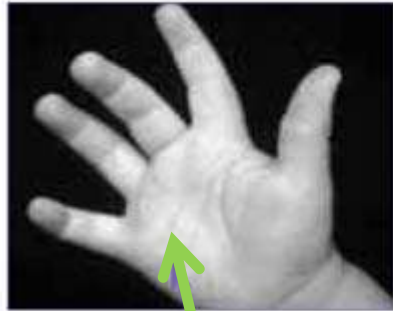


MICHIGAN CCHD SCREENING

PULSE OX PROBE PLACEMENT

PULSE OX PROBE PLACEMENT EDUCATION

1. Select application site on the outside, fleshy area of the infant's right hand and one foot.



RH Application Site



Foot Application Site

2. Place the photo detector portion of the probe on the fleshy portion of the outside of the infant's right hand or foot.
3. Place the light emitter portion of the probe on the top of the right hand or foot.
4. Remember the photo detector and light emitter must be directly opposite each other in order to obtain an accurate reading.
5. Secure the probe to the infant's right hand or foot using the adhesive or foam tape recommended by the vendor. It is not recommended to use tape to secure probe placement.
6. Some vendors use visual images such as a star or bar to specify which side of the probe should be placed on the top of the hand or foot.

Pulse oximetry equipment used for CCHD Screening:

- Must be approved by the FDA for use in newborns.
- Must be validated in low-perfusion conditions.
- Must have 2% root, mean-square accuracy.
- Must be calibrated regularly based on manufacturer guidelines.



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FDA CLEARANCE FOR PULSE OXIMETER USE IN NEONATES

<http://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfpmn/pmnm.cfm>

MICHIGAN CCHD SCREENING

PERFORMING PULSE OX- DOs & DON'Ts

PULSE OX DO's

1. If you are using disposable pulse ox probes, use a new, clean probe for each infant. If you are using reusable pulse ox probes, clean the probe with recommended disinfectant solution between each infant. Dirty probes can decrease the accuracy of your reading and can transmit infection. A disposable wrap should be used to secure the probe to the site.
2. The best sites for performing pulse ox on infants are around the palm and the foot. An infant pulse ox probe (not an adult pulse ox clip) should always be used for infants.
3. When placing the sensor on the infant's skin, there should not be gaps between the sensor and the skin. The sides of the probe should be directly opposite each other.
4. Nail polish dyes and substances with dark pigmentation (such as dried blood) can affect the pulse ox reading. Assure that the skin is clean and dry before placing the probe on the infant. Skin color and jaundice do not affect the pulse ox reading.
5. Movement, shivering and crying can affect the accuracy of the pulse ox reading. Ensure that the infant is calm and warm during the reading. Swaddle the infant and encourage family involvement to promote comfort while obtaining the reading. If possible, conduct screening while the infant is awake.
6. Pulse oximeters have different confidence indicators to ensure that the pulse ox reading is accurate. Determine the confidence indicators for the pulse oximetry equipment that you are using.
7. If an infant requires pulse ox monitoring for an extended amount of time, assess the site where the probe is placed at least every two hours. Monitor for signs of irritation and burning of the skin.

PULSE OX DON'Ts

1. Never use an adult pulse ox clip to obtain a reading for an infant. Using an adult clip on an infant will produce inaccurate results.
2. Blood flow is needed to obtain an accurate pulse ox reading. Never attempt to obtain a pulse ox reading on the same extremity where an automatic blood pressure cuff is located.
3. Bright or infrared light, including bilirubin lamps and surgical lights, can affect the accuracy of the reading. Ensure that the infant is not placed in bright or infrared light while pulse ox is being performed. You may cover the pulse ox probe with a blanket to ensure that extraneous light does not affect the accuracy of your reading.
4. Do not use tape to apply the pulse ox probe to the infant's skin.

PULSE OX CAUTION

1. A pulse is needed to determine the oximetry reading. Pulse ox is not accurate if the patient is coding or has a cardiac arrhythmia. Remember: No pulse, no oximetry!
2. 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.



CRITICAL CONGENITAL HEART DEFECTS:

*Pulse oximetry screening is **most likely** to detect seven of the CCHDs.*

These seven main screening targets are:

D-transposition of the Great Arteries

A heart in which the two main arteries carrying blood away from the heart are reversed. In a normal heart the blood flows in a cycle: body-heart-lungs-heart-body. When a d-transposition occurs, the blood pathway is impaired because the two arteries are connecting to the wrong chambers in the heart.

Tetralogy of Fallot

A heart defect that features four problems. They are: a hole between the lower chambers of the heart; an obstruction from the heart to the lungs; the aorta (blood vessel) lies over the hole in the lower chambers; and the muscle surrounding the lower right chamber becomes overly thickened.

Total anomalous pulmonary venous return (TAPVC)

A defect in the veins leading from the lungs to the heart. In TAPVC, the blood does not take the normal route from the lungs to the heart and out to the body. Instead, the veins from the lungs attach to the heart in abnormal positions and this problem means that oxygenated blood enters or leaks into the wrong chamber.

Truncus Arteriosus

When a person has one large artery instead of two separate ones to carry blood to the lungs and body. In a normal heart, the blood follows in a cycle: body-heart-lungs-heart-body. When a person has a truncus arteriosus, the blood leaving the heart does not follow this path. It has only one vessel, instead of two separate ones for the lungs and body. With only one artery, there is no specific path to the lungs for oxygen before returning to the heart to deliver oxygen to the body.

Hypoplastic Left Heart Syndrome (HLHS)

An underdeveloped left side of the heart. The aorta and left ventricle are too small and the holes in the artery and septum did not properly mature and close.

Pulmonary Atresia

A non-existent pulmonary valve, so that the only blood receiving oxygen is the blood that is diverted to the lungs through openings that normally close during development.

Tricuspid Atresia

A missing tricuspid valve in the heart so blood cannot flow from the body into the heart in the normal way. The blood is not being properly refilled with oxygen and it does not complete the normal cycle of body - heart - lungs - heart - body.



*These defects are **less likely** to be detected through pulse oximetry screening:*

Coarctation of the Aorta

A narrowing of the major artery (the aorta) that carries blood to the body.

This narrowing affects blood flow where the arteries branch out to carry blood along separate vessels to the upper and lower parts of the body. CoA can cause high blood pressure or heart damage.

Ebstein Anomaly

A malformed heart valve that does not properly close to keep the blood flow moving in the right direction. Blood may leak back from the lower to upper chambers on the right side of the heart. As a result, the right atrium becomes enlarged. If the tricuspid regurgitation (leak) is severe enough, congestive heart failure can result. This syndrome also is commonly seen with an atrial septal defect, or ASD (a hole in the wall dividing the two upper chambers of the heart).

Double-outlet right Ventricle

In double outlet right ventricle, something goes wrong during the formation of the heart and both great arteries are attached to the right ventricle. No arteries, or only a part of the aorta, are attached to the left ventricle. In some cases, because more blood than normal is flowing into the right ventricle, this heart defect means that too much blood is pumped to the lungs. Over time this uncontrolled flow can damage the lungs and heart, and heart failure can result.

Interrupted aortic arch

An absence or discontinuation of a portion of the aortic arch. IAA is classified by the site of the interruption, and is thought to be a result of faulty development of the aortic arch system during the fifth to seventh week of fetal development. This defect is almost always associated with a large ventricular septal defect (VSD).

Single ventricle

The term "single ventricle anomaly" is purposely non-specific. It is used to describe a group of cardiac defects that may differ quite dramatically from each other but share the common feature that only one of the two ventricles is of adequate functional size. Because of this feature, the ultimate plan for reconstruction is actually quite similar for most of these anomalies. All will generally undergo staged reconstructive procedures.



References:

American Heart Association. (2013). About Congenital Heart Defects. Available from <http://www.heart.org/HEARTORG/Conditions/CongenitalHeartDefects/AboutCongenitalHeartDefects>
Cincinnati Children's Hospital. (2013). Heart Institute Encyclopedia: Congenital Heart Defects. Available from <http://www.cincinnatichildrens.org/patients/child/encyclopedia/defects/default/>

***Images and Video of Defects available online from above resources. ***



MICHIGAN CCHD SCREENING SUGGESTED RESOURCES FOR PROVIDERS

**Michigan Department of
Community Health**
www.michigan.gov/cchd

American Academy of Pediatrics
www.aap.org
AAP Strategies for Implementing Screening
<http://pediatrics.aappublications.org/content/128/5/e1259.full.html>

American Heart Association
www.aha.org

**Children's National Medical Center-
Washington DC***
(Videos available for parents and providers)
www.childrensnational.org

**Children's Hospital of Philadelphia
(CHOP)***
www.chop.edu

Atlanta Children's Hospital *
(CCHD Mobile App available)
www.pulseoxtool.com

Cincinnati Children's Hospital *
www.cincinnatichildrens.org

**Center for Disease Control and
Prevention**
www.cdc.org

**Congenital Heart Information
Network***
www.tchin.org/professionals/index.htm

Baby's First Test*
(Videos available for parents and
providers)
www.babysfirsttest.org

**Inclusion on the list does not necessarily imply endorsement, nor do we guarantee the accuracy of the information contained on these sites. Always consult your institution and its physicians with questions and concerns.*

MICHIGAN Treatment Centers for CCHD:

**Children's Hospital
of Michigan**

DMC DETROIT MEDICAL CENTER

Children's Hospital of Michigan
3901 Beaubien
Detroit, MI 48201
(313) 745-KIDS
1-888-362-2500
www.childrensdmc.org

Helen DeVos
children's hospital
OF SPECTRUM HEALTH

**Helen DeVos Children's Hospital
Congenital Heart Center**
100 Michigan Street NE, Floor 10,
Grand Rapids, Michigan 495031
616-267-9150
866.989.7999
www.helendevoschildrens.org



**University of Michigan
C.S. Mott Children's Hospital**
**Congenital Heart Center at
C.S. Mott Children's Hospital**
1540 East Hospital Drive Floor 11
Ann Arbor MI 48109
1-877-308-9111
www.mottchildren.org

