Immediate Care of the Neonate

A Review For EMS Providers

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VARIETY NEONATAL INTENSIVE CARE UNIT
Objectives

- Verbalize expectations of infant transition to extrauterine life depending on gestation
- To gain an understanding of survival and outcomes with knowledge of gestational age
- Prepare for any delivery of any infant
- Fine tune your resuscitation skills in neonates
- Transport of infant safely to a tertiary facility
Which Infants Need Resuscitation?

- 10% of all newborns require some assistance to begin breathing at birth
- Less than 1% need extensive resuscitative measures to survive
- 90% of all infants delivered need no intervention to transition

Know risk factors PRIOR to delivery if possible!

- Term or Preterm? Do you know either EGA or EDC?
- Known anomalies?
- Single fetus or multiples?
- Is mom bleeding? When did it start?
- Has mom had a prior cesarean section?
- Does mom have history of Herpes 1 or 2 or other STDs?
- Is there a history of drug use?

Obtaining a good maternal history is critical to the team you ultimately hand infant off to in the ED

American Heart Association 2011
Which Infants Need Resuscitation?

- Always needed for every infant, every delivery
- Needed Less Frequently
- Rarely Needed in Newborns

Assess Risk Factors
Provide warmth
Position & Clear Airway
Dry, stimulate to breathe

Supplemental O2
Assist ventilation w/ PPV
Intubate

Chest Compressions
Medications

American Heart Association 2011
Weeks or Months of Gestation..... Does it really matter??

- 24-28 Weeks Gestation
- 29-32 Weeks Gestation
- 33-35 Weeks Gestation
- 35-37 Weeks Gestation
- 38-40 Weeks Gestation
- 41-42 Weeks Gestation
- 6-7 Months Gestation
- 7-8 Months Gestation
- 8-8.5 Months Gestation
- 8.5-9 Months Gestation
- 9-10 Months Gestation
- 10+ Months Gestation

YES! It really does matter!!
Weeks of Gestation helps prepare tertiary facility to anticipate needs of infant
Brink of Viability

22-24 Weeks

- Survival is low in this age group, but IS possible with immediate, committed, aggressive care by Neonatal experts.
- Survival is optimized by use of maternal steroids, surfactant therapy, aggressive thermoregulation, management of skin integrity, respiratory management.
Survival In America

Neonatal Death Increases with Decreasing Gestational age

*Notice slight increase in death rate in the postterm infant category

Outcome Predictor
https://www.nichd.nih.gov/about/org/der/branches/ppb/programs/epbo/Pages/epbo_case.aspx

2013 – Linked birth / Death Data

For all race and ethnic groups, infant mortality rate

<table>
<thead>
<tr>
<th>Weeks gestation</th>
<th>Terminology</th>
<th>Deaths per 1000 live births</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 32</td>
<td>Early preterm</td>
<td>163.71</td>
</tr>
<tr>
<td>32 – 33</td>
<td>Early preterm</td>
<td>16.02</td>
</tr>
<tr>
<td>34 – 36</td>
<td>Late preterm</td>
<td>7.23</td>
</tr>
<tr>
<td>37 – 38</td>
<td>Early term</td>
<td>3.01</td>
</tr>
<tr>
<td>39 – 40</td>
<td>Full term</td>
<td>1.85</td>
</tr>
<tr>
<td>41</td>
<td>Late term</td>
<td>1.8</td>
</tr>
<tr>
<td>42 or &gt;</td>
<td>Postterm</td>
<td>2.39</td>
</tr>
</tbody>
</table>

*Mathews, MacDorman, & Thoma (2015). NVSR, Vol. 64, No. 9*
Survival In America

Iowa

- Continues to have low mortality rates
- Room to improve our outcomes!

*Source: National Center Health Statistics © Statista
Survival In America

Notice:

• Prematurity and low birthweight
• Respiratory Distress
• Atelectasis
Preparation for Delivery

**WARMTH!!**

- Blankets
- Saran wrap
- Hat
- Heat source (if possible)
Thermoregulation

Use CAUTION when using heat sources for infants!

• ALWAYS use a sheet in between chemical mattresses and infants, especially preterm infants
• NEVER fill gloves with hot water to warm infants
• ALWAYS use a skin temp probe and servo (baby) mode if have access to a radiant warmer once in the ED
  • ALWAYS keep side walls up on radiant warmer beds to prevent hypothermia
Preparation for Delivery

Light
  • You NEED it!!
  • Color of infant
    • Allows for accurate assessment of circulation and perfusion
Preparation for Delivery

Airway

- Suction supplies
  - bulb syringe
  - suction catheter
- Infant ambu bag
  - Ideally with PEEP valve, pressure manometer, and pop-off valve
  - Anatomically-shaped preemie and term-sized masks
**Oxygen**

- Oxygen face mask
- Oxygen use - 100% FiO2 vs. Blended O2 for infants

**Face mask Tip:**
We often place the mask upside down on the baby’s face so the tubing does not kink or rub on the chest.

**When possible, blend O2 with medical air in order to provide the least amount of FiO2 to infant that is needed per NRP guidelines.**
Pulse Oximetry

- Place on RIGHT HAND when using ANY O2 support
  - Refer to NRP guidelines for saturation goals during resuscitation
- Place when resuscitation has moved to PPV
- Place for peace of mind during transport with or without O2
- Cover pulse ox once placed to prevent ambient light interference

<table>
<thead>
<tr>
<th>Minutes of Life</th>
<th>Goal Saturation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>60-65 %</td>
</tr>
<tr>
<td>2</td>
<td>65-70 %</td>
</tr>
<tr>
<td>3</td>
<td>70-75 %</td>
</tr>
<tr>
<td>4</td>
<td>75-80 %</td>
</tr>
<tr>
<td>5</td>
<td>80-85 %</td>
</tr>
<tr>
<td>10</td>
<td>85-95 %</td>
</tr>
</tbody>
</table>
Why place pulse ox on **RIGHT HAND**?

Proper technique:
- Place probe on right hand first, then connect probe to the machine

Right hand is fed first with oxygenated blood coming off aorta

As ductus closes, less mixing occurs to left hand and systemic circulation
Preparation for Delivery

• Freeing baby from mom
• Cord clamps
• Hemostats
• Caution with hemostats
Preparation for Delivery

Other Emergency Considerations

- Other Delivery complications
  - Meconium
  - Cord prolapse
  - Abruption
  - Preterm delivery

Equipment Considerations

- Normal Saline-10ml/Kg
- Umbilical line
- Saran Wrap
Proper use of suctioning devices

Initial steps
1. Warm, dry, stimulate to cry.....
2. CHANGE YOUR BLANKETS-keep infant warm
3. Assess breathing, clear airway
   - caution with vigorous suctioning attempts
   - suction obvious secretions
   - want to prevent creating a vagal response

   YES.... you can over suction!!
Resuscitation Skills

ABC’s
Airway...Airway...Airway.....
- Establishing an airway is key to neonatal survival
  - Bradycardia is extremely responsive to effective PPV in neonates
- Provide PPV as soon as it is recognized infant is gasping, severely labored, or apneic
- **Primary Apnea** – responds to drying and stimulation of infant
- **Secondary Apnea** – is not responsive to stimulation and will require PPV
  - Avoid excessive suctioning with bulb syringe
  - Avoid deep suctioning with catheter to “clean stomach out”
  - Assume every infant is in secondary apnea and provide PPV as soon as apnea that is unresponsive to stimulation is recognized

Airway: position and clear airway
Breathing: stimulate to breathe
Circulation: assess heart rate and oxygenation
Video Examples

Term Infant Requiring PPV

Secondary Apnea

- https://www.youtube.com/watch?v=6B00AwzjvV8
- https://www.youtube.com/watch?v=wkwan8YAI4s
Resuscitation Skills

Troubleshooting

M  Mask Adjustment

R  Reposition Airway

S  Suction Mouth and Nose

O  Open the mouth

P  Pressure – More pressure provided with each breath to achieve chest rise

A  Alternative Airway

Note: In stressful situations, attempts to provide a good mask-face seal while providing PPV to an infant may result in poor positioning and occluding the airway!

Give each other feedback in simulations to optimize bag-mask ventilation techniques
Important Birth Data

Birth Time

APGAR Score

Time PPV initiated

Time of intubation

Time to first Breath - agonal breath

Time of Chest compressions

Time of Epinephrine

APGAR SCORING SYSTEM

<table>
<thead>
<tr>
<th>Activity (muscle tone)</th>
<th>0 Points</th>
<th>1 Point</th>
<th>2 Points</th>
<th>Points totaled</th>
</tr>
</thead>
<tbody>
<tr>
<td>Absent</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arms and legs flexed</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Active movement</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Pulse</th>
<th>0 Points</th>
<th>1 Point</th>
<th>2 Points</th>
<th>Points totaled</th>
</tr>
</thead>
<tbody>
<tr>
<td>Absent</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Below 100 bpm</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Over 100 bpm</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Grimace (reflex irritability)</th>
<th>0 Points</th>
<th>1 Point</th>
<th>2 Points</th>
<th>Points totaled</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flaccid</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Some flexion of Extremities</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Active motion (sneeze, cough, pull away)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Appearance (skin color)</th>
<th>0 Points</th>
<th>1 Point</th>
<th>2 Points</th>
<th>Points totaled</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blue, pale</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Body pink, Extremities blue</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Completely pink</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Respiration</th>
<th>0 Points</th>
<th>1 Point</th>
<th>2 Points</th>
<th>Points totaled</th>
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</thead>
<tbody>
<tr>
<td>Absent</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Slow, irregular</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vigorous cry</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

| Severe depression           | 0-3      |         |          |               |
| Severe depression           | 0-3      |         |          |               |
| Moderate depression         | 4-6      |         |          |               |
| Excellent condition         | 7-10     |         |          |               |
APGAR Score

Easy to forget to keep track of time after birth

• Another way to think about the APGAR score

• Your decisions during resuscitation do not depend on score

• Score infant AFTER stabilization

<table>
<thead>
<tr>
<th>Appearance</th>
<th>Score 0</th>
<th>Score 1</th>
<th>Score 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pulse</td>
<td>No pulse</td>
<td>&lt; 100/min.</td>
<td>&gt; 100/min.</td>
</tr>
<tr>
<td>Grimace</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Activity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Respirations</td>
<td>No respirations</td>
<td>Weak, slow</td>
<td>Strong cry</td>
</tr>
</tbody>
</table>
The S.T.A.B.L.E. Program

- Sugar & Safe Care
- Temperature
- Airway
- Blood Pressure
- Lab Work
- Emotional Support
Basics of STABLE Care

- **Sugar & Safe Care**
  - Blood glucose will reflect maternal value for 30 minutes after delivery
  - Never give a baby anything more than D10W
  - Goal blood glucose level >50 mg/dL

- **Temperature**
  - Too hot or too cold will cause problems (goal of 37C/98.6F)

- **Airway**
  - Babies breathe easier when prone
  - Apnea common in preterm and sick infants

- **Blood Pressure**
  - Monitor for signs of shock
  - BP may be ok if baby is compensating; may become low abruptly and severely

- **Lab Work**
  - CBCD, CRP, blood culture, blood glucose

- **Emotional Support**
  - Provide support to family (bands/footprints/photos)
Transporting the Infant

Safest mode of transport for infant is.....?

Inside it’s mother!

When this cannot happen, infants rely on well prepared pre-hospital and interfacility care to optimize outcomes

Post stabilization:

Keep infant warm-

- Keep a hat on the infant
- Consider skin to skin contact with the mother
- Utilize saran wrap for preterm infants 32 weeks and less (approximately less than 3 pounds)
- Follow department policy on transporting infants
  - Carseat
  - Skin to skin with mother
  - Securing device on cot
Continuing Education

NRP - Neonatal Resuscitation
• 2 year certification

STABLE - Post-resuscitation/Pre-transport stabilization of infants
• 2 year certification