Newborn Screening to Identify Critical Congenital Heart Disease (CCHD)

Satellite Conference and Live Webcast
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Faculty

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Disclosures

- **No relevant financial relationships or conflict of interest in relation to this program.**

Learning Objective

- **Describe pulse oximetry screening used to identify babies with a critical congenital heart defect to include screening, equipment, training, and reporting requirements**

Mission Statement

- **All babies born in Alabama receive a newborn screen, and infants with presumptive positive results are tracked to ensure early identification of a condition so that life-saving treatment and intervention be provided as soon as possible**

What is Newborn Screening?

- **Public health service that can change a baby's life and includes the blood spot screen, hearing screen, and pulse oximetry screen**
- **The practice of testing all babies for certain harmful or potentially fatal genetic, hormonal, or congenital disorders that are typically not apparent at birth**

What is Newborn Screening?

- Screening is not intended to be diagnostic and newborns with suspicious findings must undergo further testing and clinical evaluation

What is Pulse Oximetry Screening?

- Simple, non-invasive and painless test that is used to measure how much oxygen is in the blood
- Helps identify a baby with congenital heart disease before leaving the newborn nursery
- Often thought to be a basic vital sign
- A pulse ox reading of 95 to 100 percent is normal in healthy infants

What is Congenital Heart Disease (CHD)?

- Most common birth defect
- Problem in the structure of the heart that results in improper blood flow through the heart
- Requires treatment, usually surgical intervention, in the first year of life
- Causes not always known

What is Critical Congenital Heart Disease (CCHD)?

- Types of heart defects that lead to low levels of oxygen in a newborn
- May be identified using pulse oximetry screening
- Classified into seven defects:
  1. Hypoplastic left heart syndrome
  2. Pulmonary atresia (with intact septum)

What is Critical Congenital Heart Disease (CCHD)?

3. Tetralogy of Fallot
4. Total anomalous pulmonary venous return
5. Transposition of the great arteries
6. Tricuspid atresia
7. Truncus arteriosus

Why is Pulse Oximetry Used for CHD?

- Only method used to screen for CHD
- Recommended by the US Department of Health and Human Services, American Academy of Pediatrics, and the American College of Cardiology
- Physical examination is only 50 percent effective in detecting CHD after the baby is born

Why is Pulse Oximetry Used for CHD?

- CCHD can bring a significant risk of morbidity and mortality, risk being greater if an infant is not diagnosed soon after birth

Did You Know?

- Newborn screening is one of the most significant, lifesaving public health achievements of the 20th century according to the Centers for Disease Control and Prevention because it results in life-saving treatment and intervention for approximately 12,000 newborns each year in the United States

Did You Know?

- About 1 in 125 newborns have a congenital heart defect

CCHD Timeline

- October 2009 – CCHD was nominated
- January 2010 – Nomination reviewed and approved
- May 2010 – Evidence review
- September 2010 – Approved by committee to be added
- September 2011 – Secretary of Health approved

When Did CCHD Screening Begin in Alabama?

- CCHD workgroup convened on November 30, 2011 and December 13, 2011
- Pulse oximetry screening implemented voluntarily in April 2012
- Added to the Alabama panel on June 21, 2013

Hospital Guidelines

- May 2012 – Guidelines were developed
- Adapted from Children's National Medical Center CCHD Screening Toolkit, 2009
- Purpose to provide information for screening, training, and reporting results

Equipment

- **Equipment should be compliant with national standards and adhere to the following:**
  1. **Motion-tolerant and report functional oxygen saturation**
  2. **Validated in low-perfusion conditions**
  3. **Cleared by the FDA for use in newborns**
  4. **Two percent root, mean-square accuracy**
  5. **Calibrated regularly based on manufacturer guidelines**

Children's National Medical Center. Congenital Heart Disease Screening Program Toolkit; 2nd Edition, 2009.

Training

- **Performed by qualified personnel**
- **Should be hands-on and competency based**
- **Should include:**
  1. **Overview of screening protocol**
  2. **Education on the use, care, maintenance, and trouble-shooting of equipment**
  3. **Review of general nursery policies and procedures**

Children's National Medical Center. Congenital Heart Disease Screening Program Toolkit; 2nd Edition, 2009.

Training

4. **Education on the differences between adult and pediatric oximeter probes**
5. **Explanation on the importance of adequate circulation**
6. **Effects of hypothermia and phototherapy on pulse ox screening**
7. **Resources for pediatric echocardiogram**

Children's National Medical Center. Congenital Heart Disease Screening Program Toolkit; 2nd Edition, 2009.

Education Program Components

- **Education Program Components:**
  1. **Pulse Ox Probe Placement Education**
  2. **Education for Providers – Dos and Don'ts**
  3. **Knowledge Assessment Quiz**
  4. **Competency Checklist**

Children's National Medical Center. Congenital Heart Disease Screening Program Toolkit; 2nd Edition, 2009.

Pulse Oximetry - Dos

- **Disposable probes: use a new, clean probe for each infant.**
- **Reusable probes: clean the probe with recommended disinfectant solution between each infant.**
- **Best sites are around the palm and the foot.**
- **There should be no gaps between the sensor and the infant's skin.**

Children's National Medical Center. Congenital Heart Disease Screening Program Toolkit; 2nd Edition, 2009.

Pulse Oximetry - Dos

- **Ensure infant is calm and warm during the screening.**
- **Conduct screening while infant is awake.**
- **Swaddle the infant and encourage family involvement to promote comfort.**

Children's National Medical Center. Congenital Heart Disease Screening Program Toolkit; 2nd Edition, 2009.

Pulse Oximetry – Don'ts

- **Never use an adult pulse ox sensor when obtaining a pulse ox reading for an infant.**
- **Never attempt to obtain a pulse ox reading on the same extremity that you have a blood pressure cuff.**
- **Ensure the infant is not placed in bright or infrared light while pulse ox is being performed.**
- **Do not use tape to apply the pulse ox probe to the infant's skin.**

Children's National Medical Center. Congenital Heart Disease Screening Program Toolkit; 2nd Edition, 2009.

Pulse Oximetry - Caution

- **The pulse is needed to determine the oximetry reading. Pulse ox is not accurate if the patient is coding or is having a cardiac arrhythmia. Remember: No pulse, no oximetry!**
- **Pulse ox readings are not instantaneous. The oximetry reading that is displayed on the monitor is an average of readings over the past few seconds.**

Children's National Medical Center. Congenital Heart Disease Screening Program Toolkit; 2nd Edition, 2009.

Supplies for Screening

- **Pulse oximeter – motion tolerant**
- **Infant disposable or reusable pulse ox sensors**
- **Rolling cart for supplies**
- **Data Collection Form**
- **Trained individual to perform screening**
- **Blankets for warming the infant and blocking extraneous light**
- **A parent for comforting infant during screening**

Pulse Oximetry Screening

- **Confirm infant is 24-48 hours of age**
- **Help the parent to warm and calm the baby**
- **Baby should be on room air**
- **Select a site on the right hand and one foot that is clean and dry**
- **Place the pulse ox probe and perform the pulse ox test**

Children's National Medical Center. Congenital Heart Disease Screening Program Toolkit; 2nd Edition, 2009.

Immediate Fail: Pulse Ox less than 90%

- **Notify the doctor caring for the baby immediately**
- **Perform immediate evaluation for causes of hypoxemia including infectious and pulmonary pathology**
- **If no other etiology is found, immediate echocardiogram interpreted by a pediatric cardiologist is indicated**
- **Report failed results to public health**

Reporting Form

- **Place patient label on form or complete demographic information**
- **Complete screening results**
- **Fax failed screening results to (334) 206-3791**


Failed Pulse Ox Screen Reporting Form

PLACE LABEL OR PRINT IN INFORMATION

Alabama Newborn Screening Program

Fail: Pulse Ox 90-94

- **Repeat screen in one hour**
- **If fail for a second time, repeat screen for a third time in an hour**
- **If fail for a third time, notify the doctor caring for the baby immediately**
- **Perform comprehensive evaluation for causes of hypoxemia including infectious and pulmonary pathology**

Fail: Pulse Ox 90-94

- **If no other etiology is found, consultation with pediatric cardiology or neonatology is indicated to arrange for a diagnostic echocardiogram to be interpreted by a pediatric cardiologist**
- **Report results to public health**