Stabilization of the Critically Ill Baby for Transport

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Neonatal Outreach Educator

Special thanks to
Cynthia Jensen RN, MS, CNS
Objectives

- Communicate effectively, utilize resources and execute care as a team for the best outcomes
- Understand critical steps in the stabilization of a sick neonate
- Describe the personnel, special equipment and support needed to prepare for the transport of a neonate with select diagnoses
Goal of Transport

▪ To bring the necessary personnel and equipment to the infant as quickly as possible to begin intensive care
▪ To transport the most well stabilized patient possible in a timely matter

Sick Newborns Have Increased Risk for Morbidity & Mortality during Transport for Several Reasons:

▪ They are the sickest, least stable, and often smallest infants
▪ They are usually at the most critical or unstable point in their illness
▪ Their clinical problems occur at unpredictable times and may necessitate immediate action
▪ Experienced personnel and appropriate equipment are not always available
Essentials of Transport:

- Transport personnel
- Medications and supplies
- Equipment/monitoring
- Transport vehicle
- Communication
- YOU!

Collaborate and Communicate

- Communication is the key to our success
  - Supporting the family
  - Decision making
  - Plan of care
  - Coordination of teams
  - Critical communication between the sending and receiving facilities

Why so much emphasis on communication?
Evidence Points to Early Definitive Care over Speed of Transfer

- Mindset for critically ill transports has drastically changed over last two decades
- No evidence for “scoop and run”
- Start with implementing early goal-directed therapy in transferring facilities - YOU!!

2008 Pediatric Critical Care Medicine

Sentinel Event Alert #30: Preventing Infant Death and Injury During Delivery

Issue 30: Preventing infant death and injury during delivery | Joint Commission

Sentinel Event Alert

July 21, 2004

Editor’s Note to Sentinel Event Alert Issue # 30

Please note that the Sentinel Event statistics have changed since the Sentinel Event Issue #30 was drafted. As of December 31, 2005, there are a total of 109 cases of perinatal death or permanent disability that have been reported to the Joint Commission for review under the Sentinel Event Policy. Of those 109 cases, 93 resulted in infant death and 16 cases involved major permanent disability.

Preventing infant death and injury during delivery

While a healthy and safe birth for the mother and infant is the goal for all labor and delivery units—regardless of the level of services available—in some instances, what should be a joyous, celebratory event turns to tragedy when the newborn dies. The rate of perinatal mortality in the U.S. has steadily declined to a rate of 4.9 deaths per 1,000 live births in 2003. (1) Nevertheless, since 1996, a total of 47 cases of perinatal death or permanent disability have been reported to the Joint Commission for review under the Sentinel Event Policy. Cases considered reviewable under the Sentinel Event Policy are "any perinatal death or major permanent loss of function unrelated to a congenital condition in an infant having a birth weight greater than 2,500 grams." Forty of the cases resulted in infant death and seven cases involved permanent disability. The mothers ranged in age from 13 to 41, with the average and median age being 27 years, and in just over one-half of the cases.

http://www.jointcommission.org/assets/1/18/SEA_30.PDF Retrieved July 18, 2004
**Teamwork at San Joaquin**

- How do you escalate care?
- How do you pull resources in an emergency?
- What can non NICU personnel can do for you?
  - ER
  - ICU
  - Med Surg
  - Supervisor
  - Students
  - Pharmacy

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**How to Communicate with UCSF**

- For transport requests, consults
  
  **Phone: (877) 822-4453 or (877) UC-CHILD**

- To see how a baby is doing after sending to UCSF
  
  - Send Tanya an email without the patient name and ask her to call point person with an update tanya.kamka@ucsf.edu or email valerie.huwe@ucsf.edu for maternal questions
  
  - Call Tanya **(415) 353-3912** and leave a confidential voicemail for a call back
Stabilization of the Infant

- NRP → ABCs
- Respiratory stabilization
- Adequate vascular access - *easily visualized*
- Temperature stabilization
- Hemodynamic stabilization
- Treatment of infection
- Glucose stabilization
- Special Problems

Respiratory Stabilization

- Assessment
- Work up
- Diagnostics
- Appropriate mode of support
Modes of Respiratory Support

- Oxygen
  - Nasal cannula
  - High flow nasal cannula
- Non invasive positive pressure ventilation
  - CPAP
  - SiPAP
- Intubation
- Nitric oxide

Intubation Criteria

- Worsening respiratory distress
- Increasing O2 requirement
- Apnea
- Gasping
- Specific congenital anomalies
- Who can intubate? What are your resources?
Quick Respiratory Reference

<table>
<thead>
<tr>
<th>Wt of baby</th>
<th>ETT Size mm</th>
<th>Blade Size</th>
<th>Sx Cath Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;1200</td>
<td>2.5</td>
<td>0</td>
<td>5-6 fr.</td>
</tr>
<tr>
<td>1200 - 2500</td>
<td>3.0</td>
<td>0 or 1</td>
<td>6 – 6 ½ fr.</td>
</tr>
<tr>
<td>2500 - 4000</td>
<td>3.5</td>
<td>1</td>
<td>8 fr</td>
</tr>
<tr>
<td>&gt;4000</td>
<td>4.0</td>
<td>1</td>
<td>8 – 10 fr</td>
</tr>
</tbody>
</table>

Equipment and Preparation for Intubation

- What do we need?
- Who do we need?
- Infant comfort
- Proper position:
  - ETT
  - Head
  - Tubing
  - For X-ray
Correct Placement of ETT

- 1 cm above the carina, usually T₁₋₃.
- 1-2-3 = 7-8-9 rule

Documentation After Intubation

- Size of ETT
- Number of attempts
- Tolerance of procedure
- Centimeter mark at the lip
**Infasurf**  
*(Calfactant)*  
- Bovine lung surfactant  
- Indication:  
  Prevention and treatment of respiratory distress syndrome in premature infants.  
- Dose:  
  3 ml/kg via ETT  
  May repeat Q 12 hrs X 3 as needed

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**Curosurf**  
*(Poractant Alfa)*  
- Porcine lung surfactant  
- Indication:  
  Prevention and treatment of respiratory distress syndrome in premature infants.  
- Dose:  
  2.5 ml/kg via ETT  
  May repeat 1.25 ml/kg/dose Q 12 hrs X 2 as needed  
Pneumothorax

What other signs do we see with a pneumothorax?

Pneumothorax: Potential Causes

- Vigorous resuscitation
- Over ventilation (pressures)
- Meconium aspiration
- Respiratory distress syndrome
- Pulmonary hypoplasia
Pneumothorax: Nursing Implications

- Verify by transillumination and or Chest Xray
- Assist with evacuation of air
- Assist with chest tube placement as necessary
- Remember pain and sedation as needed

Transillumination

- https://www.youtube.com/watch?v=kEydWnDMuH4
Stabilization of the Infant

- NRP→ABCs
- Respiratory stabilization
- Adequate vascular access
- Temperature stabilization
- Glucose stabilization
- Hemodynamic stabilization
- Treatment of infection
- Special Problems

Adequate Vascular Access

Most infants require some type of vascular access for transport:
- Peripheral IV
- Umbilical Arterial Catheter
- Umbilical Venous Catheter
- Central Venous Line
- Intraosseous Line
Peripheral IVs

- Resources
- Equipment
- Insertion
- Securement
- Monitoring
- Maintenance

Umbilical Lines

<table>
<thead>
<tr>
<th>Type of Line</th>
<th>UAC</th>
<th>UVC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sizes:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;1500 gms</td>
<td>3.5 Fr</td>
<td>3.5 Fr</td>
</tr>
<tr>
<td>&gt;1500 gms</td>
<td>5.0 Fr</td>
<td>5.0 Fr</td>
</tr>
<tr>
<td>Number of Lumens:</td>
<td>Single only</td>
<td>Single or Double</td>
</tr>
<tr>
<td>Best for:</td>
<td>Arterial Blood Gases</td>
<td>May give all medications and fluids IF IN GOOD PLACEMENT</td>
</tr>
<tr>
<td></td>
<td>BP monitoring</td>
<td></td>
</tr>
<tr>
<td>Ideal location on X Ray:</td>
<td>High Line: T6-T9</td>
<td>Deep line: Junction of SVC and Right Atrium</td>
</tr>
<tr>
<td></td>
<td>Low Line: L3-L4</td>
<td></td>
</tr>
<tr>
<td>Special Considerations</td>
<td>Should be transduced</td>
<td>Shallow emergency placement:</td>
</tr>
<tr>
<td></td>
<td>Not ideal for medications unless emergent needs</td>
<td>3-4 cm until blood return noted</td>
</tr>
<tr>
<td></td>
<td>Ensure all connections are tight</td>
<td>Must remove after emergency use</td>
</tr>
<tr>
<td></td>
<td>Always pull back before pushing</td>
<td></td>
</tr>
<tr>
<td></td>
<td>VERIFY placement before using</td>
<td></td>
</tr>
</tbody>
</table>
Correct UAC/UVC Placement

Waveforms and Monitoring

UVC shown at T9-T10, can be a deep line in further at junction of SVC and RA
Stabilization of the Infant

- NRP→ABCs
- Respiratory stabilization
- Adequate vascular access
- Temperature stabilization
- Glucose stabilization
- Hemodynamic stabilization
- Treatment of infection
- Special Problems

Temperature Stabilization

- 36.5 – 37.5°C axillary
- Who is at greatest risk?
- Incubator or radiant warmer
- Polyethylene wrap
- Chemical warming mattress
- Double hat or poly lined hats
Stabilization of the Infant

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Glucose Stabilization

- Ideal Glucose 50 – 110 mg/dL for sick babies
- 60 mg/dL for babies with asphyxia
- Initial infusion rates: 4 – 8 mg/kg/min. (60 – 80 cc/kg/day of D$\textsubscript{10}$W)
- Fluids D10W, no electrolytes
- May need to be adjusted based on diagnosis
## Hypoglycemia in the UCSF ICN

<table>
<thead>
<tr>
<th>Patient population</th>
<th>Blood Glucose mg/dL</th>
<th>Symptomatic</th>
<th>Asymptomatic</th>
<th>Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>All (Including NICN)</td>
<td>&lt;25 mg/dL</td>
<td>√</td>
<td>√</td>
<td>Notify MD/NNP Place IV Obtain order for: - 2ml/kg D10W bolus - D10W@80ml/kg/day</td>
</tr>
<tr>
<td>NICN Patients with Encephalopathy HIE Perinatal stroke Seizures</td>
<td>&lt;60 mg/dL</td>
<td>√</td>
<td>√</td>
<td>Notify MD/NNP Place IV Obtain order for: - 2ml/kg D10W bolus - D10W@80ml/kg/day</td>
</tr>
<tr>
<td>All Infants Identified as “at Risk” (Except NICN)</td>
<td>&lt;50 mg/dL</td>
<td>√</td>
<td></td>
<td>Notify MD/NNP IV Dextrose per order AND/OR Feeding per order</td>
</tr>
<tr>
<td>All Infants Identified as “at Risk” (Except NICN)</td>
<td>&lt;50 mg/dL</td>
<td></td>
<td>√</td>
<td>Notify MD/NNP Feeding per order AND/OR IV Dextrose per order</td>
</tr>
</tbody>
</table>

## Stabilization of the Infant

- NRP→ABCs
- Respiratory stabilization
- Adequate vascular access
- Temperature stabilization
- Glucose stabilization
- Hemodynamic stabilization
- Treatment of infection
- Special Problems
What is Shock?

▪ Shock occurs when, for any reason, systemic oxygen and nutrient supply become inadequate to meet metabolic demand

Types of Shock and Examples

▪ Pump isn’t working (cardiogenic): cardiomyopathy, rhythm disturbances, heart failure or ischemia
▪ Abnormalities within the vascular beds (distributive): sepsis, vasodilators, endothelial injury
▪ Flow restriction (obstructive): tamponade, tension pneumo, CHD
▪ Inadequate oxygen-releasing capacity (dissociative): profound anemia
▪ TANK IS EMPTY (HYPOVOLEMIC): ACUTE BLOOD LOSS, FLUID AND ELECTROLYTE LOSSES
Recognition of Shock/Hypovolemia

- Infant remains pale despite adequate oxygenation
- Heart rate may be elevated
- Normo or hypotensive
- Respiratory distress/tachypnea
- Weak peripheral pulses with adequate heart rate
- Exhibits poor response to resuscitation
- Degree of compromise related to the speed of the bleed

What Does Hypovolemia Look Like?

- Physical Exam
  - Appearance
  - Color
  - CFT
  - Pulses
  - Urine output
Volume Expanders Used to Treat Neonatal Hypovolemia

<table>
<thead>
<tr>
<th>Agent</th>
<th>Initial Dosage</th>
<th>Additional Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Isotonic sodium chloride solution</td>
<td>10-20 mL/kg intravenous (IV)</td>
<td>Inexpensive, available</td>
</tr>
<tr>
<td>Plasma</td>
<td>10-20 mL/kg IV</td>
<td>Expensive</td>
</tr>
<tr>
<td>Reconstituted blood products</td>
<td>10-20 mL/kg IV</td>
<td>Use type O negative</td>
</tr>
</tbody>
</table>

Getting Blood in Your Facility

**Remember to draw NBS if possible**

- What is the process?
- Do you need an order?
- How long does it take to get it to the bedside?
- Administration:
  - Routes?
  - How much?
  - How fast can it infuse?
  - How long does it take to see a difference in lab values?
Dopamine

- Indications:
  - Hypotension
  - Shock
  - Increase Renal Perfusion

- Dose: 5 – 20 mcg/kg/min, continuous IV infusion

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Dopamine

- Note:
  - Must have adequate intravascular blood volume before starting
  - Do not infuse into an arterial line
  - Must run in a line that will not be bolused
  - Concentration and mixing
Stabilization of the Infant

- NRP→ABCs
- Respiratory stabilization
- Adequate vascular access
- Temperature stabilization
- Glucose stabilization
- Hemodynamic stabilization
- Treatment of infection
- Special Problems

Sepsis and the Newborn: Signs and Symptoms
Clinical Presentation

▪ Central Nervous System
  • Temperature instability
  • Lethargy/irritability
  • Hypo or hypertonia
  • Seizures

Clinical Presentation

▪ Respiratory System
  • Cyanosis
  • Grunting, flaring, retracting
  • Tachypnea
  • Apnea
  • Increased oxygen requirement
Clinical Presentation

- Gastrointestinal
  - Poor feeding
  - Emesis (may be bile-stained)
  - Increased residuals (may be bile-stained)
  - Abdominal distention
  - Edema/erythema of abdominal wall
  - Diarrhea/decreased stools
  - Hepatomegaly, jaundice

Clinical Presentation

- Cardiovascular
  - Pallor, cyanosis, or mottling
  - Bradycardia/tachycardia
  - Hypotension
  - Decreased perfusion (weak pulses, cool hands & feet)
  - Edema
Clinical Presentation

- Skin
  - Rashes
  - Pustules
  - Erythema
  - Omphalitis
  - Edema

Clinical Presentation

- Hematopoietic
  - Jaundice
  - Bleeding
  - Purpura/ecchymosis
  - Splenomegaly
  - Thrombocytopenia
Clinical Presentation

▪ Metabolic
  ▪ Glucose instability
  ▪ Metabolic acidosis

Work Up and Treatment of Infection

▪ Work up
  ▪ Blood Culture
  ▪ CBC with Differential and Platelets
  ▪ CXR
▪ Ampicillin 100 mg/kg/day divided Q 12 hours
▪ Gentamicin 3.5 - 5 mg/kg/dose or
▪ Cefotaxime 50 mg/kg/dose q 8 – 12 hrs
Treatment of Infection

▪ Gentamicin dosing: birth to 1 month

<table>
<thead>
<tr>
<th>GA</th>
<th>Dose</th>
<th>Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 28</td>
<td>3.5 mg/kg/dose</td>
<td>Q 36 hrs</td>
</tr>
<tr>
<td>29-34</td>
<td>3.5 mg/kg/dose</td>
<td>Q 24 hrs</td>
</tr>
<tr>
<td>≥35</td>
<td>5 mg/kg/dose</td>
<td>Q 24 hrs (q 36 hrs for HIE &amp; significant asphyxia)</td>
</tr>
</tbody>
</table>

Stabilization of the Infant

▪ NRP→ABCs
▪ Respiratory stabilization
▪ Adequate vascular access
▪ Temperature stabilization
▪ Glucose stabilization
▪ Hemodynamic stabilization
▪ Treatment of infection
▪ Special Circumstances
Special Circumstances

- The Very Low Birth Weight Infant (VLBW)
- Intestinal Obstruction
- Esophageal Atresia and TEF
- Diaphragmatic Hernia
- Abdominal wall defect
- Myelomeningocele (Spina Bifida)
- Birth Asphyxia / HIE
- Cardiac Disease

Unique Needs of the VLBW Baby:
It’s All About Protection

- What we do during those first minutes, to hours can affect outcomes
- All systems immature and vulnerable
- General appearance
- Transition challenges
Protecting the Preemie Brain

▪ Before the birth
  • Antenatal corticosteroids
  • Magnesium sulfate

▪ During and After the birth
  • Gentle handling
  • Head position
  • Maintaining BP in normal range
  • Avoiding things that may change cerebral blood flow
  • Delayed cord clamping

ELBW brain!
**Protecting the Lungs**

- Antenatal corticosteroids
- Gentle ventilation
- The role of surfactant
- Prevention of infection (early and late onset)
- Avoidance of:
  - Barotrauma
  - Volutrauma
  - Hyperoxia

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**CPQCC Delivery Room Management Change Package:** Optimize Initial Respiratory Support

- Ventilatory strategies
  - Early use of CPAP
  - Avoid Intubation (if possible)
  - Avoid prophylactic administration of surfactant in the delivery room

Effect of Prematurity on Systems: Temperature Control

**CPQCC Delivery Room Management Change Package:** Maintain Normal Temperature (36.5-37.5°C)

- Physiologic challenges
- Iatrogenic challenges
- Emphasis on normothermia as critical to stabilization of the VLBW
- Example of warming techniques
Gastrointestinal Obstructions

- Mechanical versus functional obstruction
  - Intrinsic obstruction
    - Atresias
    - Stenoses
    - Anorectal malformations
  - Extrinsic obstruction
    - Volvulus
    - Cysts and tumors
    - Incarcerated hernias
Gastrointestinal Obstructions: Cardinal Signs and Symptoms

- Polyhydramnios
- Abdominal distention
- Bilious emesis
- Failure to pass meconium in the first 48 hours of life
Signs and Symptoms of Intestinal Obstruction
Tracheoesophageal Fistula (TEF)

**Signs and Symptoms**

- History of polyhydramnios
- Excessive mucous, “spitty”
- Cyanosis, especially with feeding
- Emesis/choking with feeds
- Inability to pass oral gastric tube
Tracheo-esophageal Malformation: Initial Management

- Airway
- Replogle to suction
- IV access
- Careful intubation
- NPO
- HOB up
- Prone

Intestinal Obstruction Stabilization

- NPO
- Abdominal exam
- KUB
- HOB elevated
- Replogle (OG) to low intermittent suction
Abdominal Wall Defects

Gastroschisis

• Herniation of bowel through a small opening to the right of the umbilicus
• Abdominal wall muscles are normal
Gastroschisis: Stabilization

• Do Not Manipulate Bowel
• Place in Vi-drape (sterile bowel or limb bag, also called a turkey bag) immediately along with some warmed normal saline, pull draw string and keep it closed
• Infant stays in Vi-drape until surgery
Omphalocele

- Failure of intestines to return from the umbilical cord into the abdominal cavity
- Male predominance
- Defects range between 2cm and 15cm
- Defect covered by transparent membrane of amnion and peritoneum
Omphalocele: Immediate Neonatal Management

- Inspect sac
- IVF, antibiotics
- Gastric decompression
- Examine for other congenital anomalies

Omphalocele
Associated Conditions with Omphalocele

- Congenital Heart Disease
- Chromosomal abnormalities
- Beckwith-Wiedemann Syndrome
- Pentalogy of Cantrell
- Prune Belly Syndrome

Abdominal Wall Defects: Stabilization

- Assess condition of bowel, perfusion
- Place infant inside sterile bag to mid chest
- Minimize heat loss
- Hydrate: Fluids at 100 – 150 cc/kg/day
- Replogle tube to LIS
- Obtain cultures and begin antibiotics
Neural Tube Defects

▪ Types:
  ▪ Anencephaly
  ▪ Meningocele
  ▪ Myelomeningocele
  ▪ Encephalocele

Meningocele

▪ Herniation of the meninges into the subcutaneous tissue of the back with overlying intact skin
Myelomeningocele

▪ Initial exam
Myelomeningocele: Stabilization

- Resuscitation side lying (preferred) or supine in donut (only if necessary)
- Visually examine myelomeningocele for cerebrospinal fluid leak, general appearance
- Maintain normothermia (36.5-37.5 °C)
- Gather supplies
Myelomeningocele: Stabilization

• Keep infant on abdomen with head of bed flat
• Avoid contamination of meningocele/dressing from stool/urine
• Make sure antibiotics are ordered and given
• Keep infant NPO, per physician order

Hypoxic Ischemic Encephalopathy

▪ What is it?
▪ What causes it?
▪ How do we recognize it?
▪ How do we treat it?
Birth Asphyxia / HIE

- Identify patients that might benefit from cooling within 6 hours of birth
- After initial resuscitation and stabilization, consider if patient is appropriate candidate.

| MUST BE: | a. ≥ 36 wk GA and ≤ 6 hrs of life |
| WITH:    | b. One or more of the following: |
|          | 1. Low apgar scores: < 5 at 10 minutes |
|          | 2. Prolonged Resuscitation: eg, chest comp, ETT/BMV at 10 min of life |
|          | 3. Severe acidosis: pH < 7.00 from cord or 1st patient gas |
|          | 4. Severe Base Excess: < -12 from cord or 1st patient gas |
| AND:     | c. Moderate to severe encephalopathy |
Birth Asphyxia / HIE

- **Moderate to severe encephalopathy** (one or more anytime within 6 hours of birth)
  - Lethargy
  - Stupor or coma
  - Hypotonia
  - Abnormal reflexes, including oculomotor or pupillary abnormalities
  - Absent or weak suck
  - Clinical seizures
  - Hyper-alert state (as a stage in the progression of encephalopathy)
  - Abnormal aEEG background and/or seizures

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Birth Asphyxia / HIE

- **Contact UCSF Access Center (877-822-4453)**
  - Discuss if patient is appropriate for cooling
  - Contact early, contact often

- **Turn down/off external heat sources and avoid hyperthermia**
  - Document time and do not actively cool patients

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Birth Asphyxia / HIE

- **Monitor core (rectal) temperature** – continuously if equipped or often
  - Target rectal temp = 33.5 C (92.3F)
  - Check temp frequently and record q 15 minutes
  - Core temp may still fall < 33.5 C with passive cooling. Be prepared to restart low heat if needed.

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Birth Asphyxia / HIE

- **Secure vascular access** – Before peripheral vasoconstriction occurs with cooling
  - UAC and UVC if possible
  - Peripheral IV at a minimum

- **Maintain adequate sedation** – Keep patient comfortable. Avoid shivering and minimize cold stress
  - Be hypervigilant about checking and maintaining blood glucose in high normal range (≥ 60mg/dL)
Birth Asphyxia / HIE

• **Treat only clinical seizures** – no prophylactic dosing
  • Lorazepam (Ativan): 0.1mg/kg/dose IV, repeat X 1 prn for suspected seizures.
  • Phenobarbital: 20 mg/kg IV load, repeat X 1 prn for confirmed seizures
  • Please note and communicate neuro exam to transport team before antiepileptic given

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Pop Quiz!

• What is the most common type of congenital anomaly?
  A. Orofacial clefting
  B. Neural tube defects
  C. Chromosomal defects
  D. Congenital heart defects
  E. Abdominal wall defects
Congenital Heart Disease

• Most common congenital defect
• Affects about 1 in 440 live births
• 40,000 babies born with CHD in the USA each year
  • One third of these infants have critical heart disease that will require immediate intervention

Congenital Heart Disease

• Recognition of the infant with CHD
• Maternal factors:
  • Chromosomal abnormalities
  • Underlying disease
  • Infection
  • Medications
  • Drug use
Congenital Heart Disease: **Danger Signs**

- Severe hypoxemia (PaO₂ may be < 30)
- Central cyanosis
- Decreased peripheral pulses
- Pale, mottled, cool extremities
- Prolonged CFT > 3 secs
- Murmur (depends on the defect)
- BP gradient upper vs. lower extremities
- Increased respiratory rate with or without increased WOB

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What is a Murmur?
CHD General Guidelines

• Not all newborns with murmurs have CHD
• Not all newborns with CHD have murmurs
• Not all CHD presents in the newborn period
• It is often difficult to differentiate CHD from respiratory disease or sepsis

  • UCSF Housestaff Manual

Rule-Out Cardiac Disease

CXR

• Size and shape of the heart
• Pulmonary vasculature
• Condition of the lungs
Rule-Out Cardiac Disease

Normal Heart

Cardiac Assessment

- Vital Signs
  - Temperature
  - Heart rate
  - Respiratory status
  - Blood pressure
  - O2 Sats*
Beyond Screening: Symptoms of Serious CHD

- Central cyanosis
- Respiratory distress
- Decreased pulses or unequal pulses
- Bounding pulses
- Unexplained metabolic acidosis
- Poor perfusion
- Shock

Acyanotic Lesions

- Generally produce a left to right shunt
- Enough oxygenated blood in the circulation
- Increases workload on the heart over time
- Types:
  - ASD
  - VSD
  - PDA
  - AV Canal
Cyanotic Heart Disease

• Right to left shunt may be present
• May have decreased pulmonary blood flow
Cyanotic Heart Disease

- Presentation
  - Central Cyanosis
  - Feeding issues
  - Murmurs?
  - CHF
  - Pulmonary Hypertension
  - Decreased blood pressure lower limbs
  - CXR Left ventricular hypertrophy

Hypoplastic Left Heart Syndrome
Rule-Out Cardiac Disease

- ABG
- CXR & ECG
- 4 Extremity blood pressures
- Pre & Post-ductal gases
- 100% Oxygen challenge
- Evaluate the need for PGE₁

Cyanotic Heart Disease: Stabilization

- Consult with Neonatologist/ Cardiology
- PGE₁
- Correct acidosis
- Support all systems
PGE$_1$ Side Effects

- Apnea
- Fever & WBC changes – consider CBC, blood culture, & starting antibiotics.
- Jitteriness and Irritability
- Hypotension
- Normal starting dose:
  - 0.05-0.1 mcg/kg/min

We Are Here for You!

- Resources
  - Tanya Kamka, Neonatal Outreach Educator
    - tanya.kamka@ucsf.edu, 415-353-3912
  - Pediatric access center
  - UCSF ICN
    - (415) 353-1565
References

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