ID</td>
<td>&gt;3 Kg</td>
<td>&gt;38 weeks</td>
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</table>
Medications for Resuscitation

- **Epinephrine**: support circulation/blood pressure
- **Volume expanders**
- **Sodium Bicarbonate**: correct metabolic acidosis
- **Naloxone hydrochloride**: reverse depression due to narcotics
- **Dopamine**: support circulation/blood pressure
Apgar Score

Virginia Apgar (1909-1974)
Anesthesiologist
# Apgar Score

<table>
<thead>
<tr>
<th>APGAR</th>
<th>Signe</th>
<th>0</th>
<th>1</th>
<th>2</th>
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</thead>
<tbody>
<tr>
<td>Aspect</td>
<td>Coloration</td>
<td>Bleue, pâleur extrême</td>
<td>Corps rose, extrémités bleues</td>
<td>Entièrement rose</td>
</tr>
<tr>
<td>Pouls</td>
<td>Fréquence cardiaque</td>
<td>Absent (¾ 80)</td>
<td>Lent (80 - 100)</td>
<td>Normal (&gt; 100)</td>
</tr>
<tr>
<td>Grimace</td>
<td>Irritabilité réflexe (à l'aspiration pharyngée par exemple)</td>
<td>Aucune réactivité</td>
<td>Grimace</td>
<td>Crie, tousser, éternue</td>
</tr>
<tr>
<td>Activité</td>
<td>Tonus musculaire</td>
<td>Flaccidité et déflexion totale des extrémités</td>
<td>Flexion peu marquée des extrémités</td>
<td>Quadriflexion des membres, mouvements actifs</td>
</tr>
<tr>
<td>Respiration</td>
<td>Efforts respiratoires</td>
<td>Aucune respiration</td>
<td>Gasps, quelques mouvements respiratoires irréguliers et lents</td>
<td>Respiration régulière, cri vigoureux</td>
</tr>
</tbody>
</table>
## Apgar Score

<table>
<thead>
<tr>
<th>SIGN</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>1 min</th>
<th>5 min</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart Rate</td>
<td>Absent</td>
<td>Less Than 100</td>
<td>Over 100</td>
<td>2</td>
<td>2</td>
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<tr>
<td>Respiratory Effort</td>
<td>Absent</td>
<td>Slow, Irregular</td>
<td>Good Cry</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Muscle Tone</td>
<td>Limp</td>
<td>Some Flexion</td>
<td>Active Motion</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Reflex Irritability</td>
<td>No Response</td>
<td>Grimace</td>
<td>Cry</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Color</td>
<td>Pale</td>
<td>Body Pink, Extr. Blue</td>
<td>All Pink</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

**TOTAL SCORE**

6  10