



Children's National
Medical Center

Congenital Heart Disease Screening Program

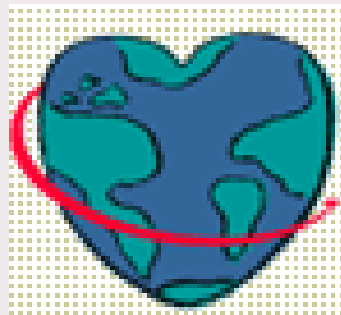
November, 2011



A Parent's Perspective

“Over the eleven years since I started C.H.I.N., hardly a day goes by when I do not hear from a distraught parent whose child was not diagnosed at birth, leading to tragic or serious life-long consequences”

Mona Barmash, President of Children's Heart Information Network
JCCHD Meeting, Fall 2007



Congenital Heart Disease

- ♥ Congenital heart disease (CHD) is the most common birth defect and occurs in 8 per 1,000 live births
- ♥ Critical CHD – Forms of CHD that are usually associated with hypoxia in the newborn period and require intervention during the first months of life
- ♥ Critical CHD accounts for approximately 1/3 of all CHD¹

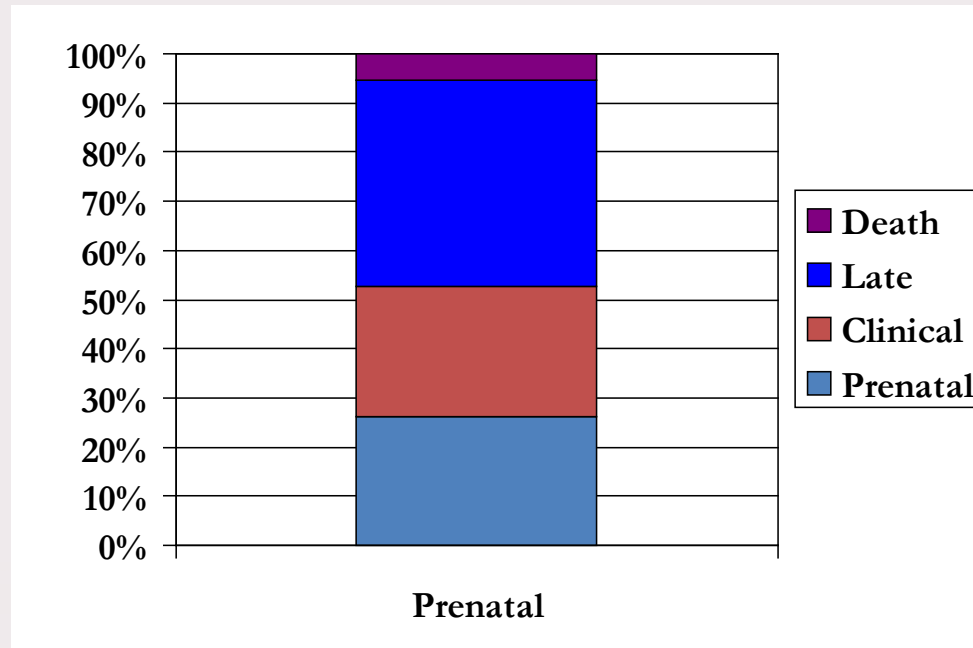
Congenital Heart Disease

CHD is important cause of morbidity & mortality in infants:

- ♥ Accounts for approximately 40% of deaths from congenital anomalies²
- ♥ Majority of deaths occur among infants during the first year of life²
- ♥ 10% of infants who died with CHD before one year of age were first diagnosed with CHD at the time of autopsy³

Congenital Heart Disease

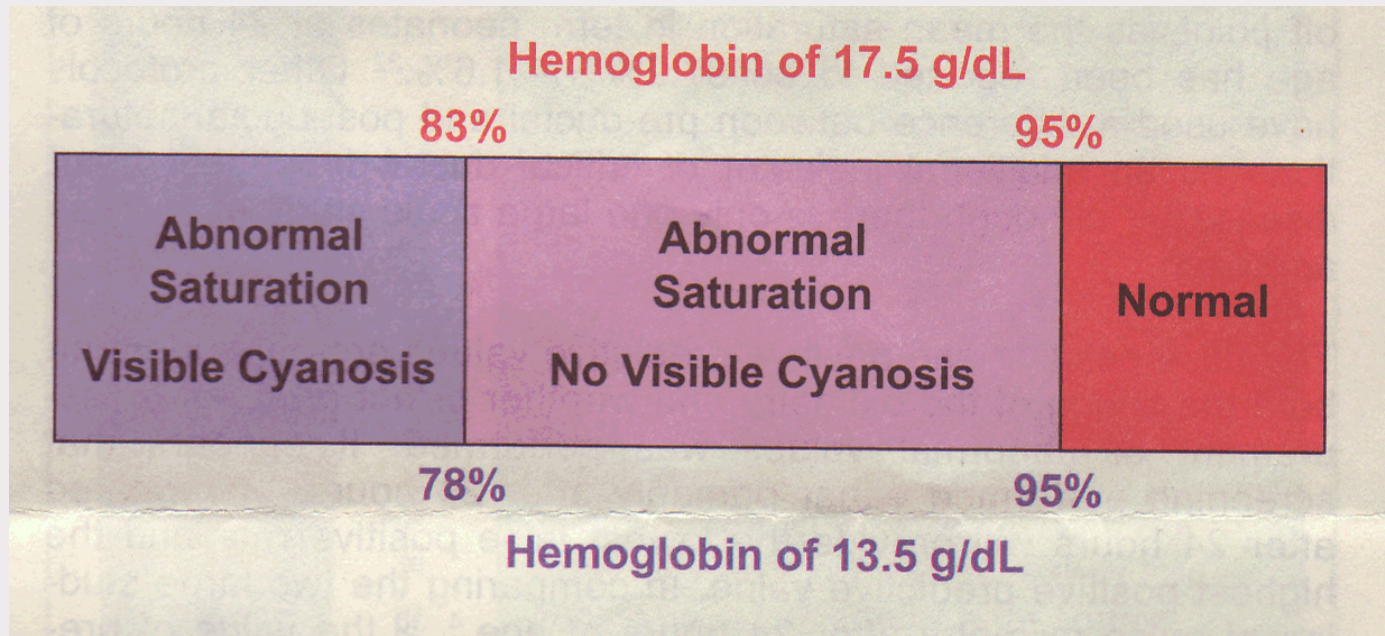
- ♥ Over the past 40 years there have been improvements in survival due to improved surgical outcomes
- ♥ There is still room for improvements in the detection of critical CHD



Why is CCHD Missed?

Visual recognition of cyanosis is difficult

Mean threshold for detection 69% ⁴



Pulse Oximetry

- ♥ A painless and non-invasive way of measuring the oxygen saturation of hemoglobin in the arterial blood.
- ♥ Routine to clinical care, often thought of as the 5th vital sign.



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Pulse Oximetry

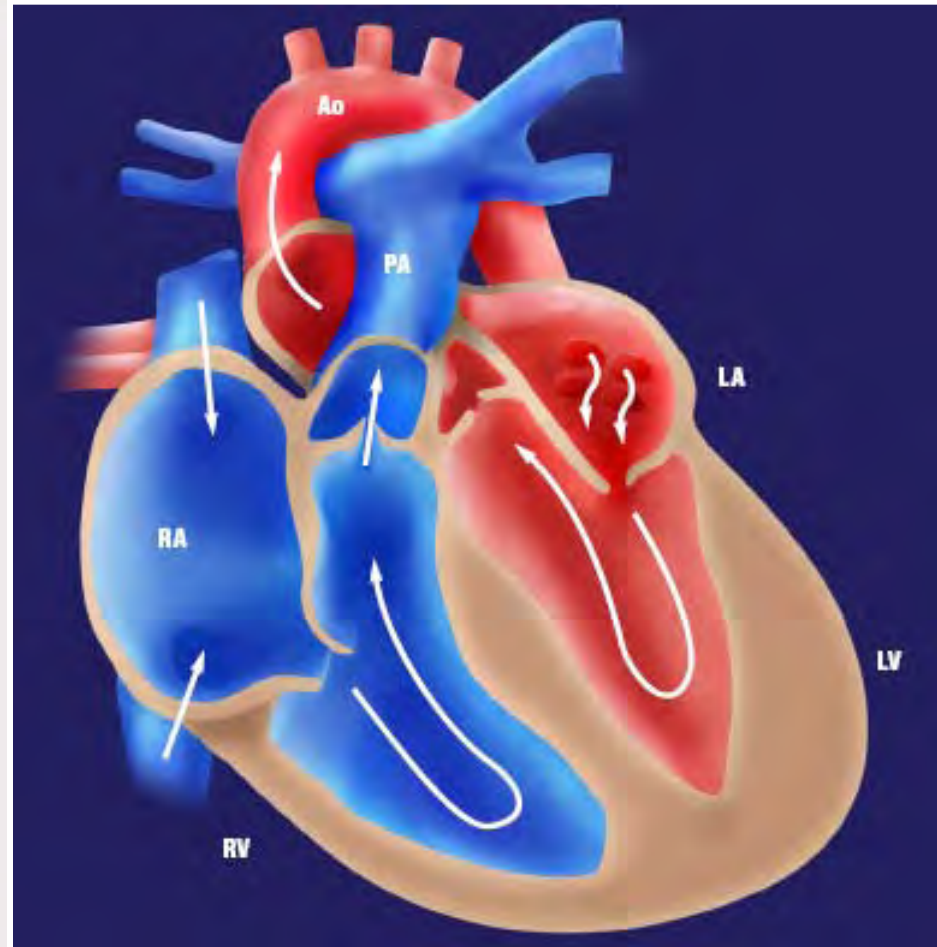
How Does Pulse Oximetry Work?

- ♥ Dependent on Heart Beat as arterial blood vessels contract/expand with each HB
- ♥ Red (R) and Infrared (IR) Light are transmitted via Light Emitters to a Photodetector
- ♥ Oxygenated and Deoxygenated Hb absorb different amounts of both R and IR light
- ♥ A ratio of the light absorbed by the photodetector correlates for oxygen saturation of hemoglobin in the arterial blood

Pulse Oximetry as a Screening Method

Normal Heart

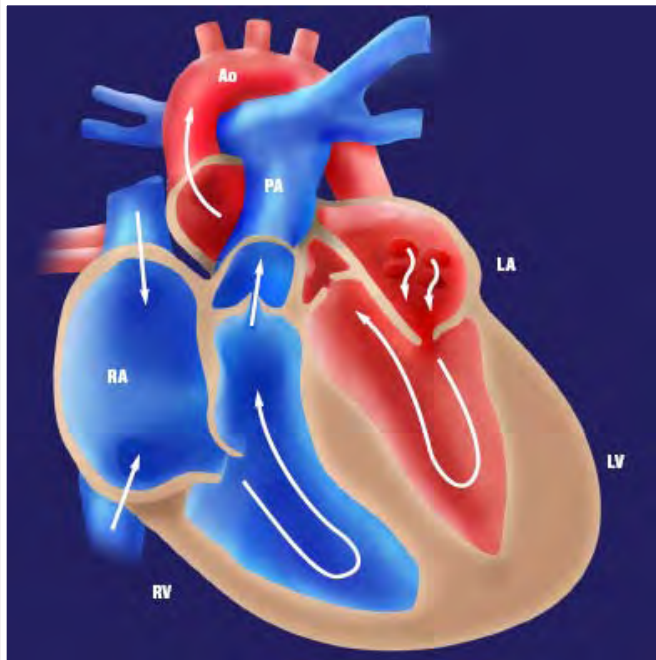
No Mixing of Systemic and Pulmonary Venous Blood Flow



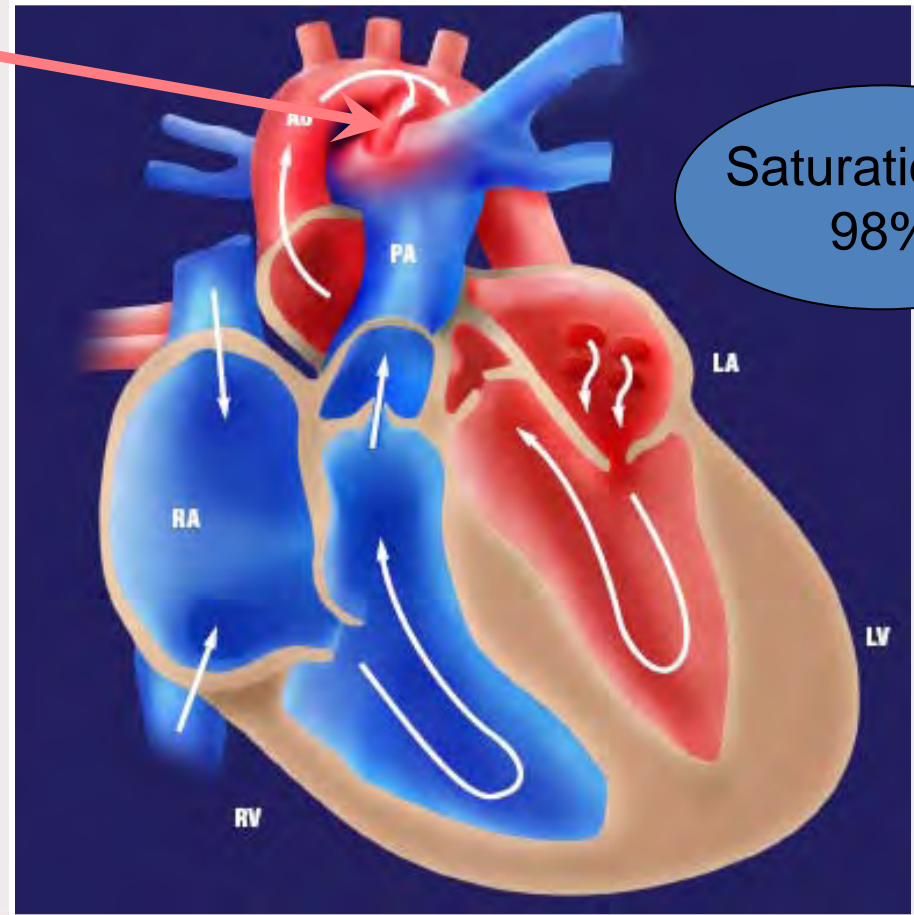
Saturation of
100 %



Fetal Circulation



PDA

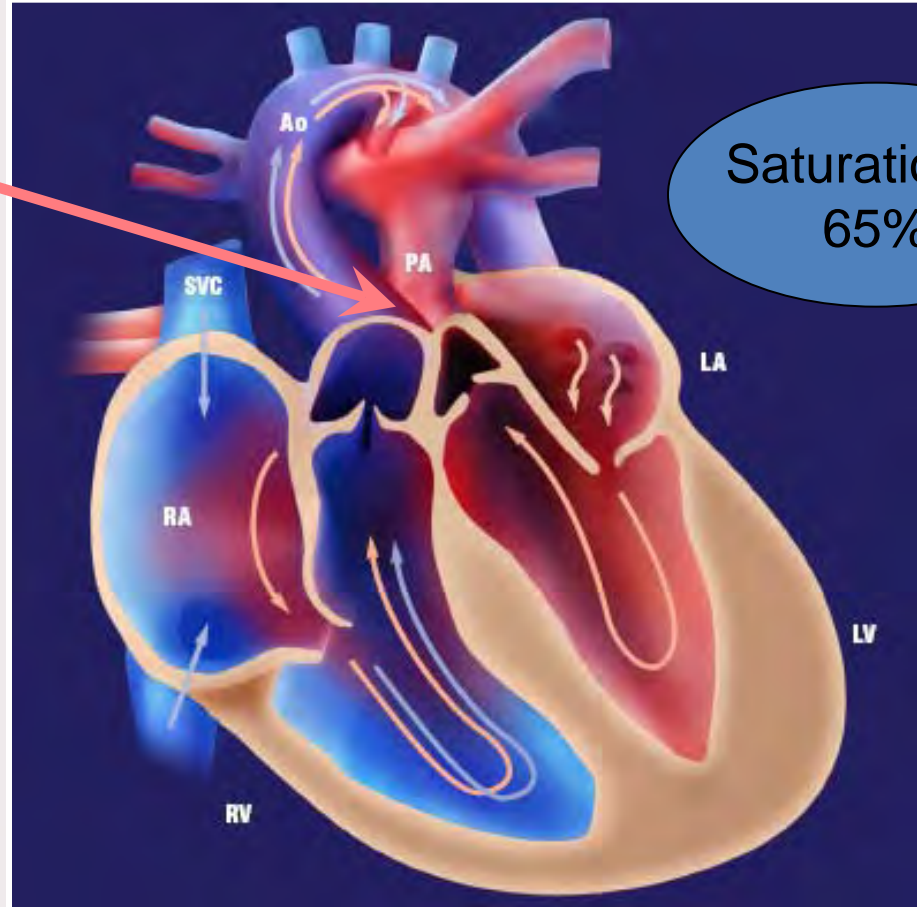
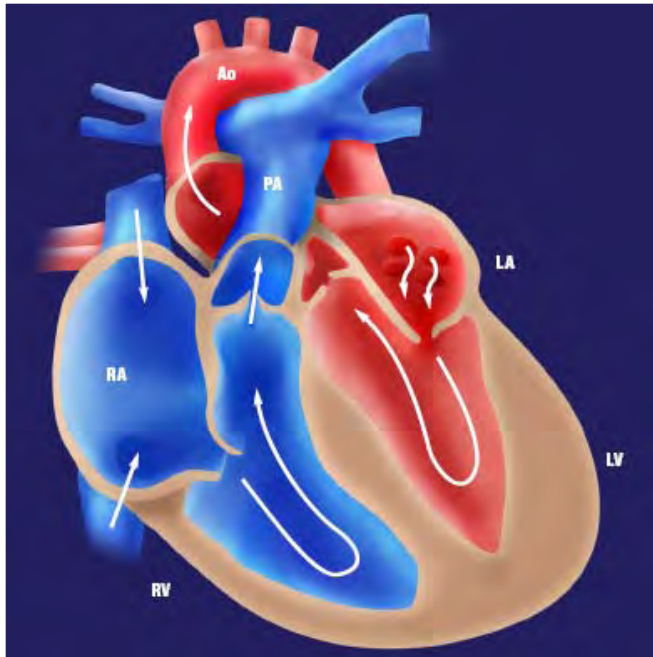


Saturation of
98%



Transposition of the Great Arteries

TGA



Pulse Oximetry as Screening Method

- ♥ Highest sensitivity (true positives) and highest specificity (true negatives) associated with screening the right hand and one foot, using a cut-off of less than 95% or a greater than 3% difference between the two ⁵
- ♥ Best outcomes may be found when physical examination is paired with pulse oximetry screening.
- ♥ September 21, 2011- Health and Human Services Secretary Kathleen Sebelius **endorsed adding screening for CCHD to the recommended universal screening panel** ⁶

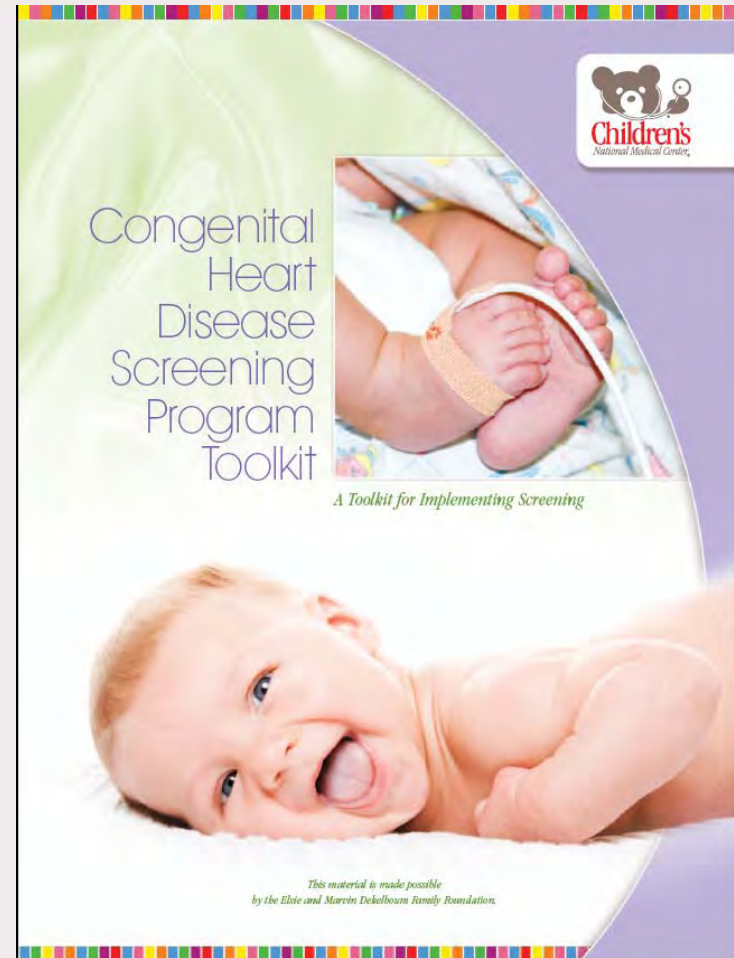
Vision

All infants with critical congenital heart disease are detected before leaving the newborn nursery.

Congenital Heart Disease Screening Program

Program Aims:

- ♥ Implement pulse oximetry screening programs for the detection of critical CHD in newborn nurseries
- ♥ Minimize obstacles encountered while performing pulse oximetry screening methods
- ♥ Screen 100% of infants eligible for screening
- ♥ Detect critical CHD before clinical deterioration of infant



Congenital Heart Disease Screening Program

- ♥ Who is eligible to be screened?
 - All infants that are at least 24 hours of age

- ♥ How will mothers be educated about screening?
 - Prenatal
 - Tours and Prenatal Classes
 - OB/GYN Clinics
 - Newsletters and Hospital Websites
 - Postnatal
 - Prior to screening

Placement of Pulse Oximetry Probe

Application with
Disposable Probe



“Star to the Sky”

Application with
Reusable Probe



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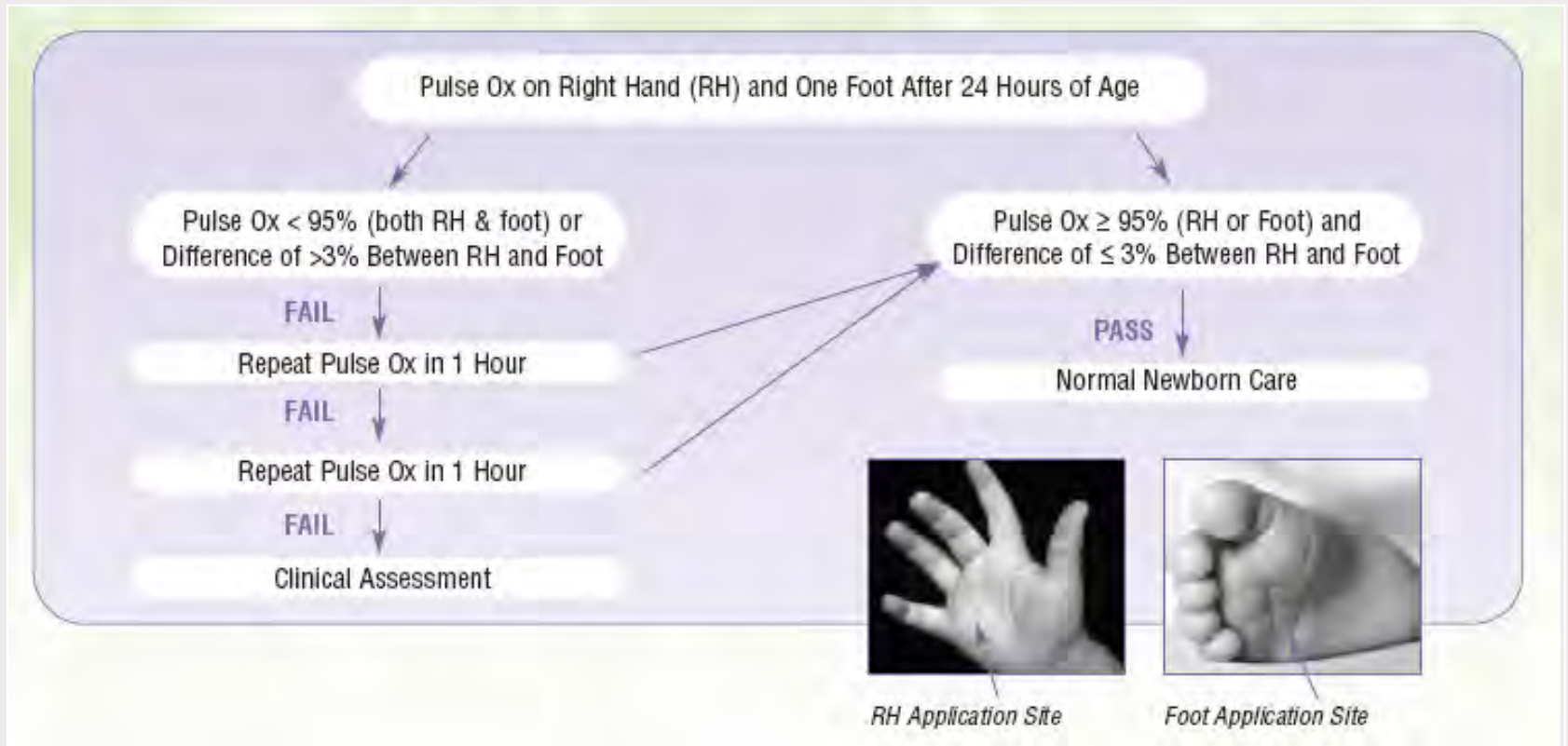
“Raise the (Red) Bar”



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Medical Center®

Congenital Heart Disease Screening Program

Screening Protocol 7, 8



Recommendations for Follow Up

ASSESSMENT OF BABIES WITH FAILING SATURATIONS

1. Babies with saturation of $< 90\%$ in RH or foot should have immediate assessment.
2. Babies with Failing Saturations:
 - Clinical Assessment
 - Infectious and Pulmonary pathology should be excluded
 - Complete echocardiogram
 - If symptomatic, referral to Pediatric Cardiology immediately
 - If asymptomatic referral to Pediatric Cardiology in timely manner

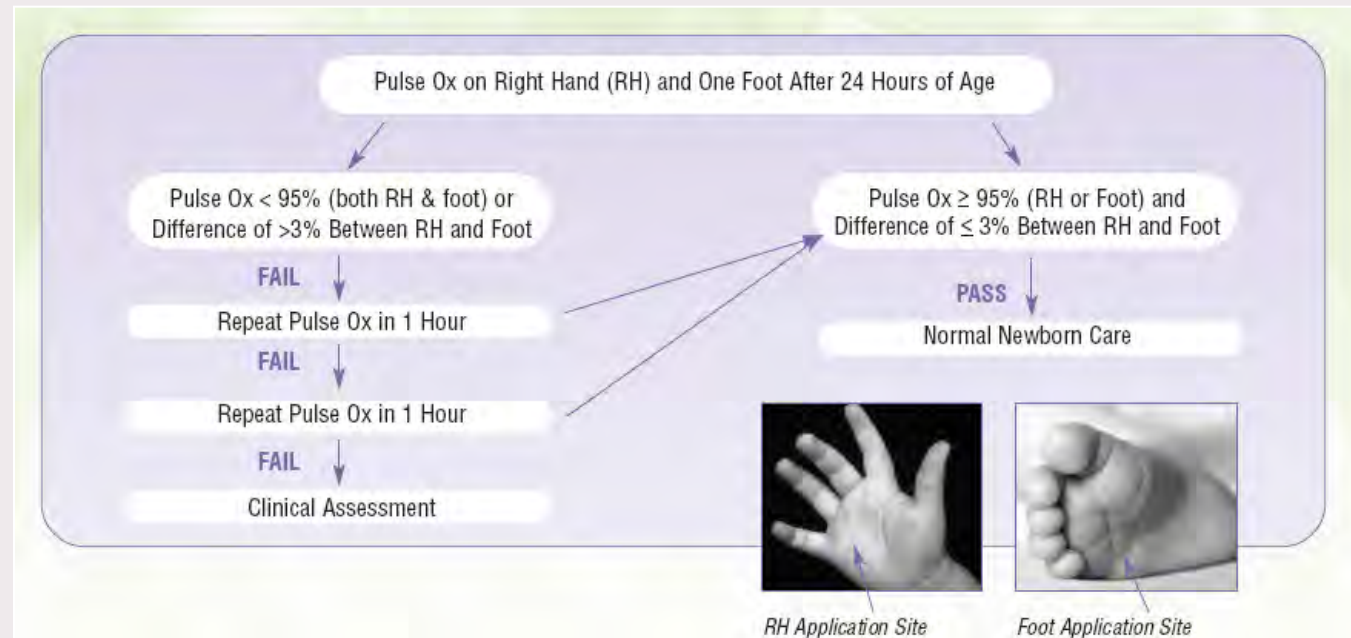
Example 1

UE Sat - 100%

LE Sat - 96%

a. PASS

b. FAIL



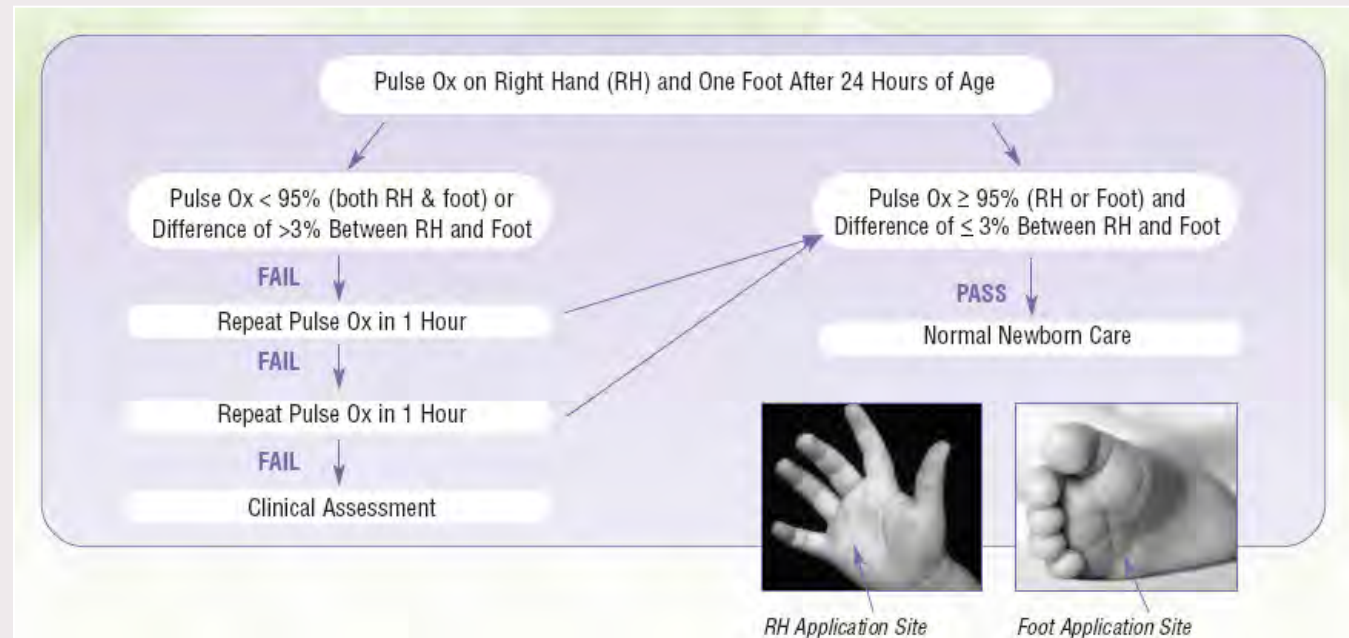
Example 1

UE Sat - 100%

LE Sat - 96%

a. PASS

b. **FAIL**



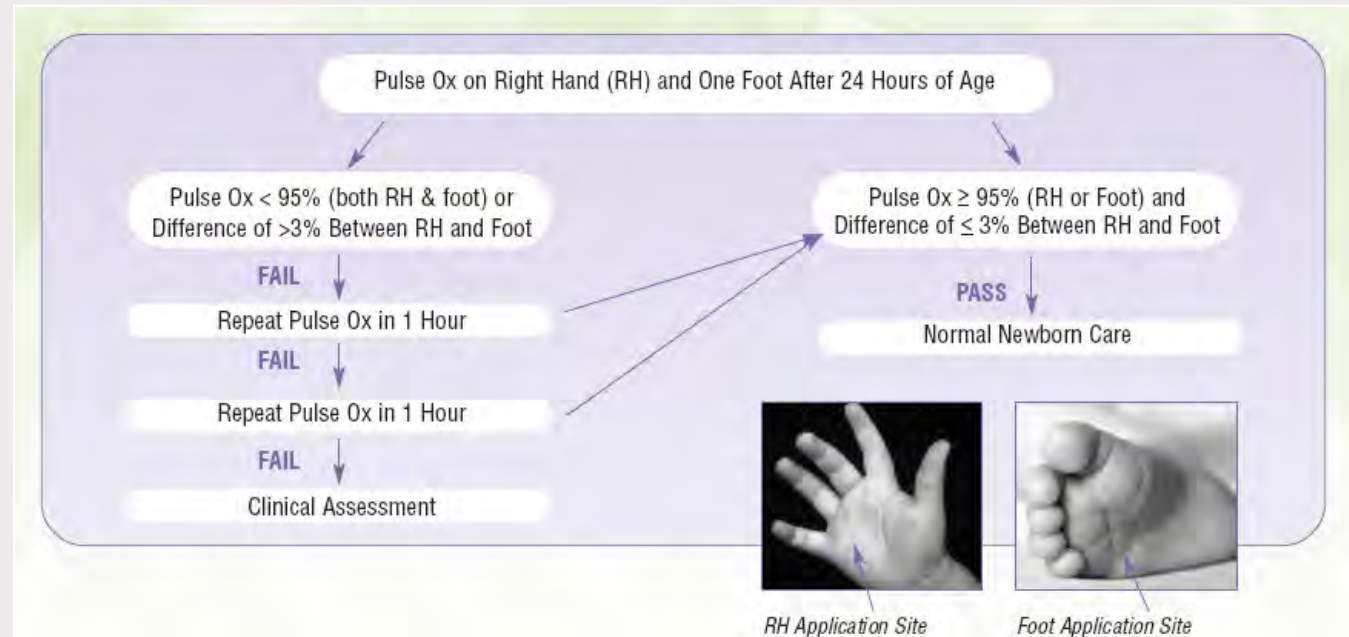
Example 1

2nd Screen:

UE Sat – 99%

LE Sat – 98%

- PASS
- FAIL



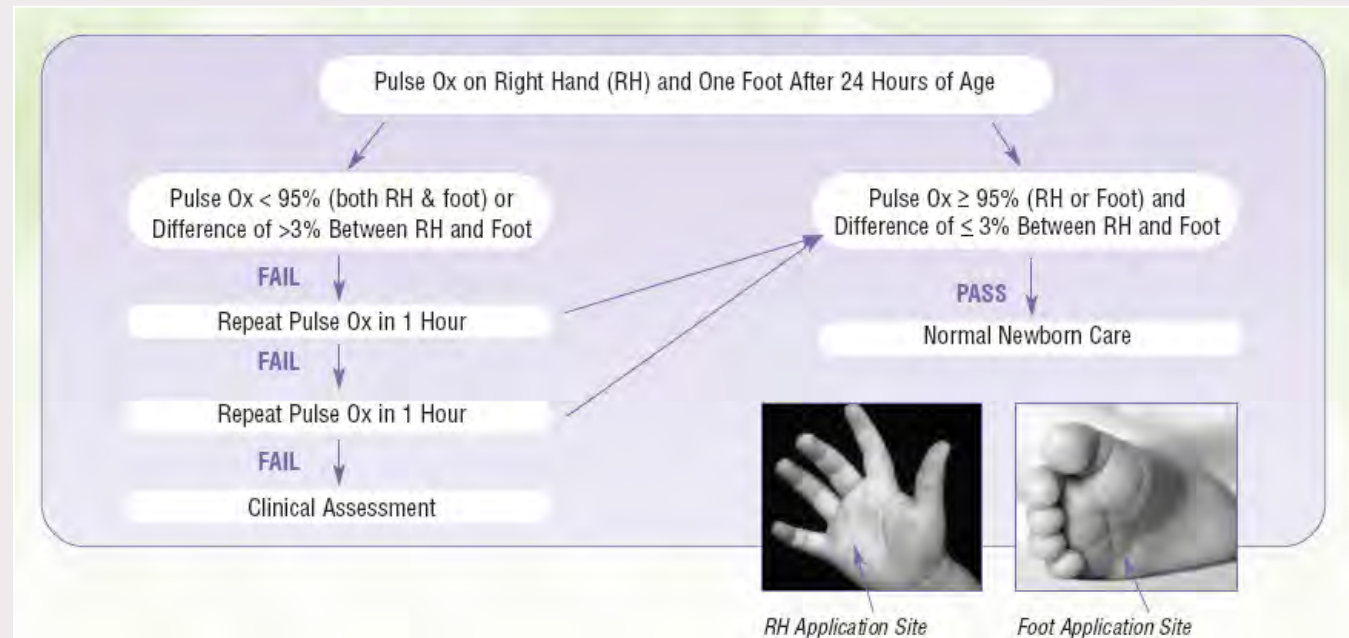
Example 1

2nd Screen:

UE Sat – 99%

LE Sat – 98%

- **PASS**
- FAIL



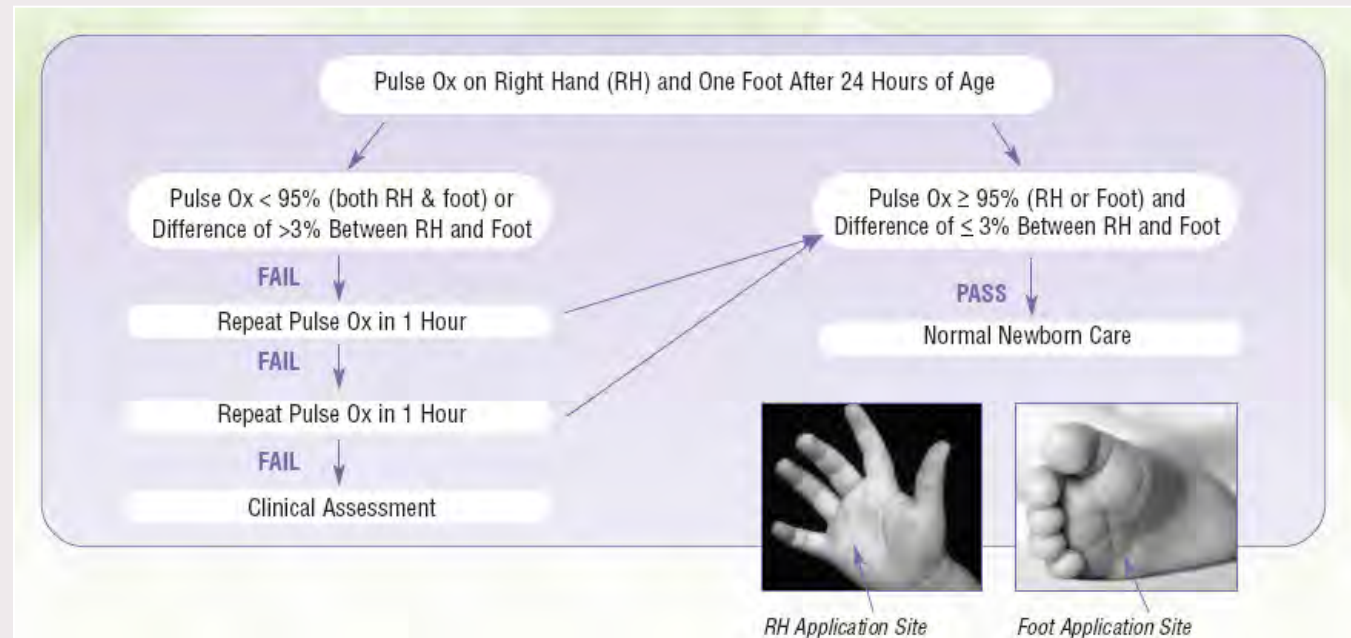
Example 2

UE Sat - 96%

LE Sat - 94%

a. PASS

b. FAIL



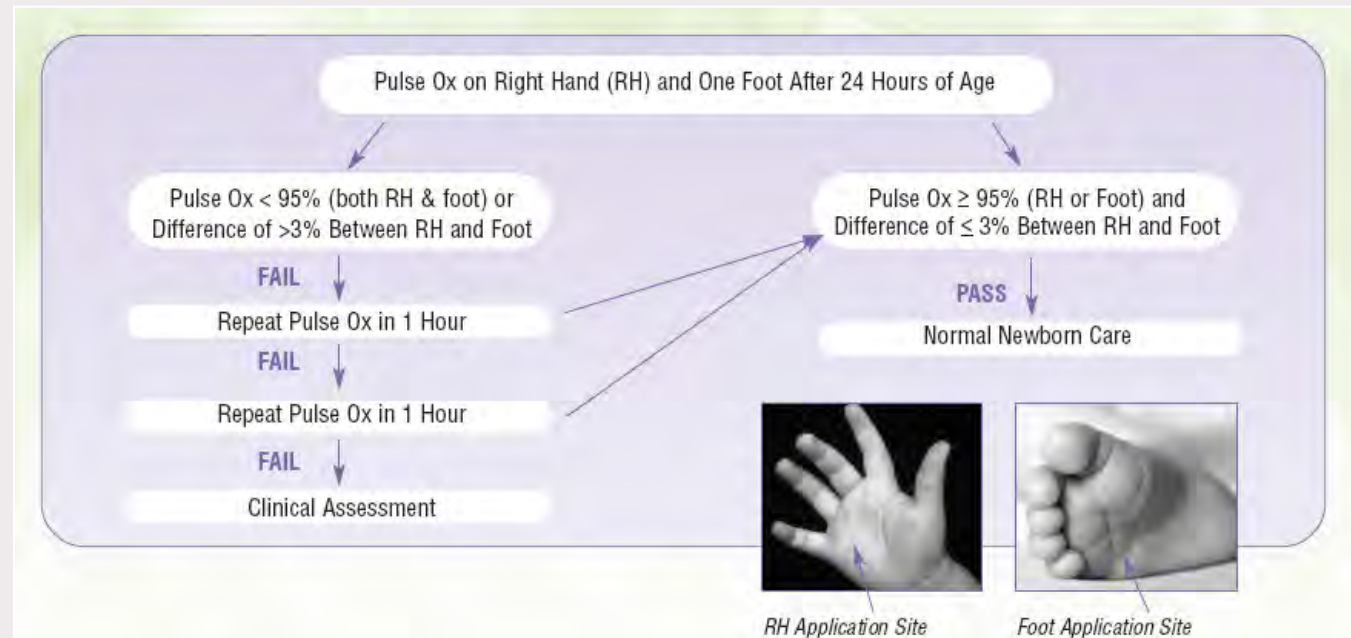
Example 2

UE Sat - 96%

LE Sat - 94%

a. **PASS**

b. **FAIL**



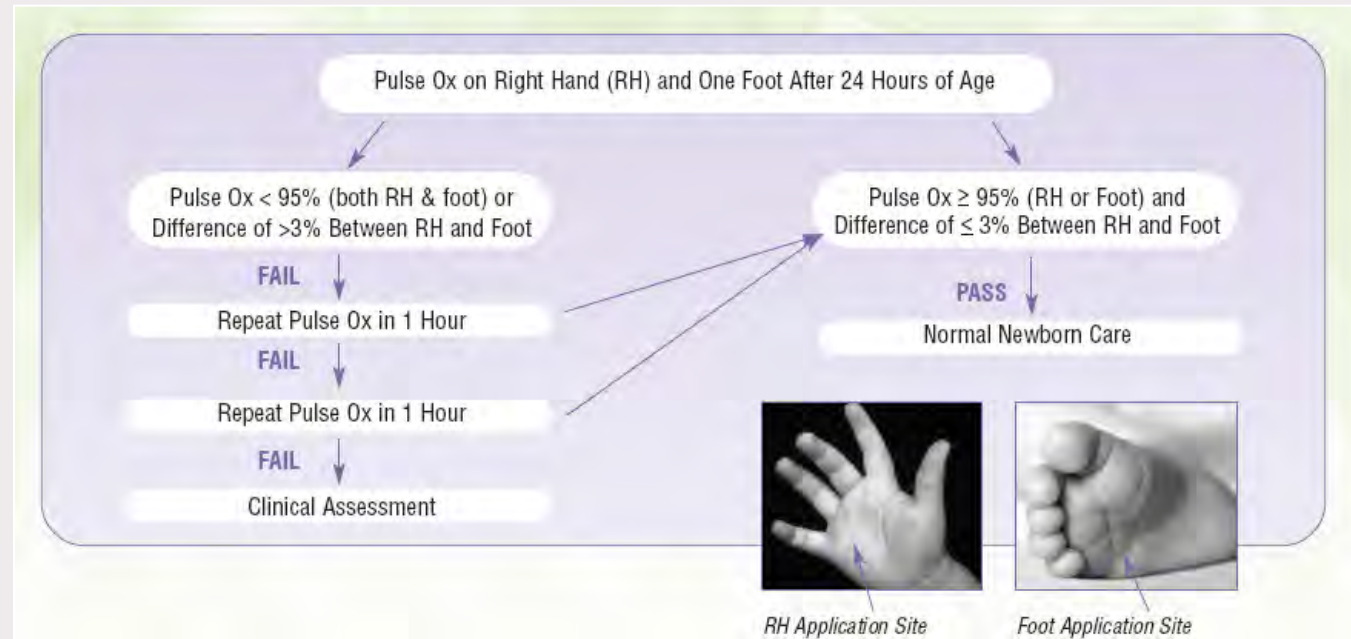
Example 3

UE Sat - 89%

LE Sat - 87%

a. PASS

b. FAIL



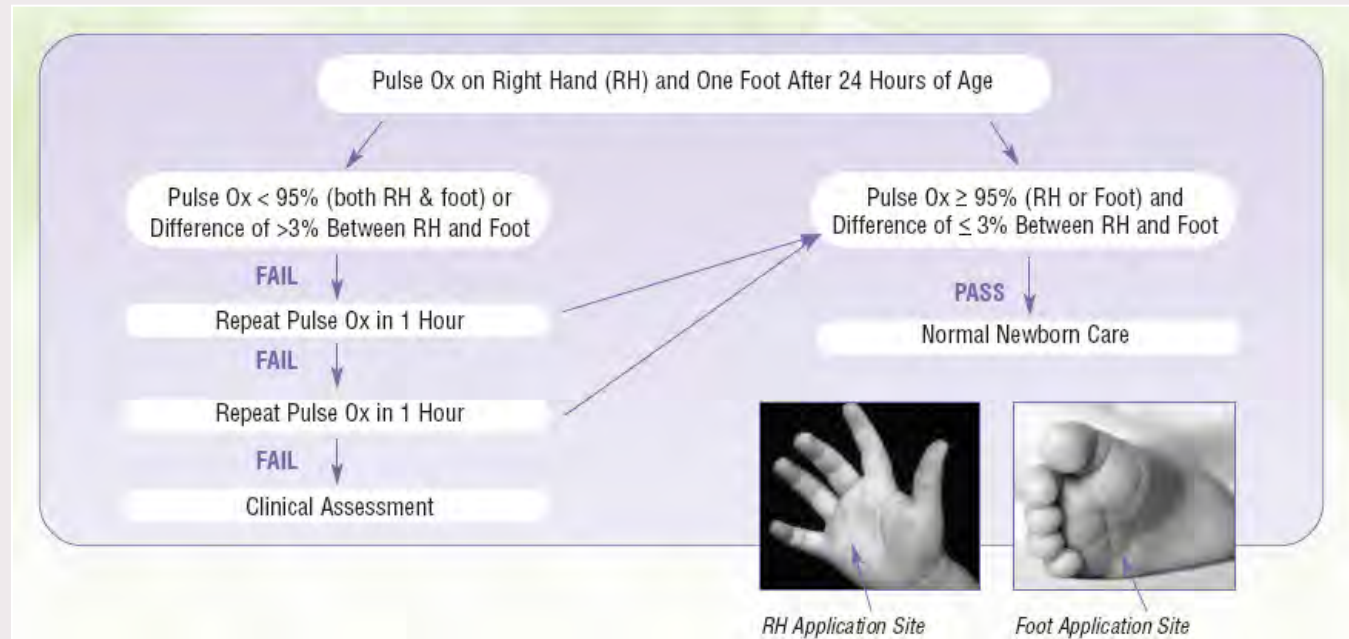
Example 3

UE Sat - 89%

LE Sat - 87%

a. PASS

b. **FAIL**



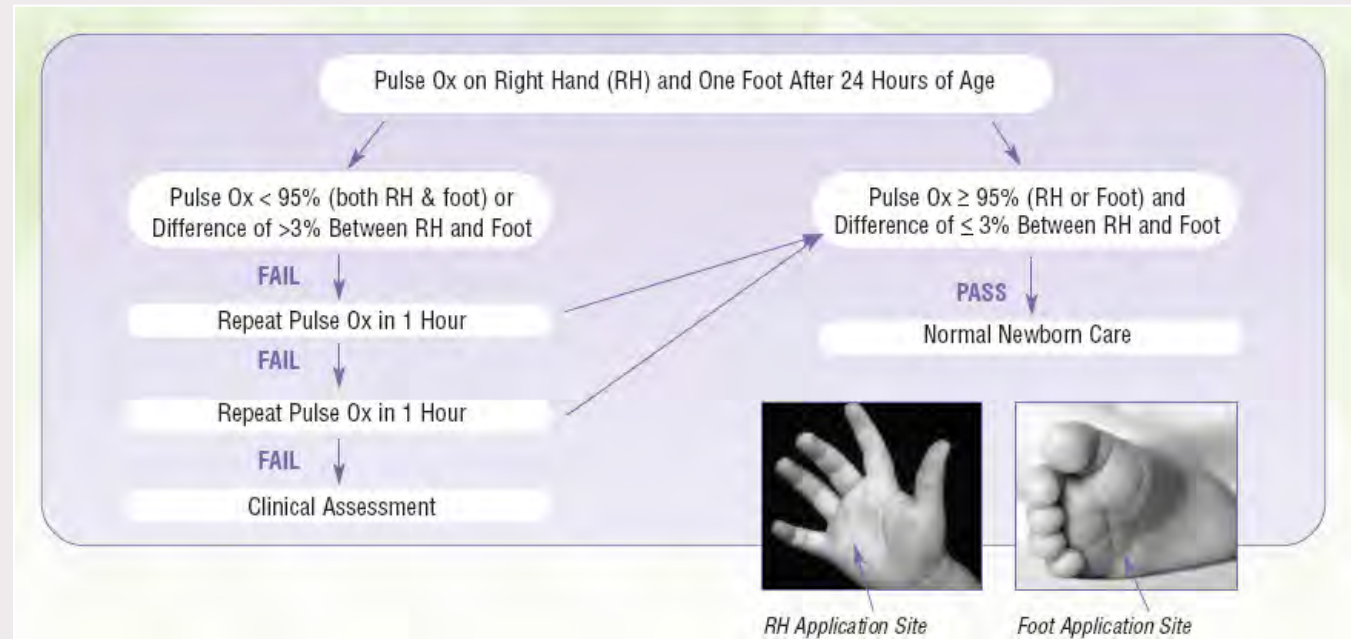
Example 4

UE Sat - 92%

LE Sat - 96%

a. PASS

b. FAIL



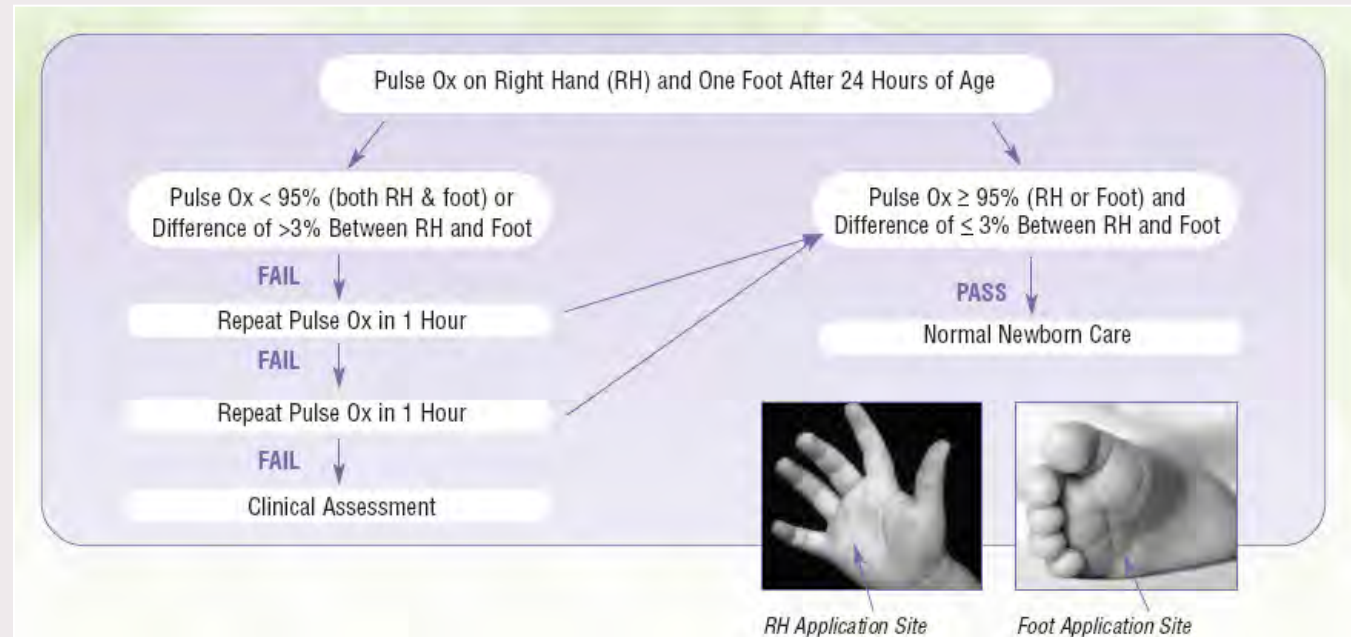
Example 4

UE Sat - 92%

LE Sat - 96%

a. PASS

b. **FAIL**



Example 4

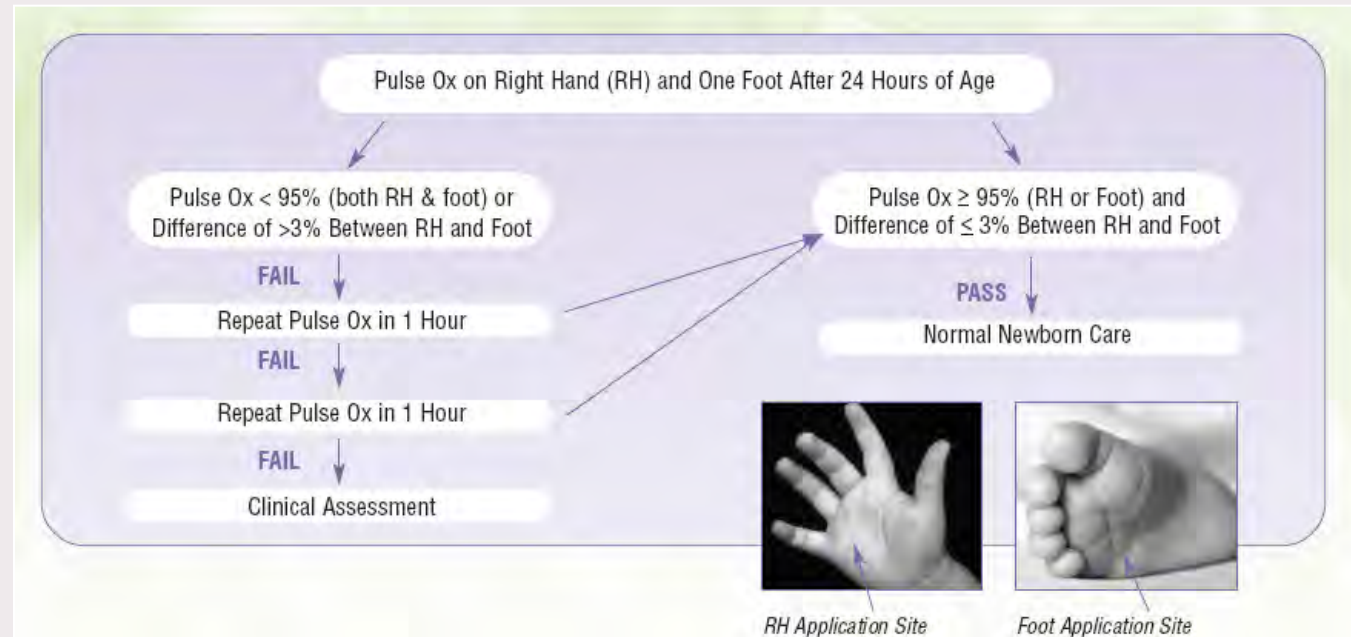
2nd Screen

UE Sat - 92%

LE Sat - 94%

a. PASS

b. FAIL



Example 4

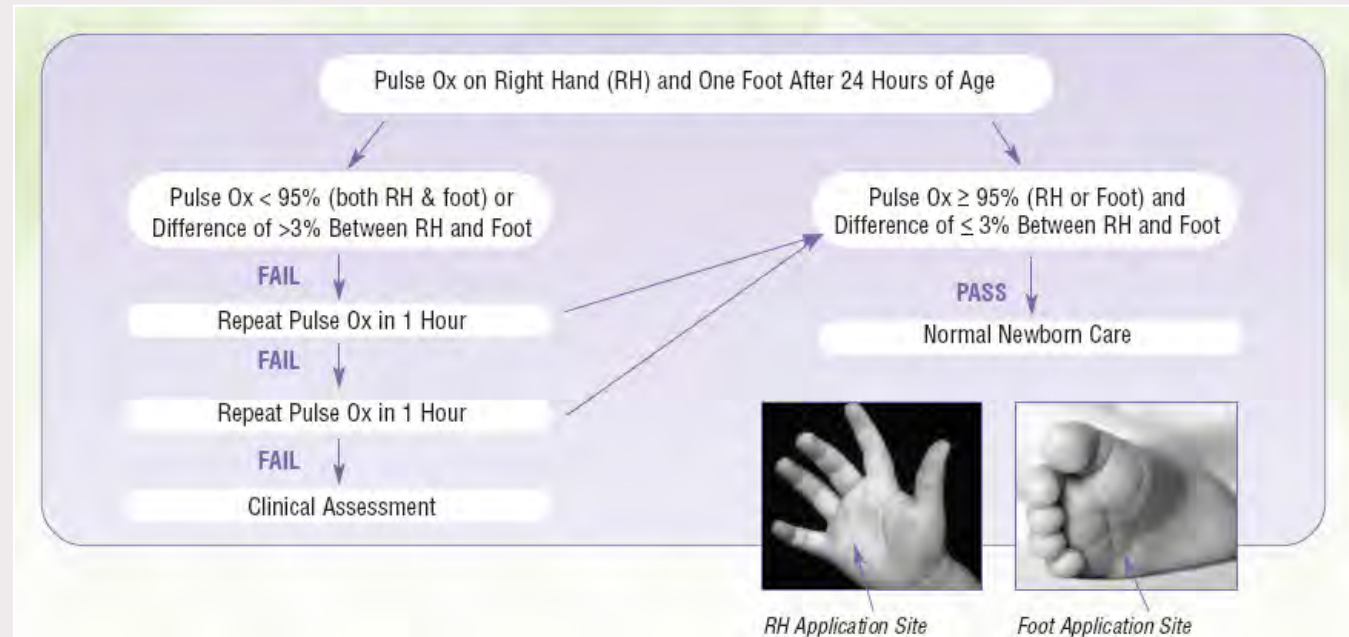
2nd Screen

UE Sat - 92%

LE Sat - 94%

a. PASS

b. **FAIL**



Example 4

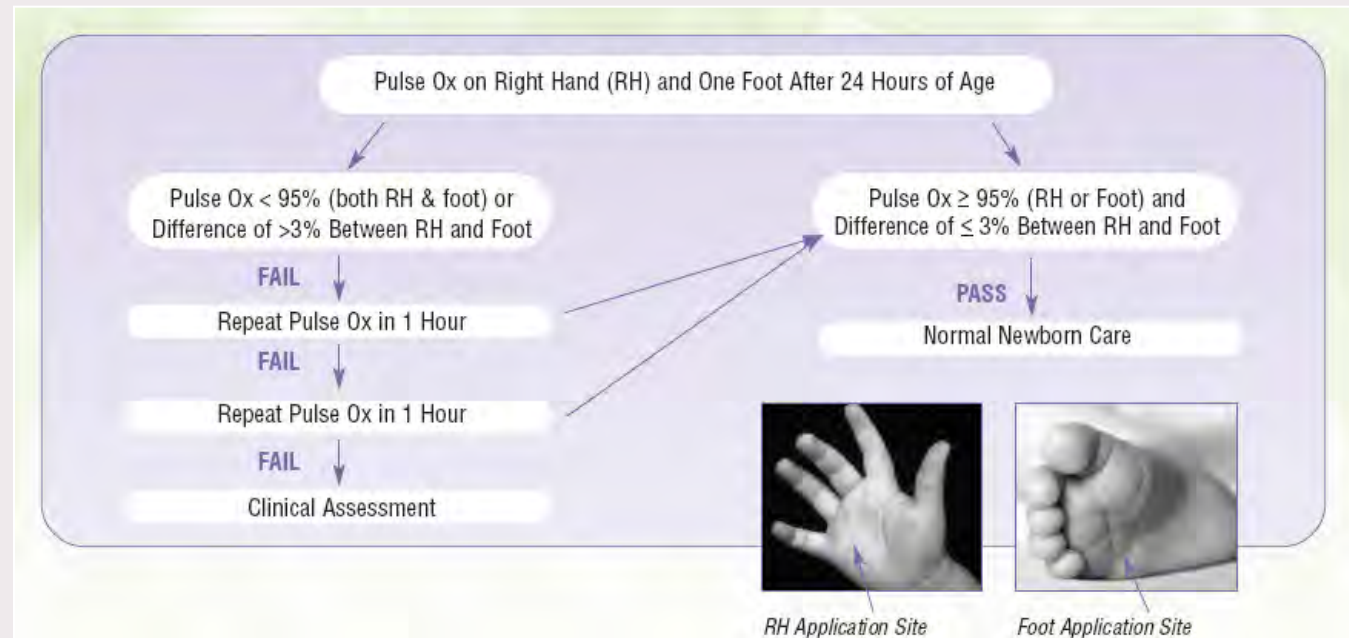
3rd Screen

UE Sat - 92%

LE Sat - 92%

a. PASS

b. FAIL



Example 4

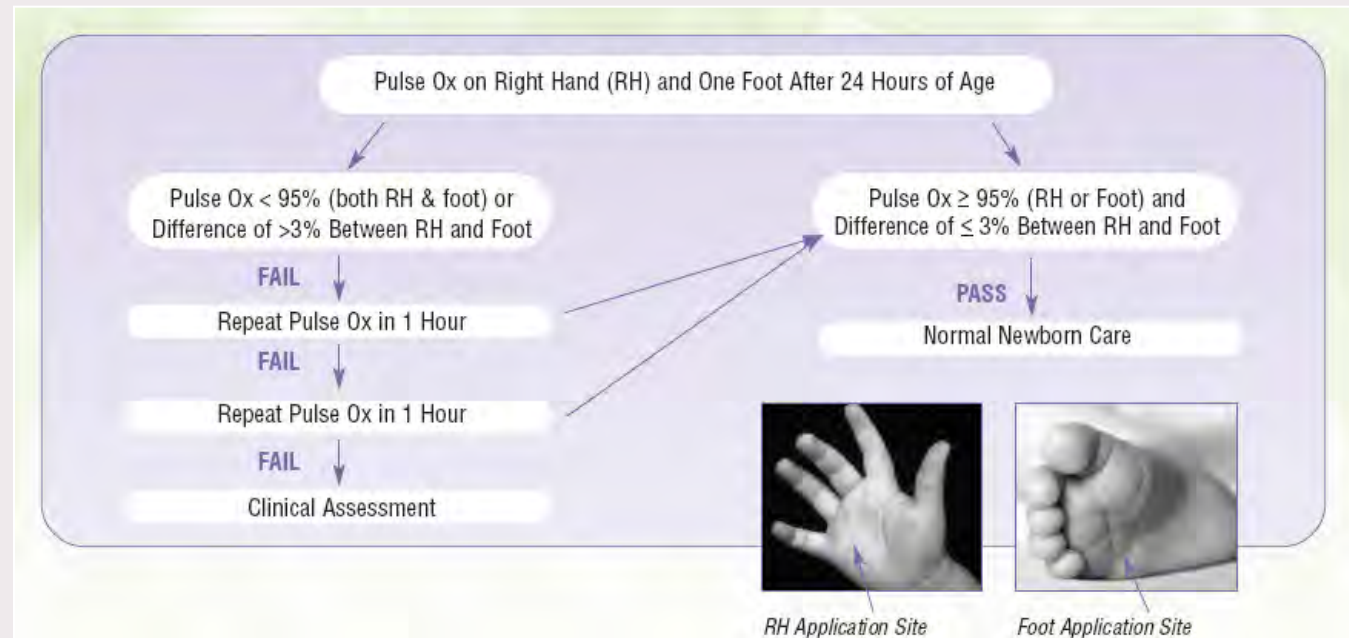
3rd Screen

UE Sat - 92%

LE Sat - 92%

a. PASS

b. **FAIL**



Congenital Heart Disease Screening Program

Questions?

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Congenital Heart Disease Screening Program

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