Implementation of Newborn Screening for Critical Congenital Heart Disease (CCHD) in New York State

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Learning Objectives

- Recognize the public health significance of CCHD in NYS.
- Describe the requirements for universal CCHD screening of infants born at home or in a NYS hospital.
- Discuss the availability of NYS information resources about CCHD for parents and guardians.
- Recognize the CCHD conditions that could be associated with a low oximetry result.
- Identify the best practices process for CCHD implementation in a hospital based setting.
- Identify challenges for CCHD implementation in NYS.

Disclosure Statements

The planners and presenters do not have any financial arrangements or affiliations with any commercial entities whose products, research or services may be discussed in this activity.

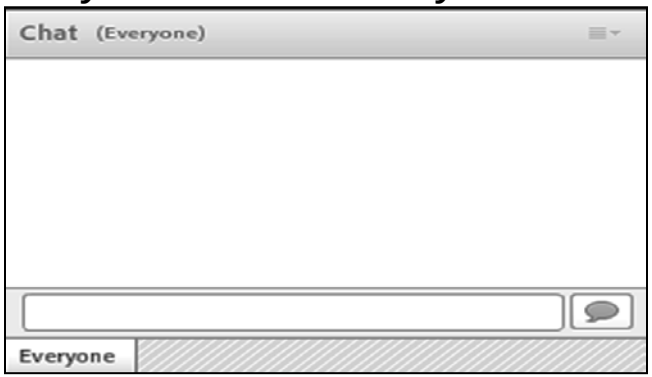
No commercial funding has been accepted for this activity.

Continuing Education Credits

- Credits available: CME, CNE, and CHES
- To obtain continuing education credits, participants must complete an evaluation and score 80% of above on the post-test.
- A link to the evaluation and post-test will be available after the webinar.
- Continuing education credits are available for this webinar until February 2016.

Webinar Guidelines

- You will listen to the audio through your computer speakers. Please make sure they are turned on and turned up.
- Adobe Features you will use today:
  - Chat Box
  - Polls



- Type any questions you have into the chat box, and they will be answered at the end of session.
- Today's session is being recorded

Disclosures

- Dr. Kacica has nothing to disclose.

Implementation of Newborn Screening for Critical Congenital Heart Disease (CCHD) in New York State

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WHAT IS THE PUBLIC SIGNIFICANCE OF CCHD?

- 2-3 out of 1,000 live births have Critical Congenital Heart Disease (CCHD)
- ~300 children in New York State are born with CCHD each year
- 17% of these children will die in the first year of life
- Universal screening may prevent up to 50 infant deaths each year in New York State

Number/Prevalence of NYS Children with CCHD, Including Number (%) that Died in First Year Birth Year, 2007-2009

Type of CCHD	Number	Prevalence* *Per 10,000 live births	N (%) that Died in First Year	Average Annua cases
astic left heart syndrome	192	2.61	72 (37.5%)	64
ary atresia (intact septum without VSD)	50	0.68	8 (16.0%)	17
Tetralogy of Fallot	357	4.85	26 (7.3%)	119
malous pulmonary venous return (TAPVR)	87	1.18	14 (16.1%)	29
osition of Great Arteries	277	3.76	55 (19.9%)	92
Tricuspid atresia	41	0.56	8 (19.5%)	14
Truncus arteriosus	36	0.49	6 (16.7%)	12
Total by Defect**	1040	14.11	189 (18.2%)	347
Total by Child**	916	12.43	158 (17.3%)	305

ren had more than one CCHD

BACKGROUND

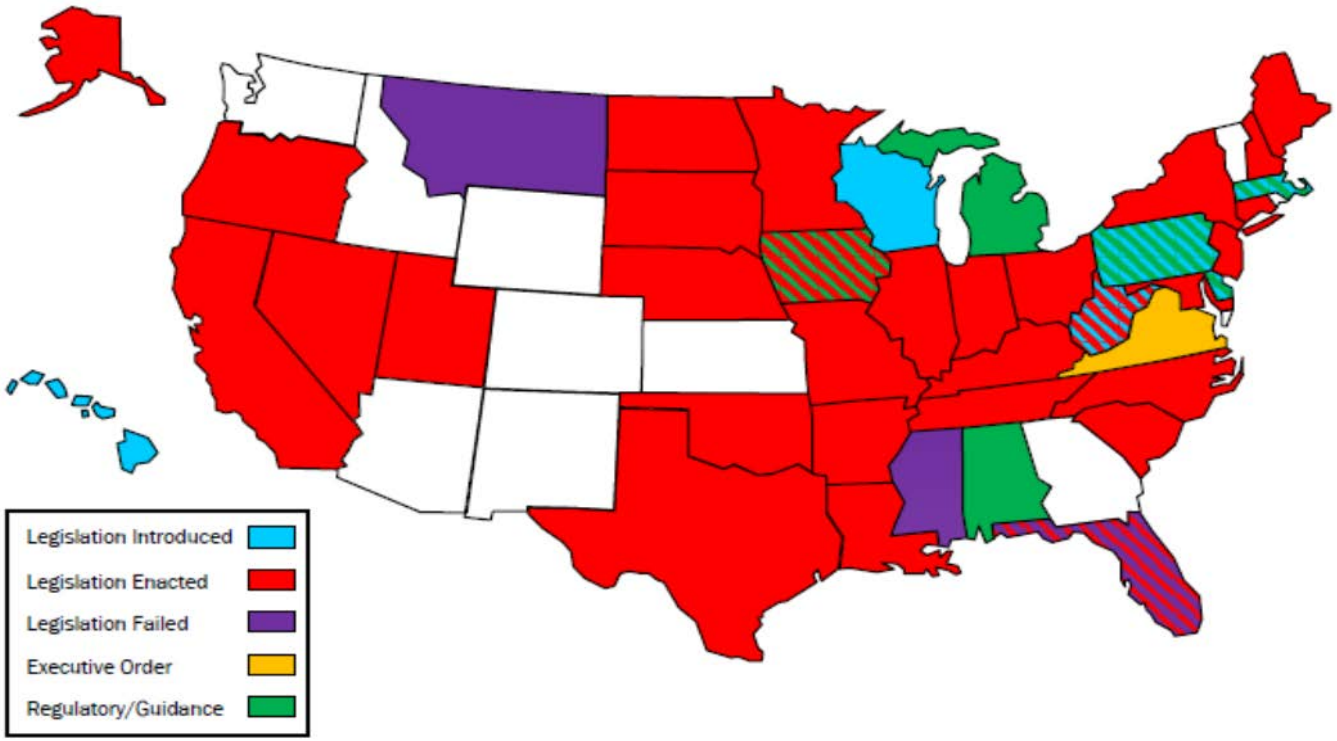
National Recommendations for CCHD Screening

- September 2010
  - Final draft of comprehensive evidence based report on CCHD presented to the federal Maternal & Child Health Bureau at HRSA
  - Secretary's Advisory Committee on Heritable Disorders in Newborns & Children (SACHDNC) voted to add CCHD to the Recommended Uniform Screening Panel (RUSP)

- September 2011
  - Secretary Sebelius adopted the SACHDNC's recommendation to add CCHD to the Newborn RUSP

American Academy of Pediatrics
NEWBORN SCREENING FOR CRITICAL CONGENITAL HEART DISEASE (CCHD)–2013 STATE ACTIONS

(As of December 23, 2013)



LEGISLATION INTRODUCED

NYS PUBLIC HEALTH LAW 2500-a.(a)
Effective January 27, 2014
Mandates pulse oximetry screening in NYS

- Facilities caring for infants 28 days or less and the person registering the birth of a child to test for CCHD through pulse oximetry screening

- Pulse oximetry screening should be performed after the baby is 24 hours old and < 48 hours of life

- Information to be disseminated to the parents and guardians of the infant tested

Note: Parents may object to testing based upon religious teachings/tenets

NYS Recommendations for CCHD Screening to Providers

- ❑ Document screening results in medical record
- ❑ Assure appropriate referrals for diagnostic evaluation
- ❑ Collect appropriate follow up data as to assure that all babies are screened and receive needed treatment
- ❑ Report cases of diagnosed CCHD to Congenital Malformations Registry

New York State's
Congenital Malformation Registry
Data Submission for Reporting Cases of CCHD

HCS for CMR Data Submission

NYS Recommendations Regarding Follow-Up Data for Pulse Oximetry Screening

- Data & time of screening
- Screening results (pass/fail)
- Referral to medical provider after failed screen (Y/N)
- Identification of an infant with CCHD by another means (prenatal U/S, clinical signs prior to pulse ox screening)
- Diagnostic results
- Parent refusal of screening

NYSDOH Role in the Implementation of Newborn Screening for CCHD

- Provided notice in January 2014 to health care providers (hospitals, physicians, nurse midwifes) via Health Commerce System about requirements for screening and reporting of diagnosed CCHD cases

- Developed NYS tools and resources
  - Algorithm (distributed with provider notice)
  - Series of Parent information Resources
  - CCHD Screening Page on NYSDOH website: **http://www.health.ny.gov/community/infants_children/critical_congenital_heart_disease_screening/**

NEW YORK
state department of
HEALTH

Nirav R. Shah, M.D., M.P.H.
Commissioner

Sue Kelly
Executive Deputy Commissioner

January 2014

To: Hospital Administrators, Chief Medical Officers and Health Care Providers

From: Marilyn A. Kacica, M.D., M.P.H, NYSDOH, Division of Family Health

Alert to NYS Birthing Facilities Regarding Universal Newborn Screening for Critical Congenital Heart Disease

Please distribute to all staff in Obstetrics & Gynecology, Midwives, Pediatricians, Pediatric Cardiologists and Neonatologists. Please also share with your non-hospital based colleagues.

This notice contains information about new requirements for birthing facilities regarding screening for critical congenital heart disease in newborns.

Congenital heart diseases (CHD) are the most common type of birth defects in children and occur in 8 per 1,000 live births[i]. About 25% of all CHDs are considered critical congenital heart diseases (CCHDs). Children with CCHD have an increased chance of developing serious complications during the first few days or weeks of life.[ii] Each year almost 300 New York State children are born with CCHD and 17% of these children die in the first year of life.

Pulse oximetry is an effective method of screening all newborns for CCHD and can reduce the number of infants who are undiagnosed. The purpose of pulse oximetry screening is to detect CCHD **before** clinical deterioration of the infant.

Child in well-baby nursery* at 24-48 hours of age (or shortly before discharge if < 24 hours of age)

RH = Right Hand
F = Foot

Screen

<90 % in RH or F Fail Do not rescreen	90-94 % in RH and F or >3 % difference between RH and F	≥ 95 % in RH or F and ≤ 3% difference between RH and F

Repeat Screen in one hour

<90 % in RH or F Fail Do not rescreen	90-94 % in RH and F or >3 % difference between RH and F	≥ 95 % in RH or F and ≤ 3% difference between RH and F

Repeat Screen in one hour

<90 % in RH or F Fail Do not rescreen	90-94 % in RH and F or >3 % difference between RH and F	≥ 95 % in RH or F and ≤ 3% difference between RH and F

FAIL

- Notify responsible medical practitioner about failed screen.
- PCP should conduct **clinical assessment** for causes of low oxygen (sepsis, pneumonia, pulmonary hypertension). In absence of clear cause for low oxygen, get echocardiogram within 24 hours. This may require transfer or telemedicine.
- **If saturation is <90% in either the hand or foot, the baby should have immediate clinical assessment and referral to pediatric cardiology. In this case, do not wait and rescreen.**

PASS

- Pass on the screen does not exclude the existence of a cardiac disorder.
- If cardiac evaluation is otherwise indicated (e. g. clinical signs, prenatal diagnosis of critical congenital heart disease, dysmorphic features, etc.) proceed with cardiac evaluation even if infant receives a pass on the pulse oximetry screen.

NYS CCHD Screening Parent Resources

- ❑ General CCHD Screening Fact Sheet
- ❑ Second Fact Sheet explaining
  - ❖ What Does a Low Result Mean?
- ❑ Congenital Heart Defect Resources Fact Sheet

File Edit View Window Help

Congenital Heart Defects Resources

Explore these resources to find information, products, services and support for children with congenital heart defects and their families.

Cardiology Services

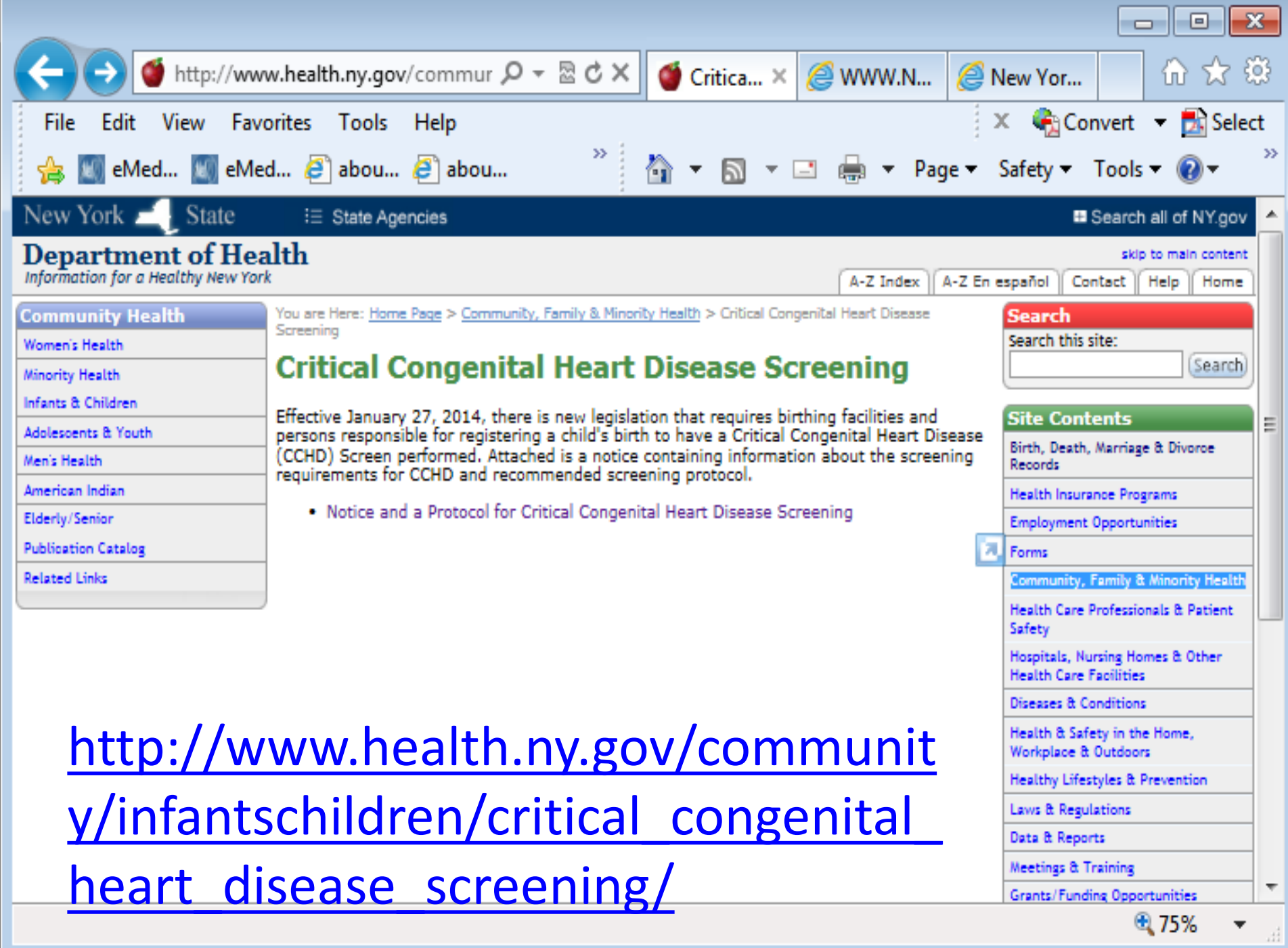
- **Congenital Heart Information Network (C.H.I.N.):** tchin.org
- **It's My Heart:** www.itsmyheart.org
- **Kids with Heart National Association for Children's Heart Disorders:** kidswithheart.org

General Information

- **American Heart Association (AHA)** www.heart.org
- **Centers for Disease Control and Prevention (CDC)** www.cdc.gov
- **Mayo Clinic:** www.mayoclinic.com
- **National Birth Defects Prevention Study (NBDPS)** www.nbdps.org
- **National Heart, Lung and Blood Institute (NIH):** www.nhlbi.nih.gov

Care packages: Deliver gifts & supplies during a child's hospital stay

- **Mended Little Hearts** www.mendedlittlehearts.org
- **Saving Little Hearts** www.savinglittlehearts.com



http://www.health.ny.gov/community/infantschildren/critical_congenital_heart_disease_screening/

Poll Question

Is information on CCHD screening currently being given to parents or guardians by your facility or organization?

a)Yes

b) No

c) N/A

Robert Koppel M.D.

CCHD Implementation, Cardiac Anomalies Associated with CCHD

and Best Practices

Physician's Point of View

New York State Department of Health CCHD Screening Webinar June 9, 2014

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North Shore LIJ - Hofstra University School of Medicine

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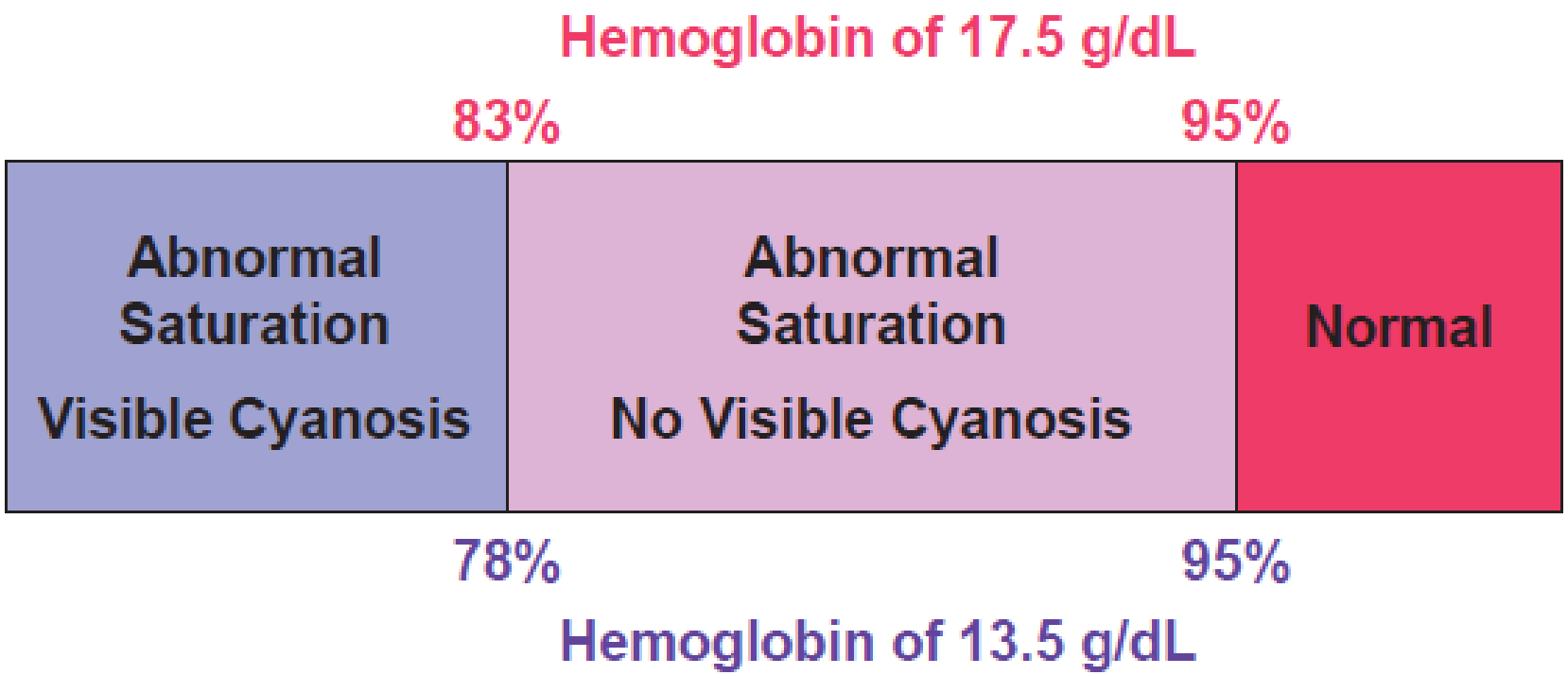
Disclosures

- Dr. Koppel has nothing to disclose.

Reliability

The Cyanotic "Blind Spot"



Hokanson, Neonatology Today 2010;5(12):1-6.

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Reliability of Pulse Oximetry Screening for CCHD

- Meta-analysis of 13 eligible studies with data for 229,421 newborn babies

- Sensitivity: 76.5% (95% CI 67.7 – 83.5)
- Specificity: 99.9% (95% CI 99.7 – 99.9)
- False-positive rate: 0.14% (95% CI 0.06 – 0.33)

Thangaratinam et al. *The Lancet*,, 2 May 2012 doi:10.1016/S01406736(12)60107-X

Reliability of Pulse Oximetry Screening for CCHD

- The false positive rate was particularly low when pulse oximetry was done after 24 hours from birth compared to being done before 24 hours

- 0.05% [0.02 – 0.12] vs. 0.50 [0.29 – 0.86]
  - p=0.0017

Thangaratinam et al. *The Lancet*, Early Online Publication, 2 May 2012 doi:10.1016/S01406736(12)60107-X

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Reliability of Pulse Oximetry Screening for CCHD

- China
  - 122,738 babies
  - Sensitivity of pulse oximetry plus clinical assessment:
    - 93.2% (95% CI 87.9 – 96.2)
  - False positive rate
    - Clinical assessment: 2.7%
    - Oximetry – 0.3%

Zhao et al. *The Lancet*, 23 April2014 http://dx.doi.org/10.1016/S0140-6736(14)60198-7

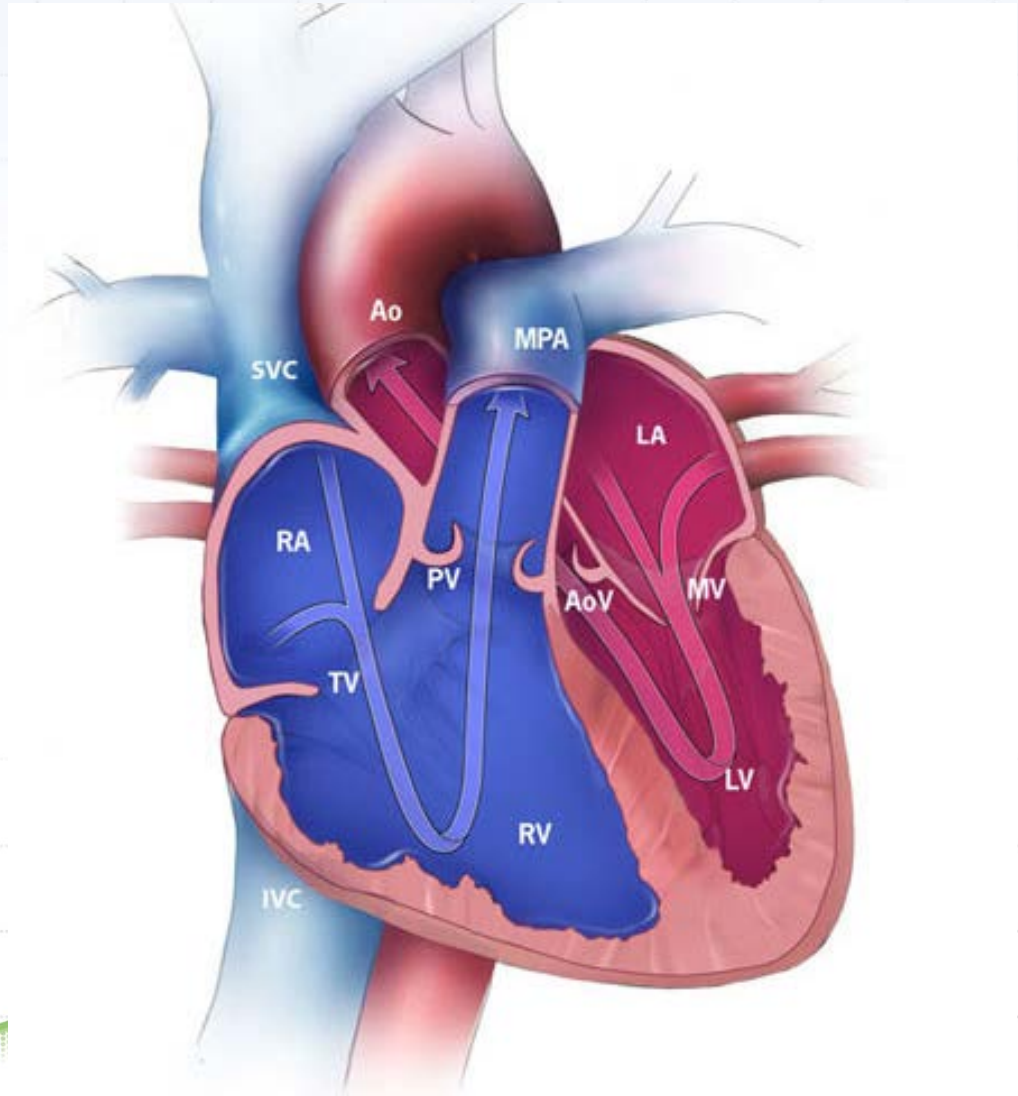
Detection of CCHD Lesions ($SpO_2 \leq 95\%$)

CCHD Lesion	Total	Percent Detected
DORV	3/3	100
HLHS	5/5	100
PA	5/5	100
d - TGA	9/9	100
TAPVC	6/7	85.7
Truncus	7/8	87.5
TA	1/1	100
AA/AS	3/4	75.0
TOF	9/13	69.2
AVSD	4/5	80.0
CoA	8/15	53.3
PS	2/6	33.3

Mahle WT, Newburger JM, Matherne GP, et al Circulation.;120:1-12, 2009

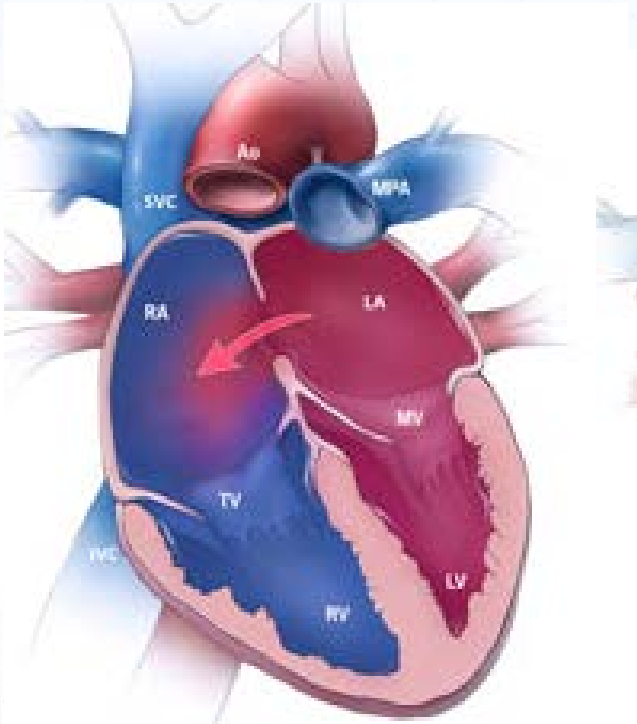
CCHD Screening Targets

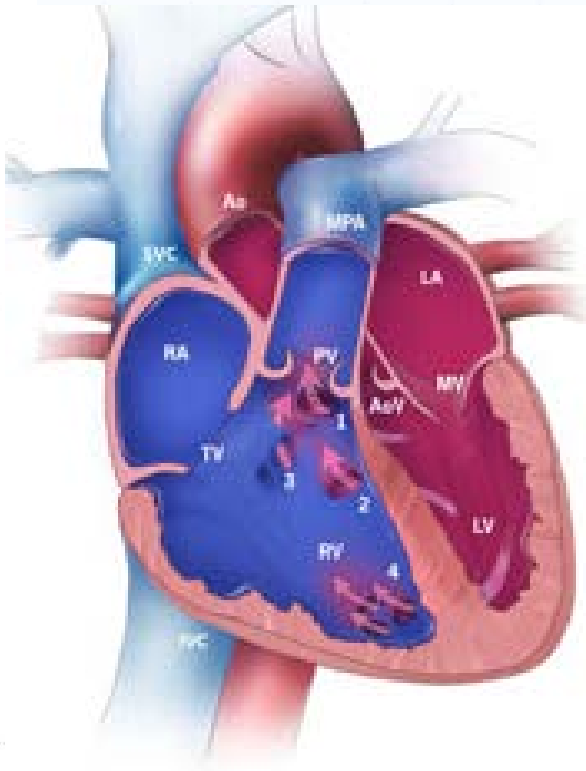
Normal Heart

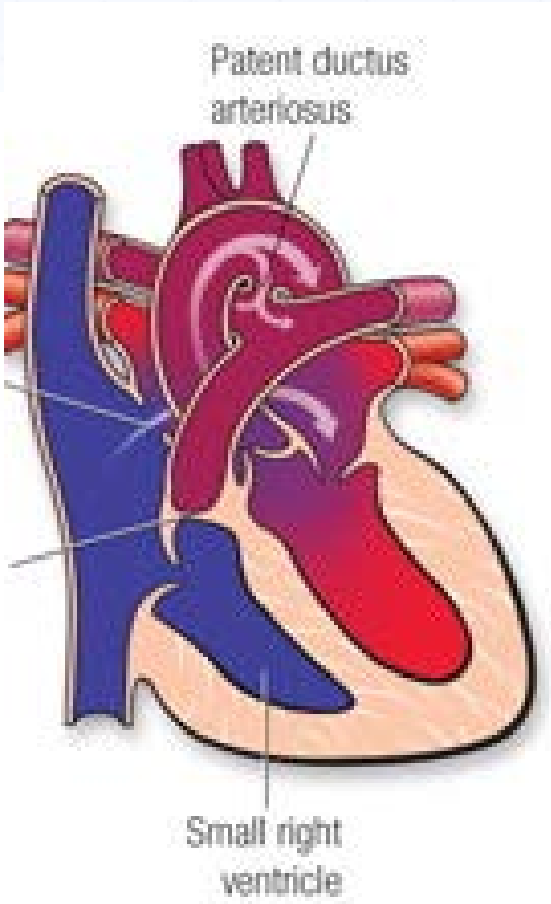


CDC

ASD VSD PDA





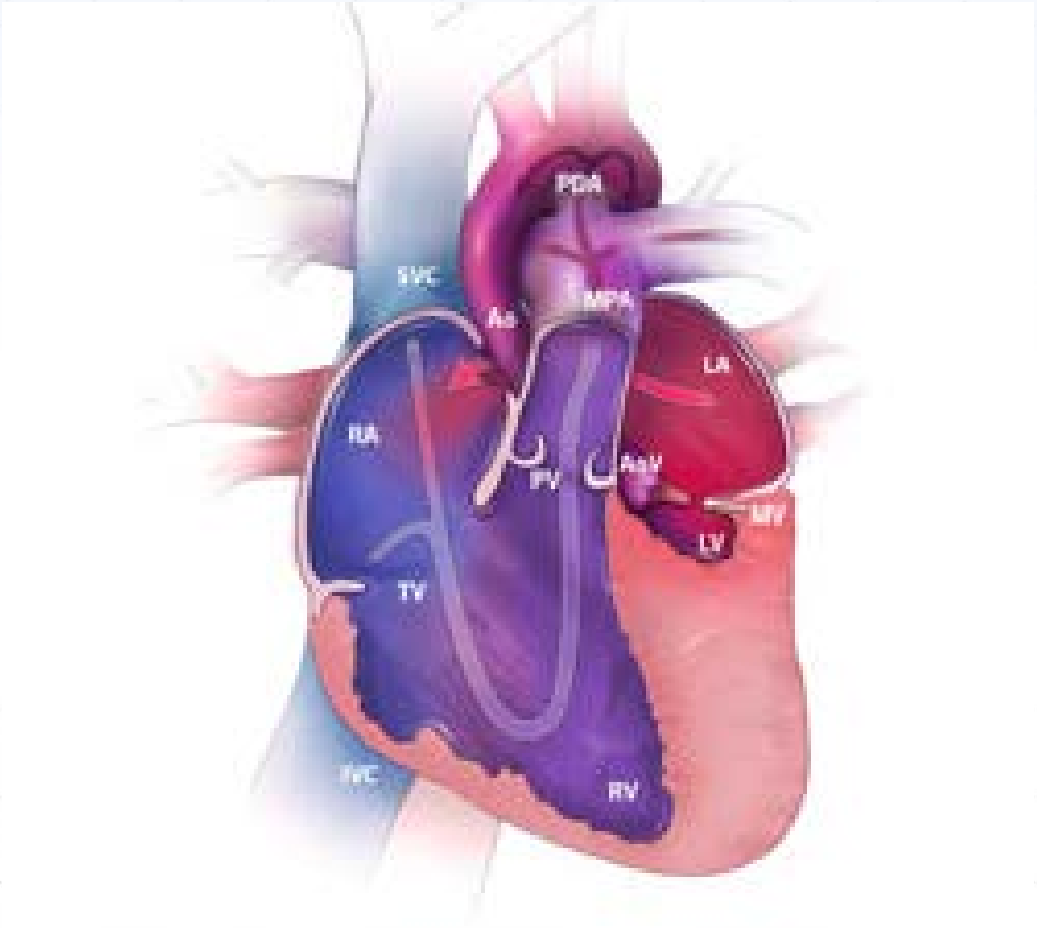


CDC - AHA

CCHD Screening

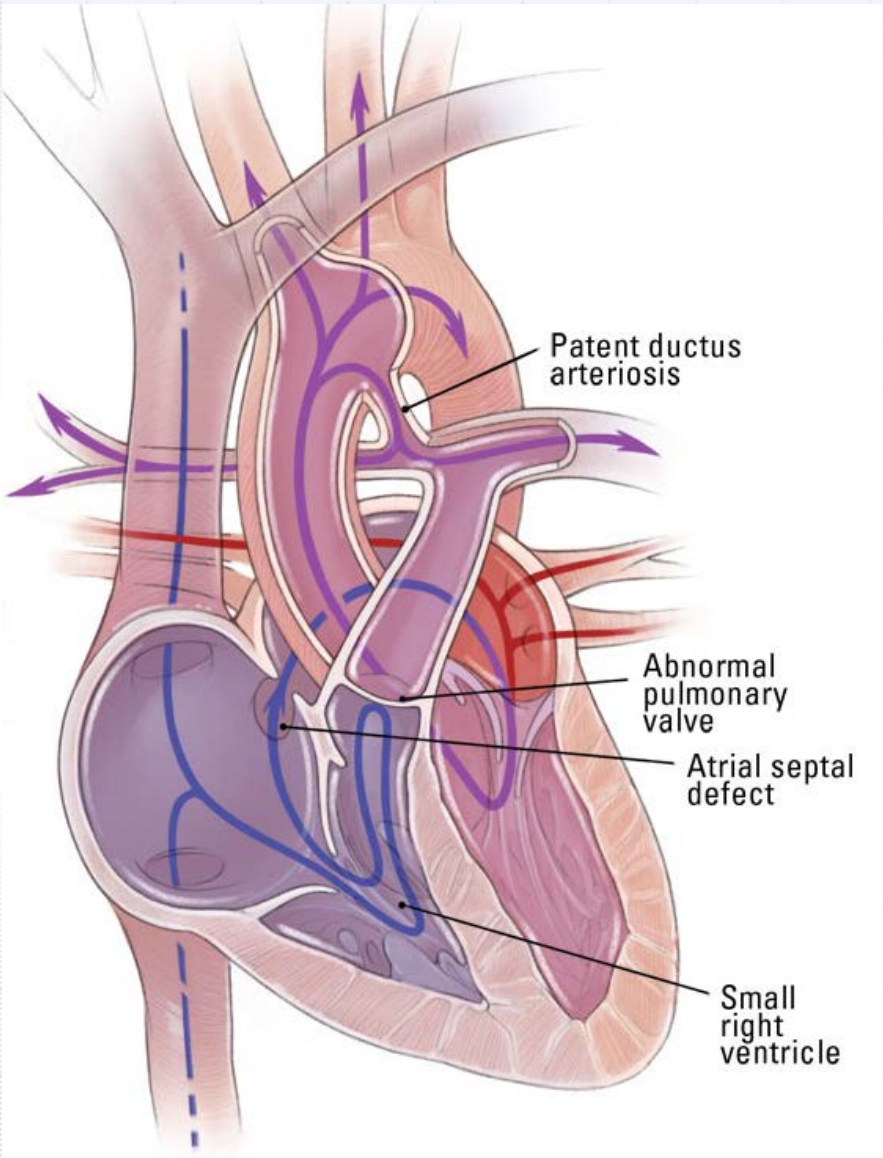
- **7 primary targets**
  - Hypoplastic left heart syndrome
  - Pulmonary atresia (with intact septum)
  - Tetralogy of Fallot
  - Total anomalous pulmonary venous return
  - Transposition of the great arteries
  - Tricuspid atresia
  - Truncus arteriosus

Hypoplastic Left Heart Syndrome



CDC

Pulmonary Atresia with Intact Septum



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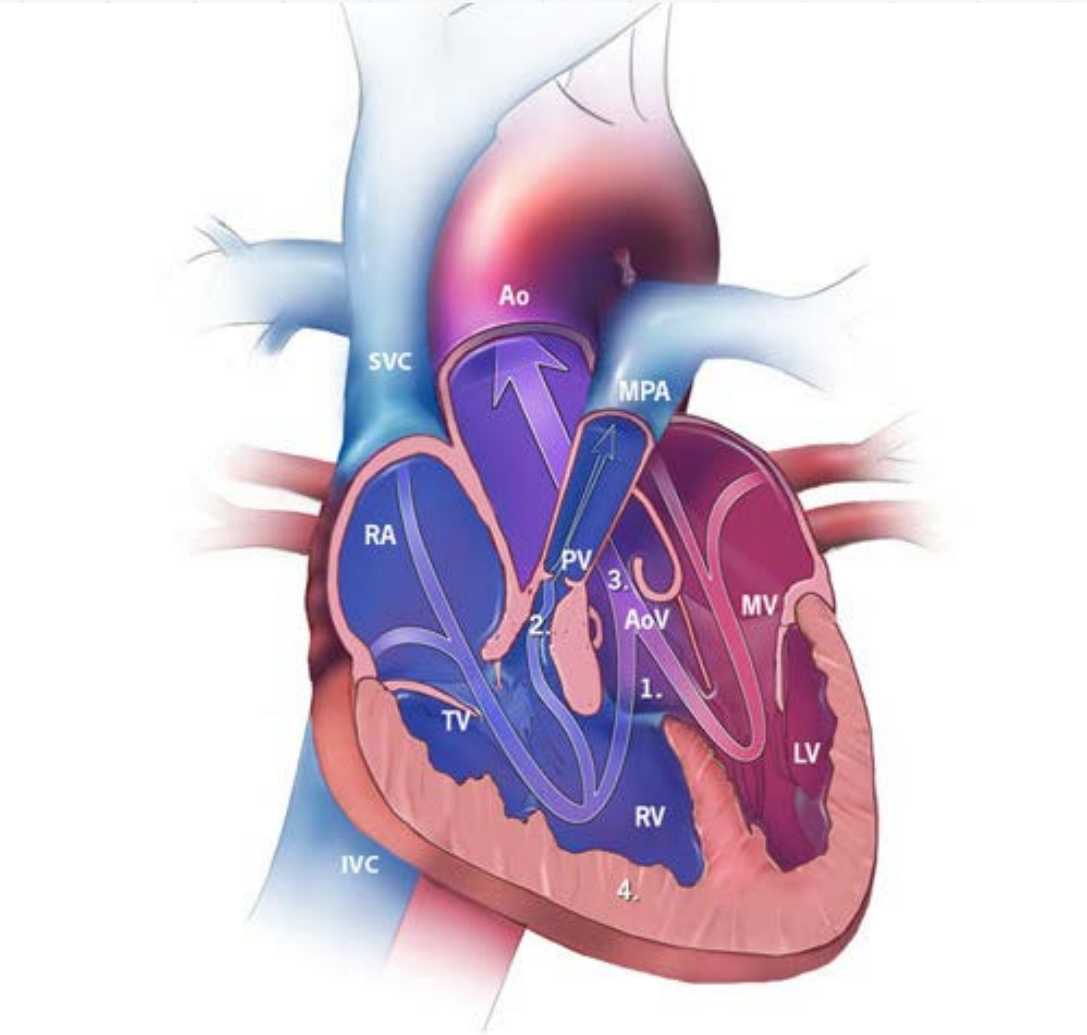
Tetralogy of Fallot



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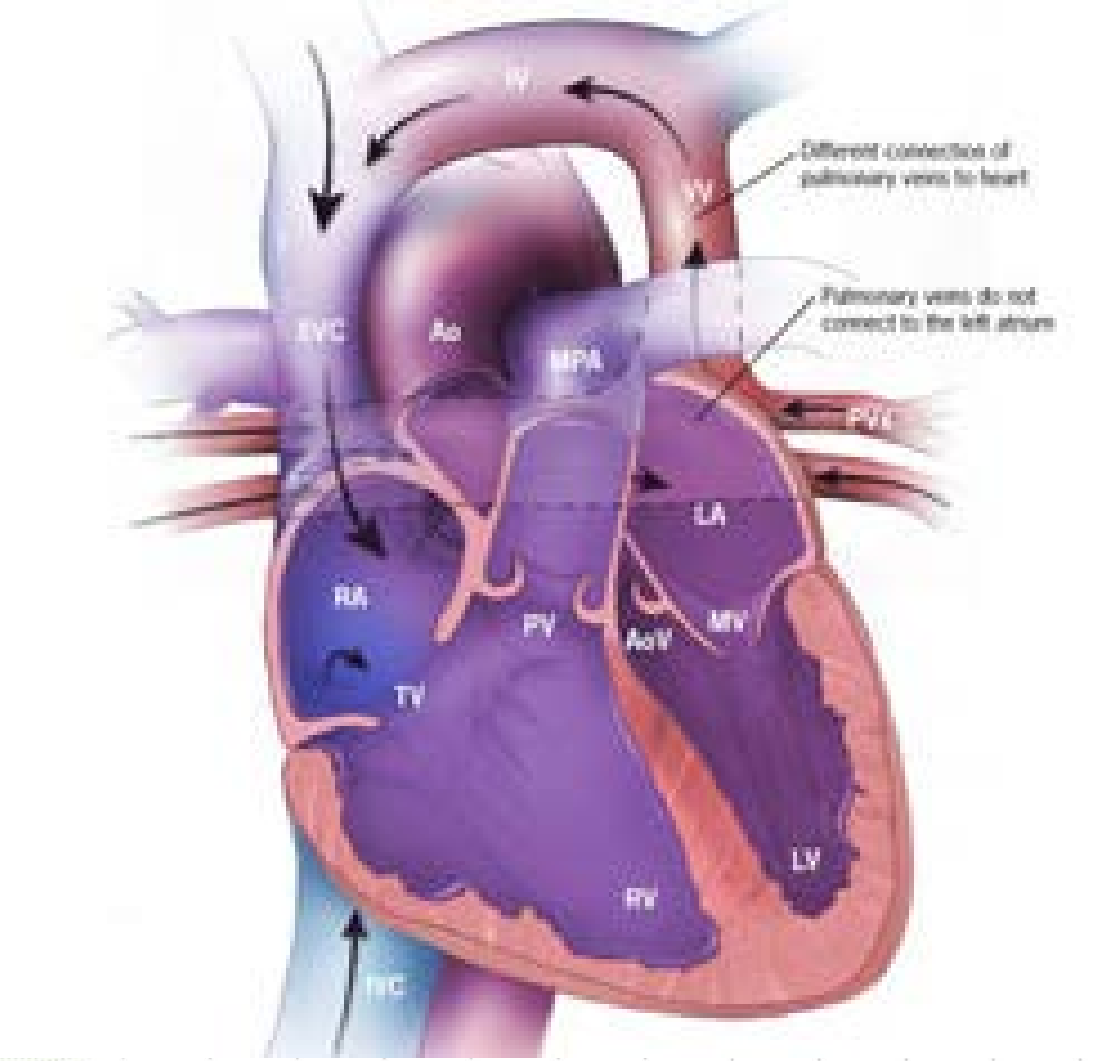
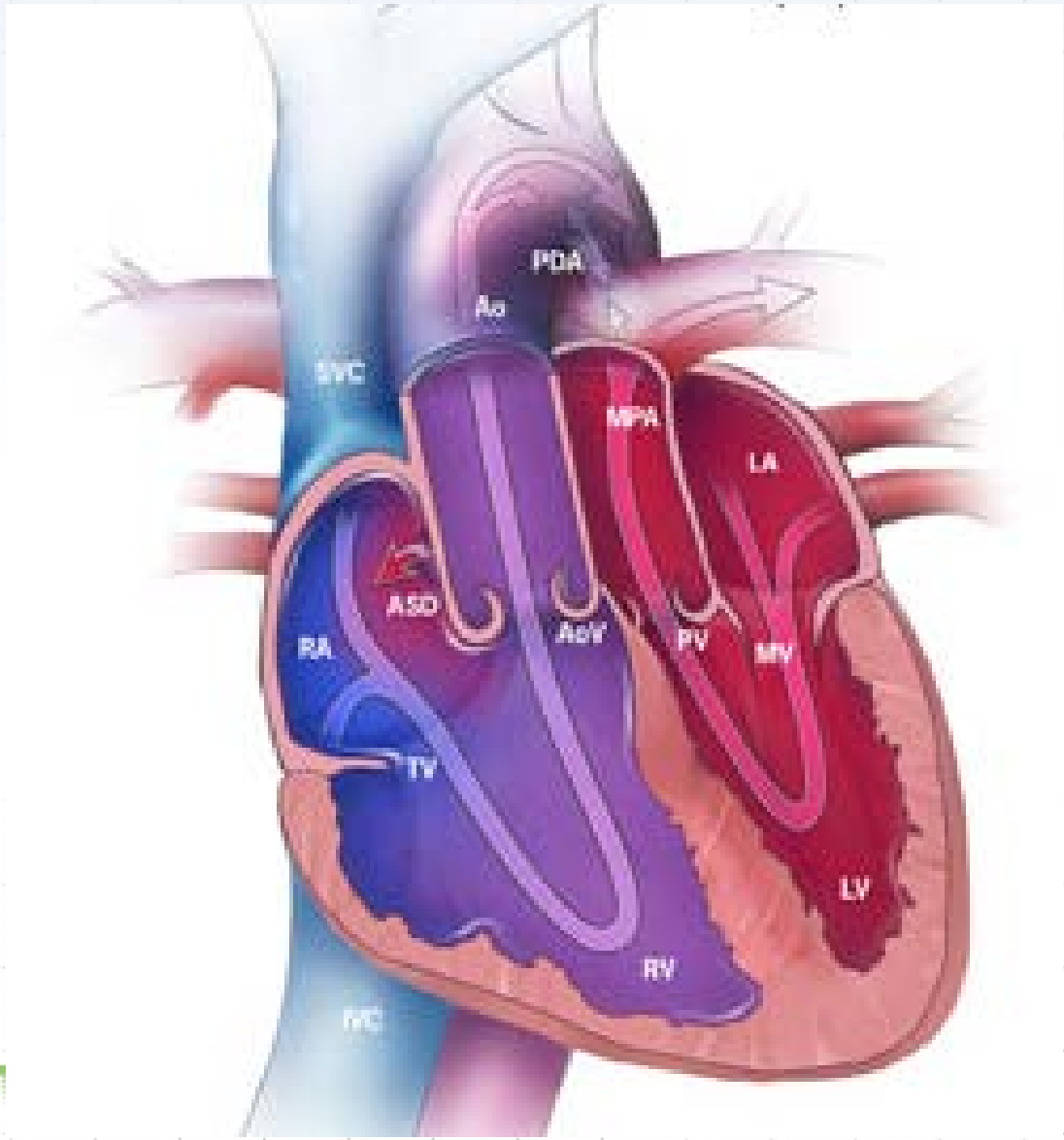
CDC

Total Anomalous Pulmonary Venous Return



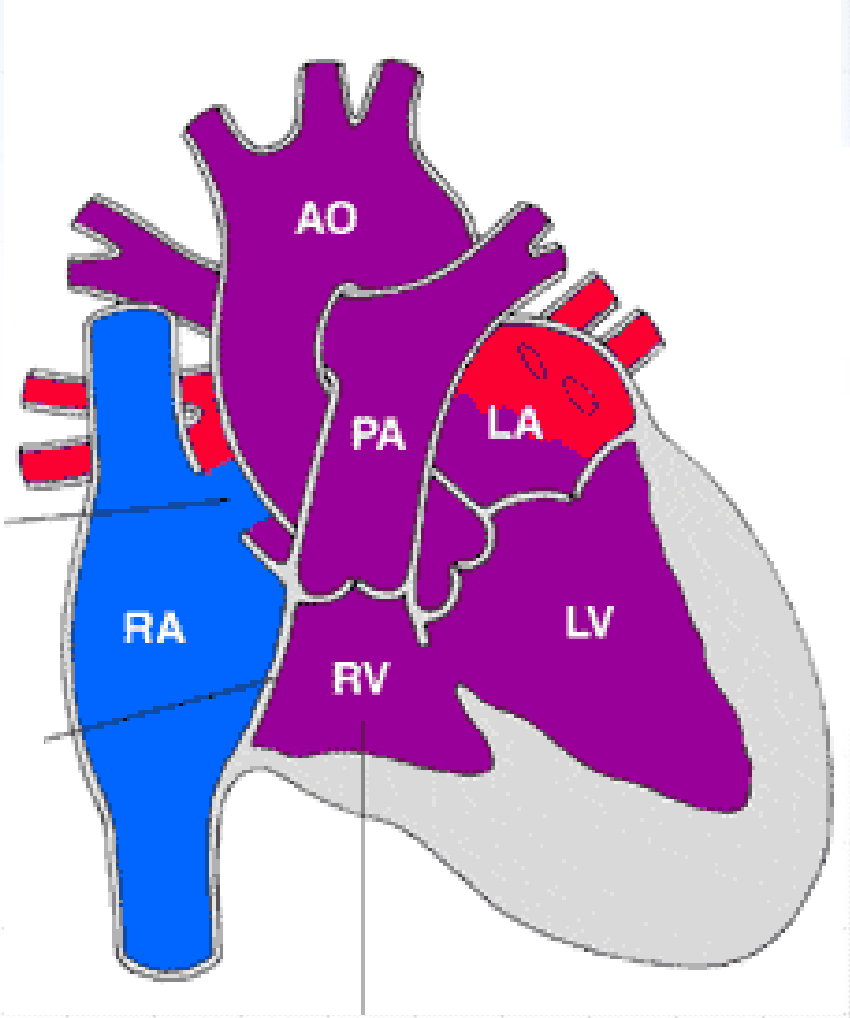
CDC

Transposition of the Great Arteries

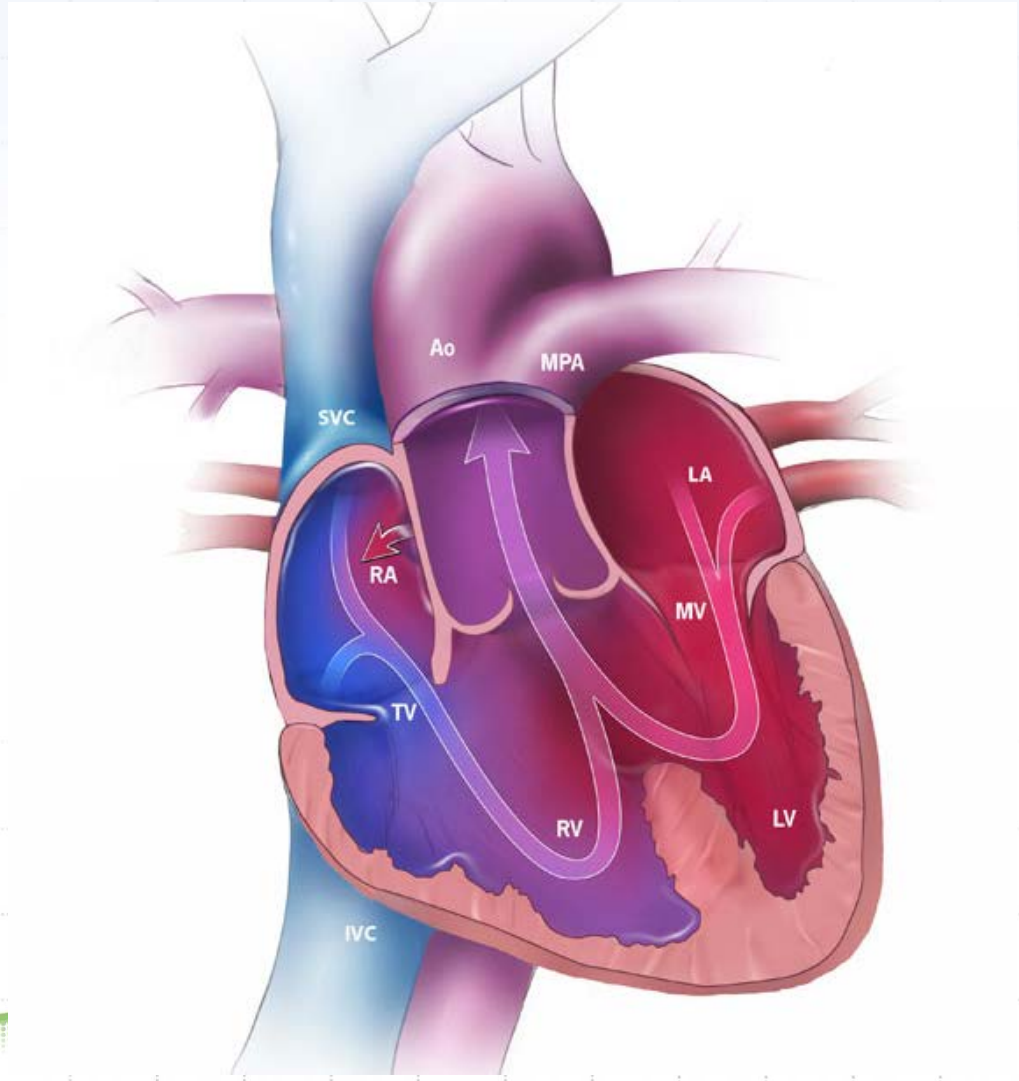


CDC

Tricuspid Atresia



Truncus Arteriosus



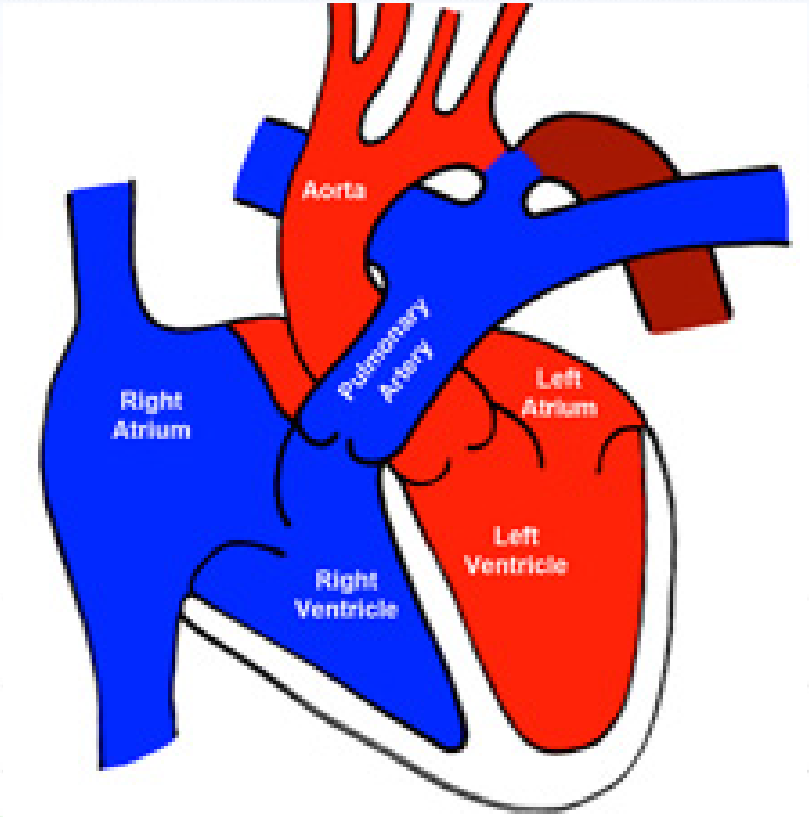
CDC

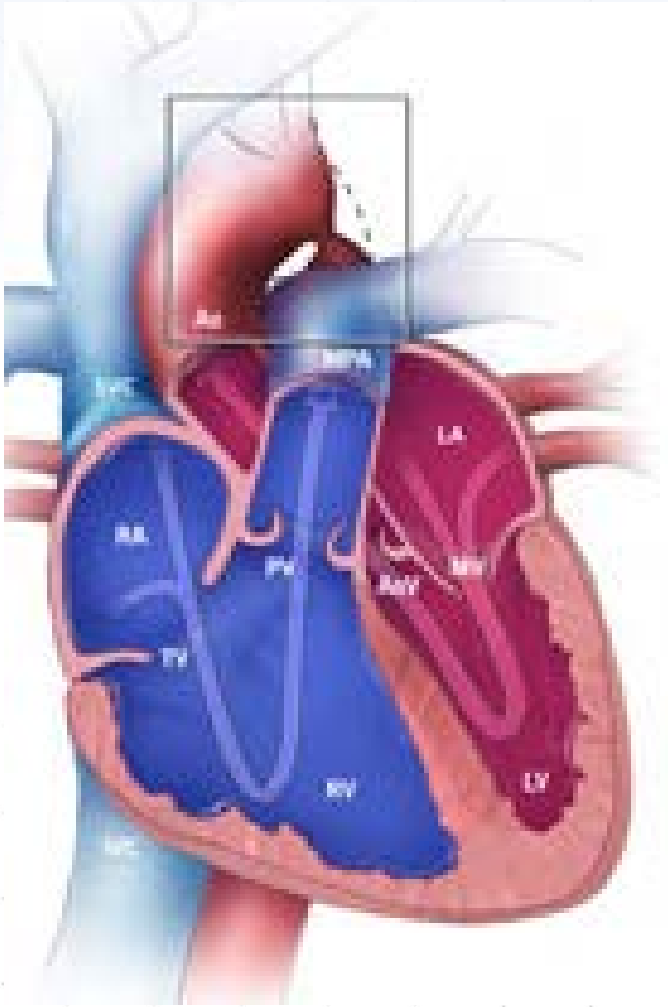
CCHD Screening

- **5 secondary targets:**
  - Coarctation of the aorta
  - Double outlet right ventricle
  - Ebstein anomaly
  - Interrupted aortic arch
  - Single ventricle

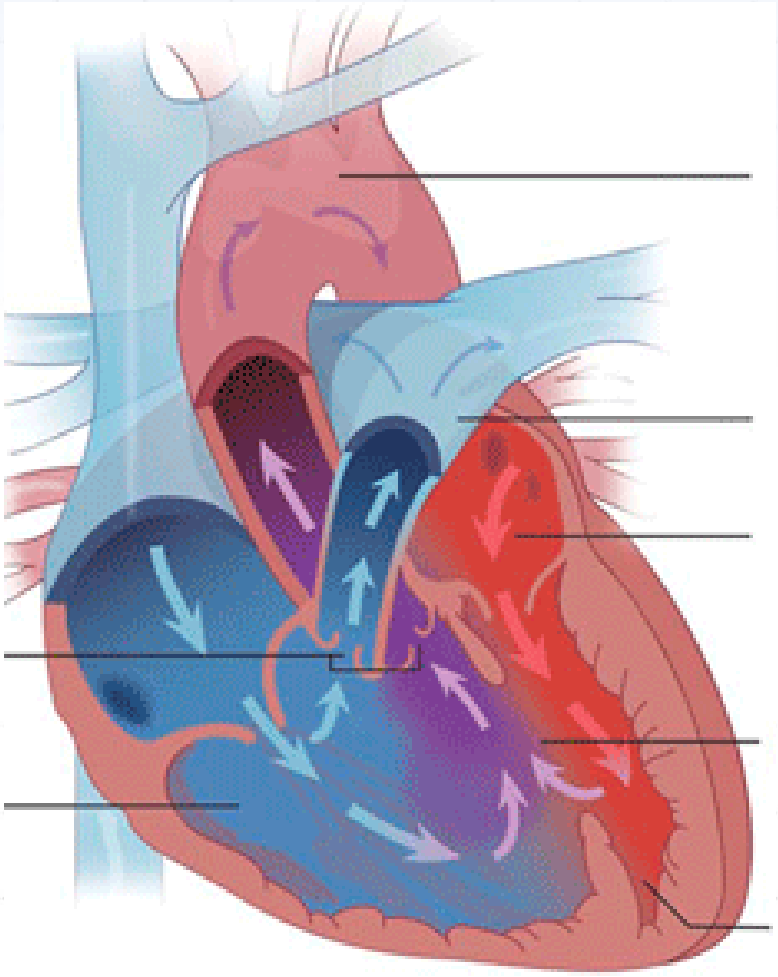
- *Can be just as severe but not consistently detected*
- *Screening may also detect other significant medical conditions that present with hypoxemia*

Coarctation





Double Outlet Right Ventricle



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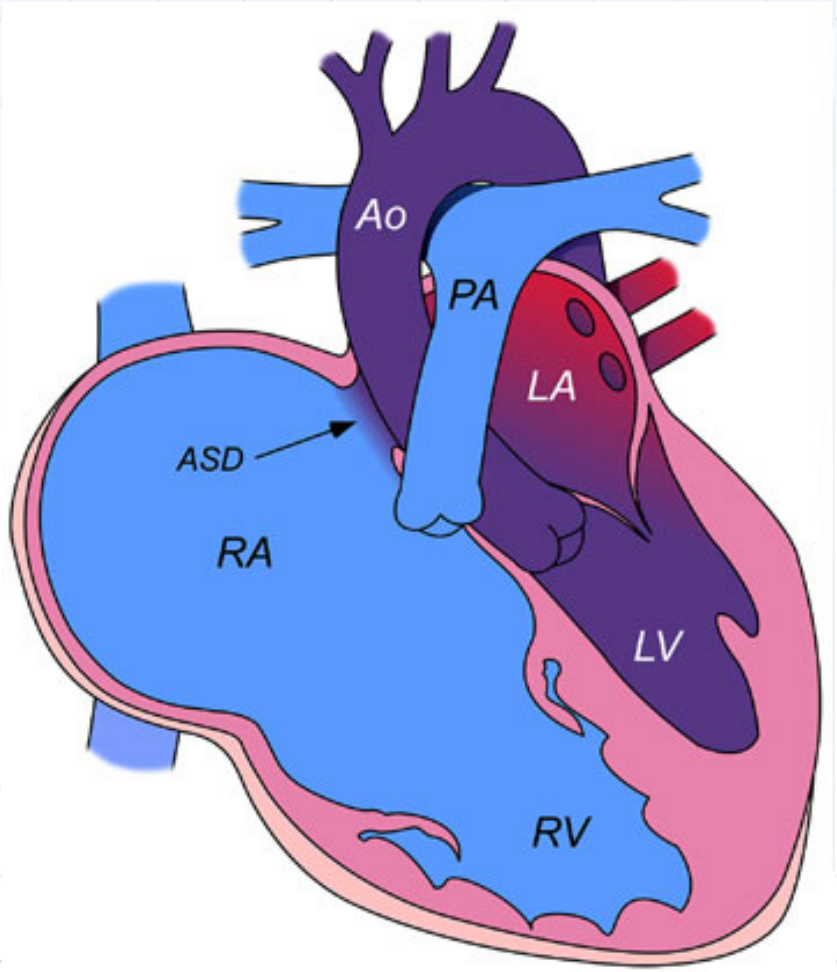
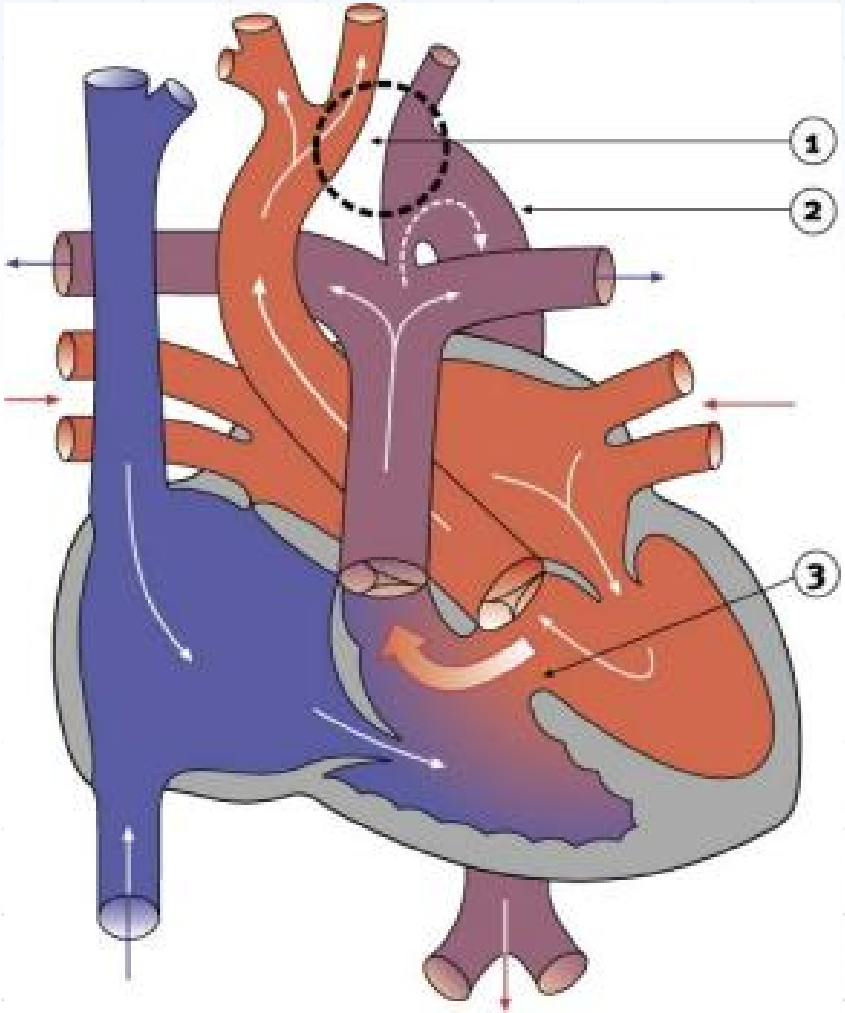
Ebstein's Anomaly



Interrupted Aortic Arch



Manitoba Ministry of Health

Single Ventricle

- Tricuspid atresia
- Hypoplastic left heart syndrome
- Double inlet left ventricle
- Many of the heterotaxy defects
- Some variations of double outlet right ventricle

Other Conditions Detected During CCHD Screening

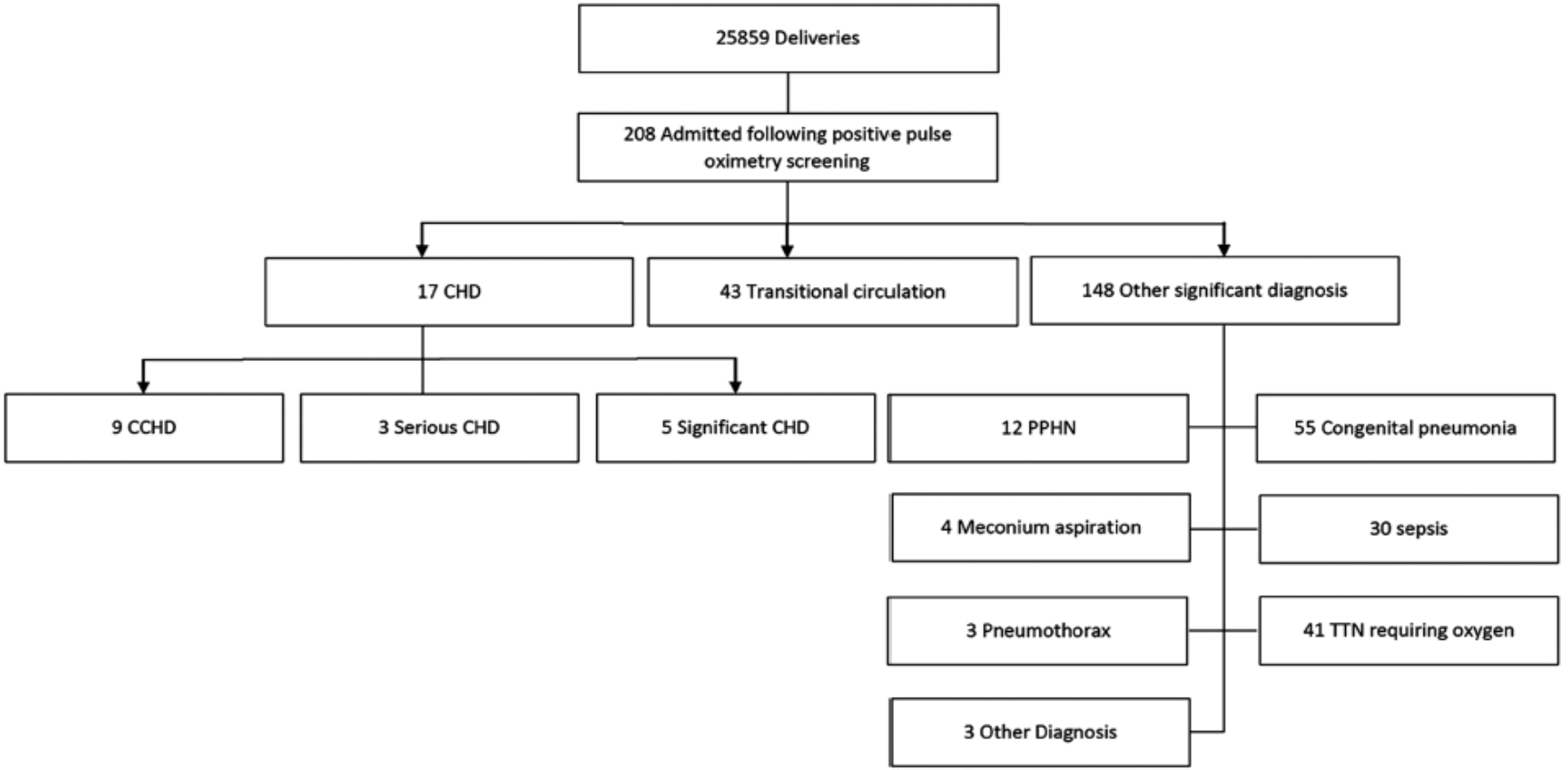


Figure 3 Outcomes of test positives following pulse oximetry screening.

Differential Diagnosis of Neonatal Cyanosis

A Airway	B Breathing	C Circulation
Choanal atresia	Pneumonia	Oxygen carrying capacity
Micrognathia	Congenital diaphragmatic hernia	Polycythemia
Pierre Robin sequence	Congenital cystic adenomatoid malformation	Anemia
Laryngomalacia	Pulmonary sequestration	Methemoglobinemia
Vocal cord paralysis	Congenital lobar emphysema	Congenital heart disease
Tracheal stenosis	Pulmonary hypoplasia	*Decreased pulmonary blood flow*
Vascular slings/rings	Phrenic nerve palsy	Tricuspid atresia
Cystic hygroma	Hypoventilation	Pulmonary atresia
Hemangioma		Pulmonary stenosis
Other neck masses		Tetralogy of Fallot
		Ebstein's anomaly
		Inadequate mixing
		Transposition of the great arteries
		Persistent pulmonary hypertension

Clin Pediatr Emerg Med. 2008 September ; 9(3): 169–175.doi:10.1016/j.cpem.2008.06.006

Performing the Screen

- **Use an appropriate device**
  - Standardized hospital grade
  - Motion tolerant
  - FDA approved
  - Proper sensors are used with the device

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Performing the Screen

Supplies

- Disposable or re-usable sensors
  - Disposable - single patient use
  - Reusable
    - maintenance of infection control
    - proper cleaning between patients

- Use according to manufacturer's instructions

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Application of the Sensor

- Apply to clean, dry skin
- Best sites: outer aspects of the palm and foot, the great toe and thumb
- The wrist is not recommended
- Light emitter and photodetector directly opposite each other

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Performing the Screen

- Secure the sensor to the infant's right hand to obtain a pre-ductal reading and either foot for a post-ductal reading
- Turn on the oximeter
- Connect probe
- Wait for pleth wave (arterial pulse) to stabilize
- Assess HR correlation
- Assess saturation reading
- Document

Poll Question

Are staff routinely performing the pulse oximetry on the baby's right hand and a foot for each screen?

a)Yes

b)No

c)N/A

Performing the Screen

- The baby should be at least 24 hours of age.
- Can be done with other newborn screening - hearing, metabolic - that is also done after 24 hours of age and prior to discharge
- Conduct screening in quiet area and, if possible, with parent present to soothe and comfort the infant
- Conduct screening while infant is awake and quiet
- Avoid screening when infant is crying, cold or in a deep sleep

Parent Education

- Explain the purpose of screening
  - to help detect some serious heart problems in well appearing infants
- Explain the screening process
- Timing of the screen
- How it is performed
- Screening does not detect all heart defects
- Warning signs of congenital heart disease
  - Sweating especially when feeding, difficulty feeding, fast breathing, poor weight gain, bluish or pale skin color.

Accuracy: Paper Algorithm v. Computer-Based Tool

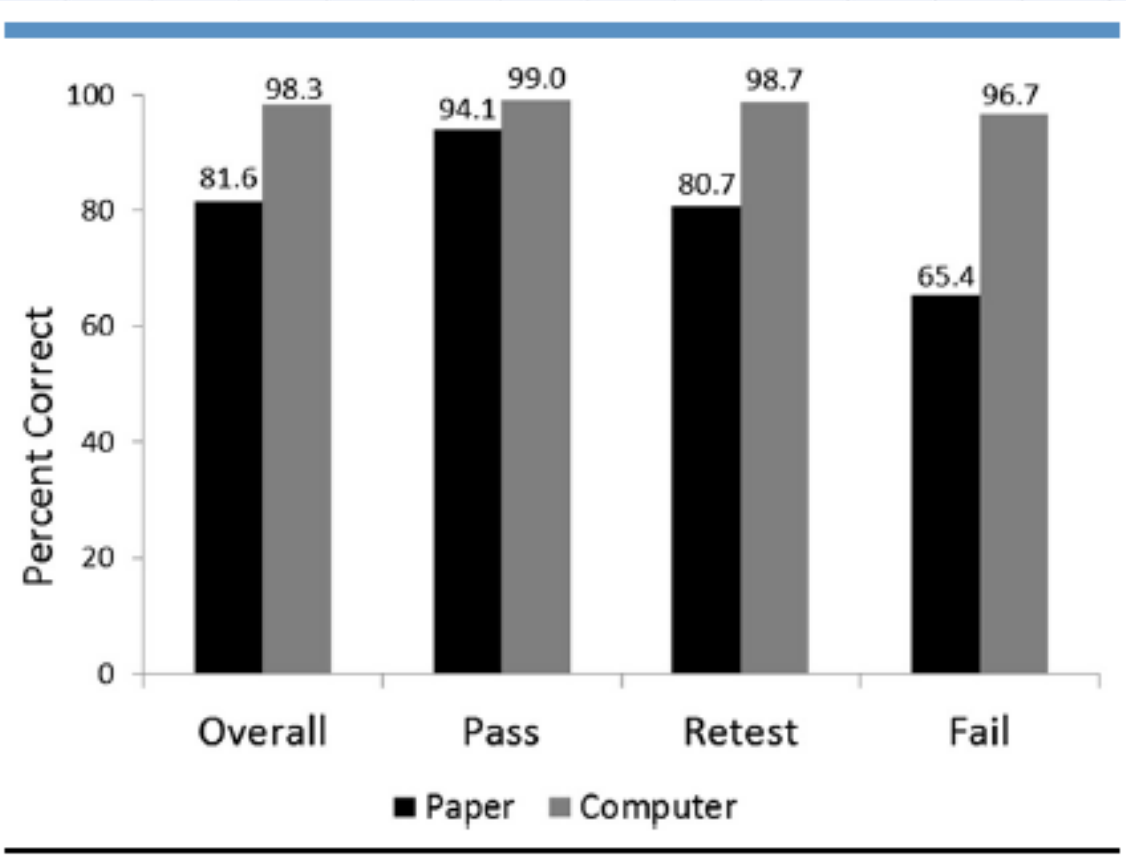
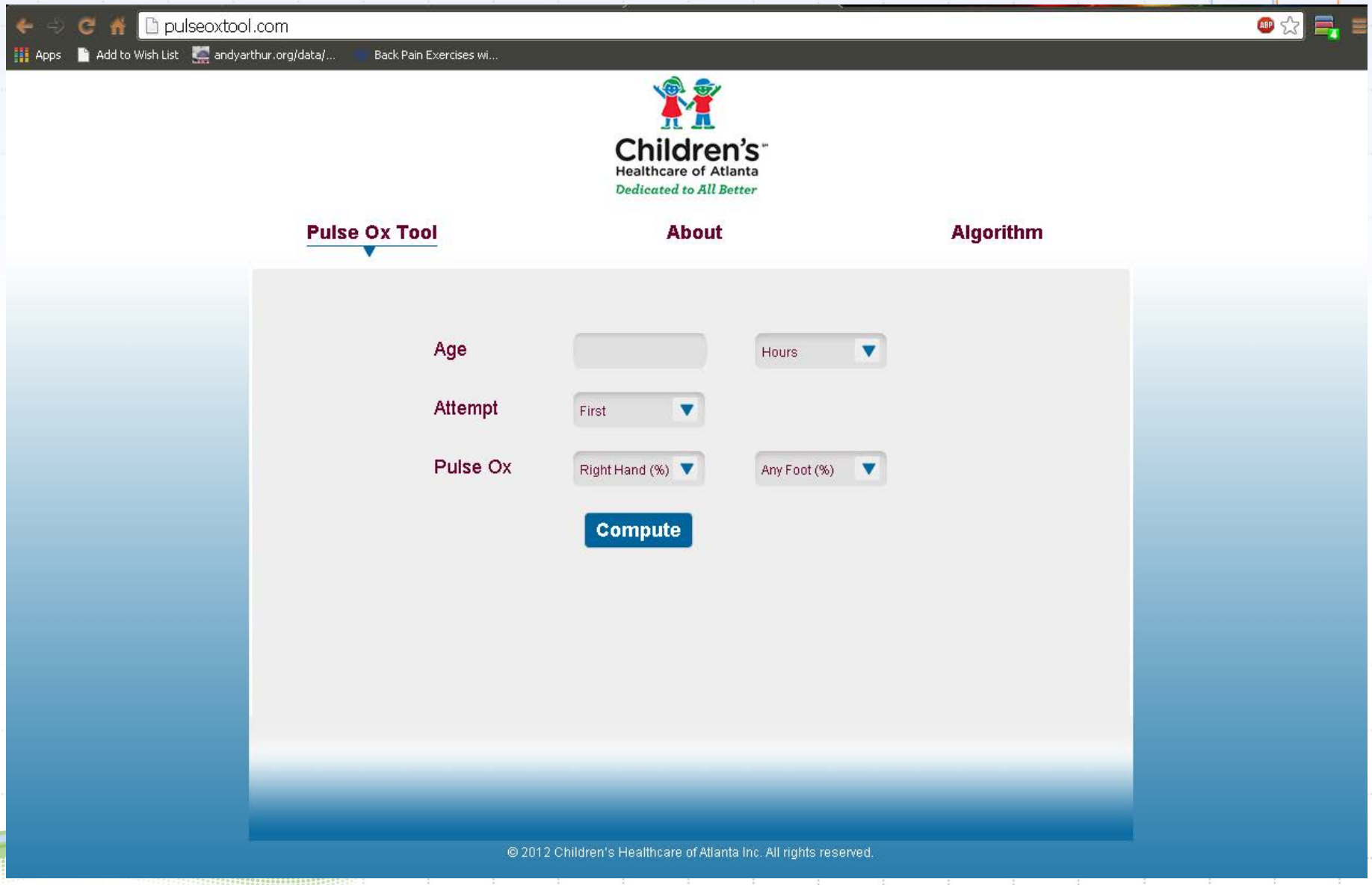


Figure 2. Accuracy when using a paper algorithm vs a computer-based tool. In 20 mock scenarios for screening for CCHD using pulse oximetry, those using the computer-based tool identified the correct answer more often than those using the paper algorithm ($P < .001$ for paper vs computer in all comparisons).

J Pediatr. 2014 Jan;164(1):67-71.e2. doi: 10.1016/j.jpeds.2013.08.044.



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Mueller CCHD Screening Table

Green= Negative Screen (PASS)
Red=Rescreen in 1 hour
Red for 3 consecutive screens= Positive Screen (FAIL)
***Red*= Automatic Positive Screen (FAIL)**

RIGHT HAND	FOOT											
												<90
100	100	99	98	97	96	95	94	93	92	91	90	*
99	100	99	98	97	96	95	94	93	92	91	90	*
98	100	99	98	97	96	95	94	93	92	91	90	*
97	100	99	98	97	96	95	94	93	92	91	90	*
96	100	99	98	97	96	95	94	93	92	91	90	*
95	100	99	98	97	96	95	94	93	92	91	90	*
94	100	99	98	97	96	95	94	93	92	91	90	*
93	100	99	98	97	96	95	94	93	92	91	90	*
92	100	99	98	97	96	95	94	93	92	91	90	*
91	100	99	98	97	96	95	94	93	92	91	90	*
90	100	99	98	97	96	95	94	93	92	91	90	*
<90	*	*	*	*	*	*	*	*	*	*	*	<90

Technical Factors

False positive and negative readings

- Poor perfusion
- Motion artifact
- Ambient light
- Partial probe detachment
- Differences between manufacturers

Pediatr Cardiol (2008) 29:885-889

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Physician Response to Failed Screen

- Examine the infant
  - Ensure that the baby is hemodynamically stable
  - Evaluate for cause of hypoxemia
    - Consider sepsis or pneumonia

- **Any signs or symptoms of congenital heart defect should prompt rapid evaluation**

- If baby is asymptomatic with no obvious cause for hypoxemia, a cardiologist or neonatologist should be consulted and an echocardiogram should be performed

- Do not discharge home until the underlying reason for hypoxemia has been identified or the hypoxemia has resolved

- Babies will often appear normal and have no clinical findings other than the low oxygen saturation, but a thorough evaluation is necessary

American Academy of Pediatrics. http://www.aap.org/en-us/advocacy-and-policy/aap-health-initiatives/PEHDIC/Pages/Newborn-Screening-for-CCHD.aspx

Managing the Positive Screen

- Unless a non-cardiac cause can be identified for a failed screen, an infant who fails the screen should have a diagnostic echocardiogram done before being discharged

- This could involve an echocardiogram within the hospital or birthing center, transport to another institution for the procedure, or the use of telemedicine for remote evaluation

Oster, Matt. "Screening Newborns for Critical Congenital Heart Disease." *Medscape*. N.p., 18 Mar 2013. Web. 20 Feb 2014. <http://www.medscape.com/viewarticle/780571>.

Poll Question

Have there been any babies that have failed the pulse oximetry screen in your facility/care?

Yes or No

For Patients Who Failed Their CCHD Screens

- Confirm that the infant had a diagnostic echocardiogram
- Make sure that the patient receives appropriate follow-up, such as being seen by a cardiologist; and
- Facilitate long-term follow-up for patients diagnosed with CCHDs

Oster, Matt. "Screening Newborns for Critical Congenital Heart Disease." *Medscape*. N.p., 18 Mar 2013. Web. 20 Feb 2014. <http://www.medscape.com/viewarticle/780571>.

Communication of Results to Primary Care

- Include screening results in discharge summary
- Include in the hand-off report to the receiving hospital if infant is transferred

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First Well Visit Post Discharge

- Pediatrician should have access to all screening results from hospital (CCHD, Metabolic, Hearing)
- If patient not appropriately screened at birth facility, develop strategies for screening

Follow-up Visit

- Passing the newborn oxygen saturation screening DOES NOT rule out all important congenital heart disease

- It is crucial to note that an infant in a pediatric office may have severe heart disease

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Signs & Symptoms

- Cyanosis
- Tachypnea (often with diaphoresis during feeding)
- Poor perfusion & pulses (femoral)
- Murmur – Not as pertinent
- Poor weight gain (if infant is thriving, heart failure is very unlikely)

Case Presentation

- 39 weeks, NSVD, Apgar 9/9
- Discharged home on Day 2
  - Oximetry screening - post-ductal SpO_2 100%
- Day 3
  - Lethargy
  - Decreased PO intake
  - Dry diapers
  - Tachypnea
  - Evaluated by pediatrician

Case Presentation

- Referral to ED for respiratory distress
  - grunting
  - Retracting
  - unable to measure SpO_2
- Intubated
- Umbilical arterial and venous catheters inserted

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Case Presentation

- ABG: 7.09/17/199/8/-23.3
- Chemistry: 143/8/104/6/63/5.98

- Echo: coarctation, DA closed
  - (history of normal fetal echo)

- Prostaglandin infusion
- Dialysis prior to CoA repair

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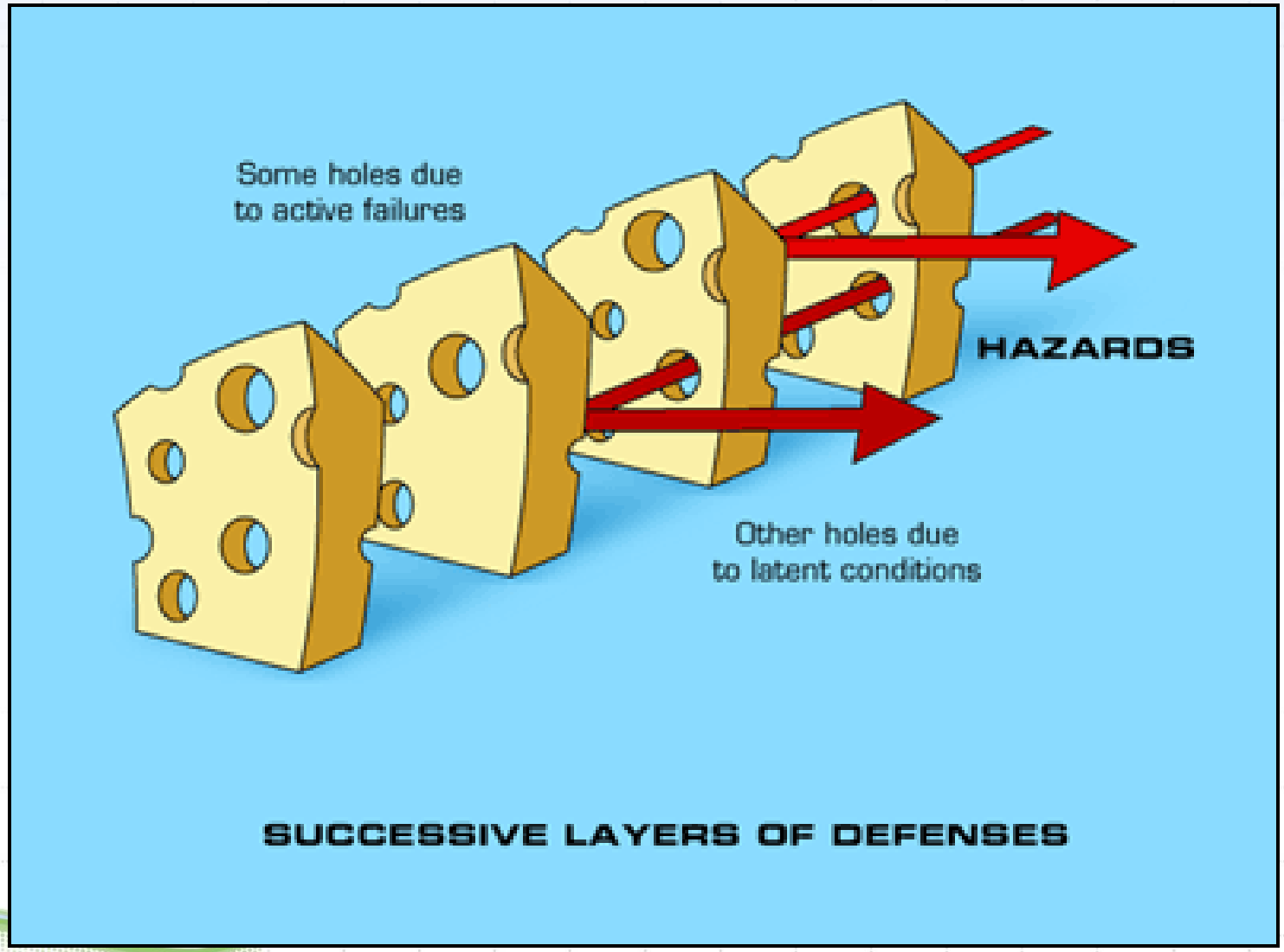
“Swiss Cheese” Model of Accident Causation



British Medical Journal **320** (7237): 768–770

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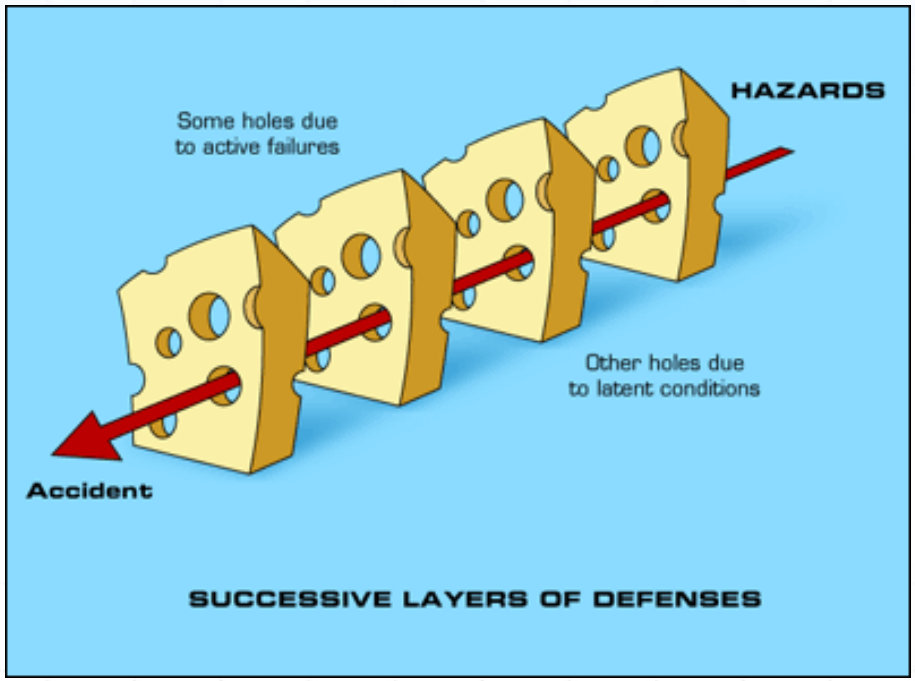
“Swiss Cheese” Model of CCHD Screening Failure

“Swiss Cheese” Model of Accident Causation



- Obstetric ultrasound
- Fetal echo
- Newborn physical exam
- Nursery course
- Oximetry screening

British Medical Journal **320** (7237): 768–770

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Ideal CCHD Screening Program

- Education
  - Nurses
    - Normal newborn
    - NICU
    - Formal screener training
    - Competency
    - Continuing education
  - Physicians
    - Pediatricians
    - Neonatologists
    - Cardiologists
    - Continuing education

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Ideal CCHD Screening Program

- Education
  - Parents
    - Negative screen
    - Positive screen
    - languages
    - Literacy

NEW YORK STATE DEPARTMENT OF HEALTH

Pulse Oximetry Screening for Critical Congenital Heart Disease (CCHD)

Information for Parents and Guardians

What is Newborn Screening?

Newborn screening is a way to find babies who have serious medical conditions that need urgent treatment. Most babies are born with no serious health problems. Newborn screening is a way to find critical heart conditions in newborns.

What is Critical Congenital Heart Disease?

Critical Congenital Heart Disease (CCHD) is a medical problem that occurs when a baby's heart or major blood vessels near the heart are not formed properly. The heart may not work well and may not have enough oxygen in the blood.

Why is screening babies for CCHD important?

Some babies with a heart defect can appear healthy at first. If these babies are sent home before their problem is found, they are at risk for serious illness or death.

How is screening for CCHD done?

Pulse oximetry is a test to determine the amount of oxygen in the baby's blood and pulse rate. Pulse oximetry is fast, easy, and does not hurt. A small soft sensor is wrapped around the baby's hand and foot to measure the heart rate and oxygen level in the blood. Every baby born in New York State will have a pulse oximetry test as part of universal newborn screening after 24 hours of life to see if there are signs of CCHD.

What happens if the pulse oximetry reading is low?

Some babies have a low oxygen level reading. Your doctor will determine if further testing is needed, to look for CCHD, such as an ultrasound of the heart (also called echocardiogram or heart echo).

A low oxygen reading does not always mean that the baby has CCHD. Some healthy babies can have a low pulse oximetry reading while their heart and lungs are adjusting after birth. There could be other conditions that can cause your baby to have a low oximetry test result.

What do parents need to know?

Most babies who pass the pulse oximetry screen will not have CCHD. ***It is important for parents to know that newborn screening cannot identify every child with a critical heart problem.*** Warning signs that all parents should watch for are: bluish color to the lips or skin, grunting, fast breathing, poor feeding, and poor weight gain. If you notice any of these signs in your baby please contact your baby's health care provider right away.

Who can I contact if I have additional questions about newborn screening for CCHD?

Ask your baby's doctor about newborn screening or visit the CDC's website at:

http://www.cdc.gov/ncbddd/pediatricgenetics/pulse.html

O:\OMD\CCHD Screening\Drafts of fact sheets\CCHD Parent Fact sheet 7B

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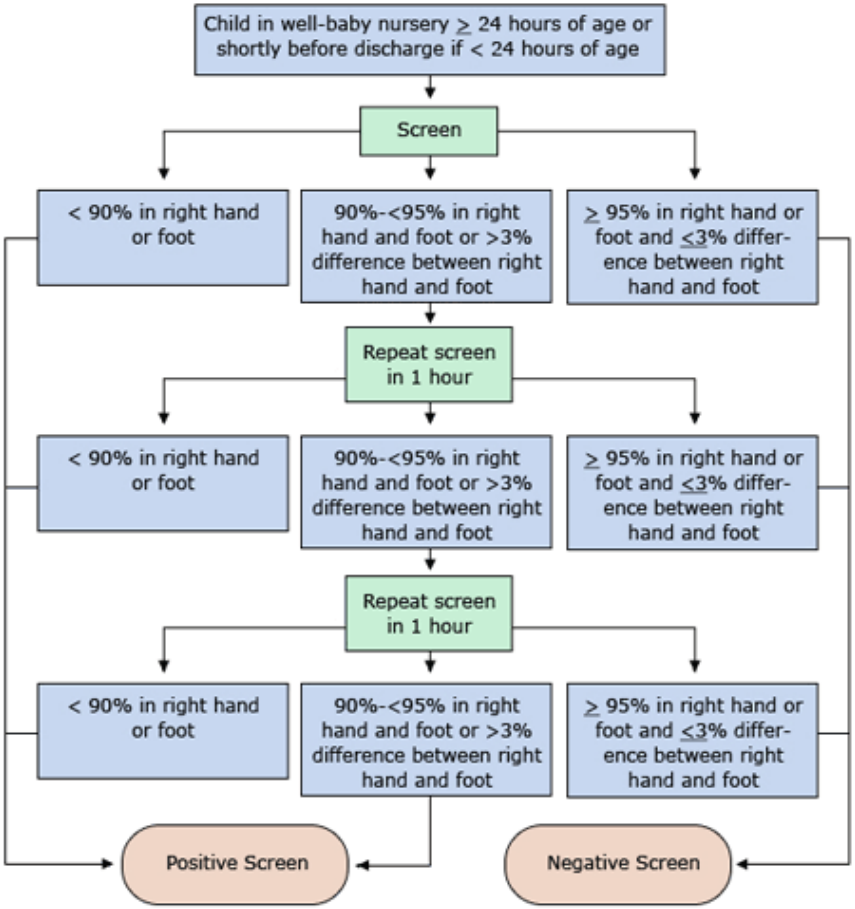
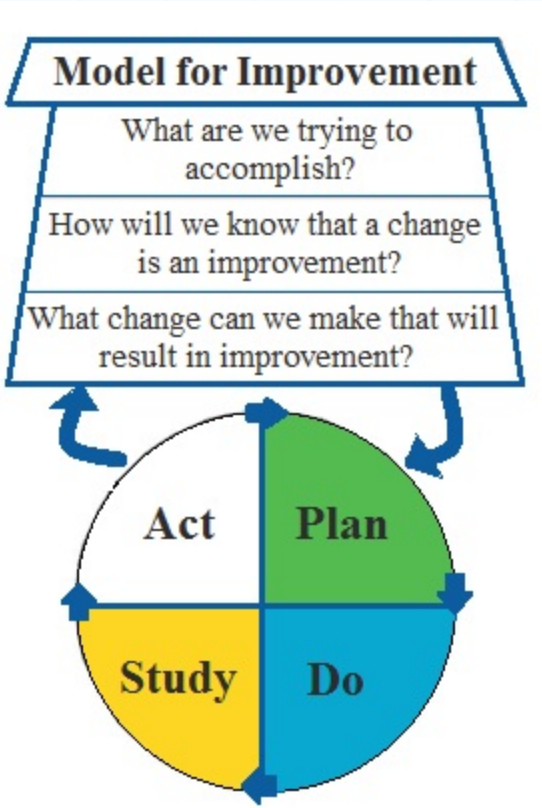
Ideal CCHD Screening Program

- Standardization of algorithm
  - Minimize variation
    - Equipment
    - Supplies



Ideal CCHD Screening Program

- Universal testing
- Quality of Process
- Database
  - Local
  - Public health



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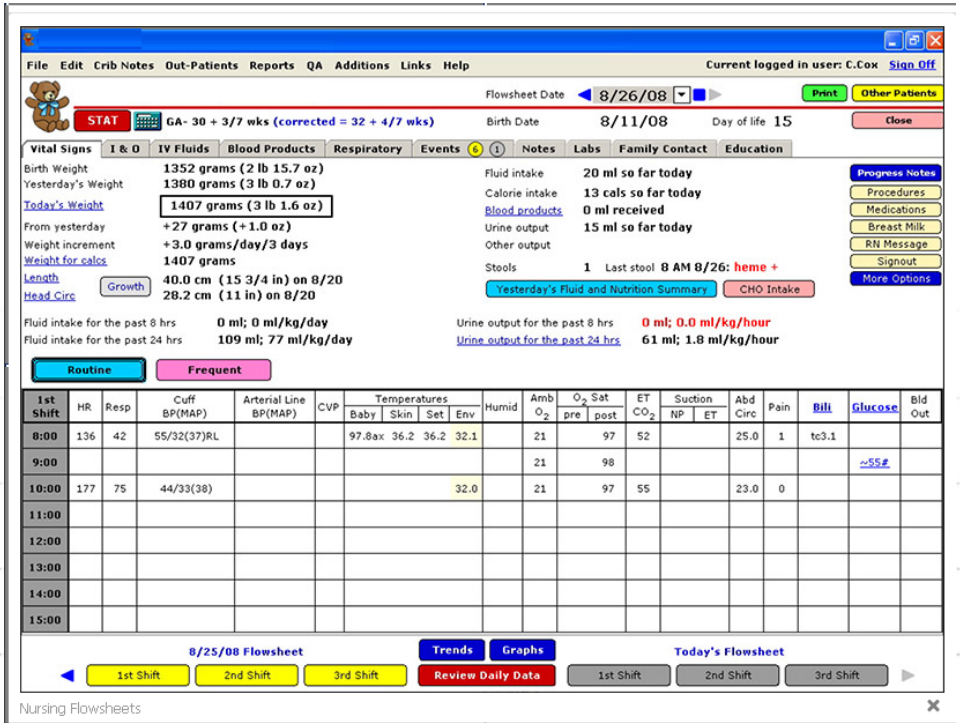
Ideal CCHD Screening Program

- Documentation
  - Automatic link to EHR
  - Automatic reporting to DOH



Ideal CCHD Screening Program

- Communication
  - Parents
  - Pediatrician
  - Cardiologist

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Disclosures

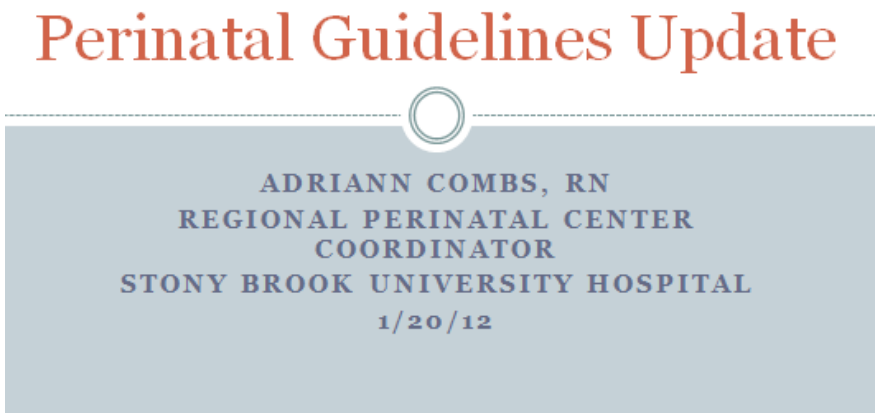
- Adriann Combs, R.N., BSN has nothing to disclose.

Adriann Combs, R.N., BSN
Stony Brook University Hospital

Educational Events, Technical Assistance, Quality Assurance and Challenges

RPC's Point of View

Did you host educational events for local hospitals about CCHD screening implementation?



Pediatrics 2011; 128: e1259-e1267

- Initial update in 2012 with Update to Guidelines in Perinatal Care, 7th ed.

Stony Brook Medicine

Stony Brook Medicine Administrative Policy and Procedures

Subject: PC0134 Critical Congenital Heart Disease Screening	**Published Date:** 01/15/2013
Provision of Care, Treatment and Services	**Next Review Date:** 09/19/2015
Scope: Hospital Wide	**Original Creation Date:** 09/19/2012

Printed copies are for reference only. Please refer to the electronic copy for the latest version.

SBUH Policy and Procedure developed Fall 2012-shared with affiliates

What type of technical assistance was provided?

- Strategies on incorporating screening into existing care epochs
  - With discharge bilirubin screening or test
  - With metabolic screen draw

- Clinical information regarding maximizing the infant's condition for efficient, successful screening
  - Satiated
  - Quiet
  - Warm

FEASIBILITY OF AND DELAY IN OBTAINING PULSE OXIMETRY DURING NEONATAL RESUSCITATION

COLM P. F. O'DONNELL, MB, MRCPI, MRCPCH, C. OMAR F. KAMLIN, MB, BS, MRCPCH, PETER G. DAVIS, MD, FRACP, AND COLIN J. MORLEY, MD, FRACP, FRCPCH

Table. Failure rate and times for sensor application, for oximeter to generate and display data, and from birth to data display in delivery room resuscitation by method of sensor application

	Sensor applied to infant after connection to oximeter (n = 37)	Sensor applied to infant before connection to oximeter (n = 78)
Failed to display data (%)	10 (27)	0 (0)
Time to apply sensor (sec)*	20 (16-24)	18 (15-22)
Time to display data (sec)*	41 (20-78)	15 (11-16)
Time from birth to data display (sec)*	100 (74-157)	68 (59-80)

*Data are median (interquartile range).

Technical assistance in identifying pulse oximeters that have a reliable signal

Apply sensor to infant prior to attaching to cable

Strategies to optimize signal attainment and strength

Increased success in oximeter with signal extraction technology

MASIMO PULSE OXIMETER KEY POINTS

Normal SpO2 Values After Birth:

Targeted Preductal SpO_2 After Birth	
1 min	60%-65%
2 min	65%-70%
3 min	70%-75%
4 min	75%-80%
5 min	80%-85%
10 min	85%-95%

http://pediatrics.aappublications.org/content/early/2010/10/18/peds.2010-2972E.citation

1. Turn Masimo unit O

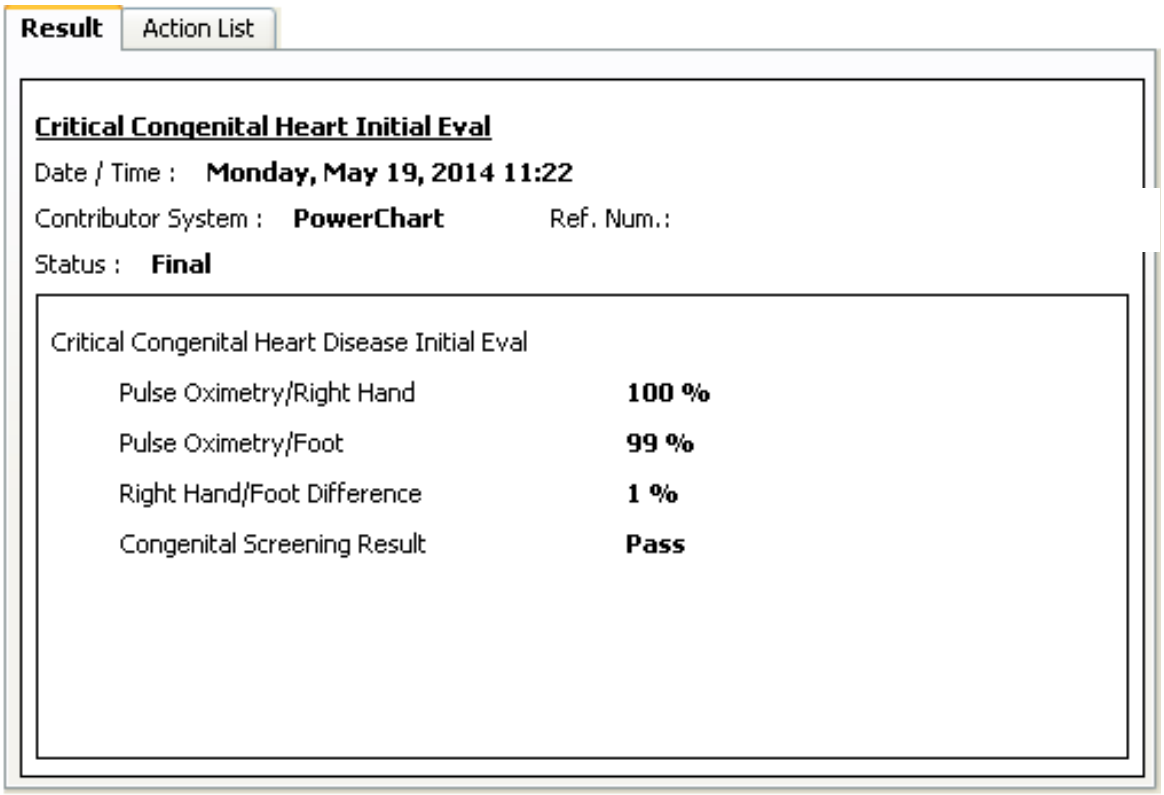
2. Attach sensor wire tape to infant's palmer aspect of RIGHT hand or radial area of RIGHT wrist (longer sensor tape), or RIGHT thumb (smaller sensor tape). This is PRE ductal placement. (Always apply sensor tape to baby **BEFORE** connecting this wire to the cable coming from machine.) The "red lit" area circle should be directly opposed to the non - lit circle on the tape.

3. Then, connect sensor tape wire (already connected to baby) to the white cable that is attached to machine.

4. See chart above for normal SpO2 values changes with each minute of life.

What issues came up?

- Cost associated with screening
- Special circumstances: early discharge, home births
- Process for Pediatric Cardiology evaluation in settings without service
  - After a failed screen, the first step is to examine the infant to make sure the baby is hemodynamically stable, and then begin the process of evaluation for hypoxemia. Depending on the status of the baby, this could involve evaluating for sepsis or pneumonia. Any signs or symptoms of congenital heart defect should prompt rapid evaluation, including potential urgent transfer to a center with advanced care capabilities.
  - If the baby is asymptomatic and otherwise well, with no obvious cause for hypoxemia, a cardiologist or neonatologist should be consulted and an echocardiogram should be performed. Newborns should not be discharged home until the underlying reason or hypoxemia has been identified or the hypoxemia has resolved. Remember, these babies will often appear normal and have no clinical findings other than the low oxygen saturation. Still, a careful and thorough evaluation is necessary.
  - In addition, it is critical to remember that CCHD screening does not detect all cases of serious congenital heart defect. For example, coarctation of the aorta can be life threatening in early infancy, but may not be associated with hypoxemia.


Result
Action List
Critical Congenital Heart Initial Eval
Date / Time : Monday, May 19, 2014 11:22
Contributor System : PowerChart
Ref. Num.:
Status : Final
Critical Congenital Heart Disease Initial Eval
Pulse Oximetry/Right Hand 100 %
Pulse Oximetry/Foot 99 %
Right Hand/Foot Difference 1 %
Congenital Screening Result Pass

Quality assurance activities

- Parent education
  - Was education provided?
  - Was education provided in the preferred language?
- Every baby screened
  - If a miss, why?
  - Do you have a policy that addresses transfers to a different level of care/another facility?
  - What if a parent refuses?
- Screeners following protocol
  - Education/training
  - Documentation
  - Knowledgeable re: process for notify LIP?
- Completeness/quality of screening data
  - Captured electronically
  - Data reviewed?
- Completeness/quality of data for CCHD positive r/t Congenital Malformation Registry

THANK YOU!

Contact

MARINA.SEPOWSKI@HEALTH.NY.GOV

Continuing Education Credits

Evaluation and post-test located here:

http://www.albany.edu/sph/cphce/mch_cchd.shtml