From Children's National Medical Center. Congenital Heart Disease Screening Program Toolkit: A Toolkit for Implementing Screening. Washington, DC: Children's National Medical Center; 2013.

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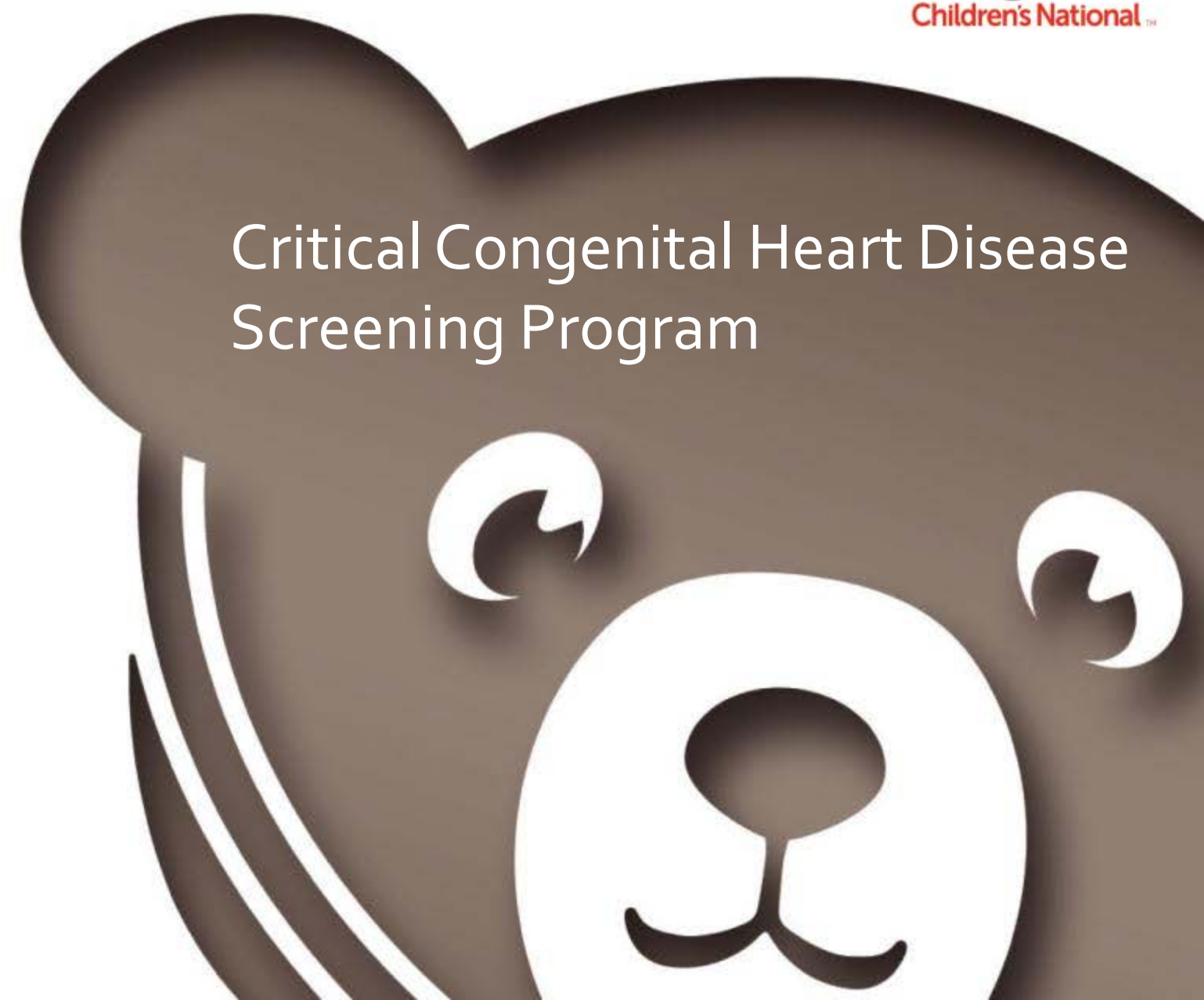
Critical Congenital Heart Disease Screening Program



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 Congenital Heart Information Network

JCCHD Meeting, Fall 2007

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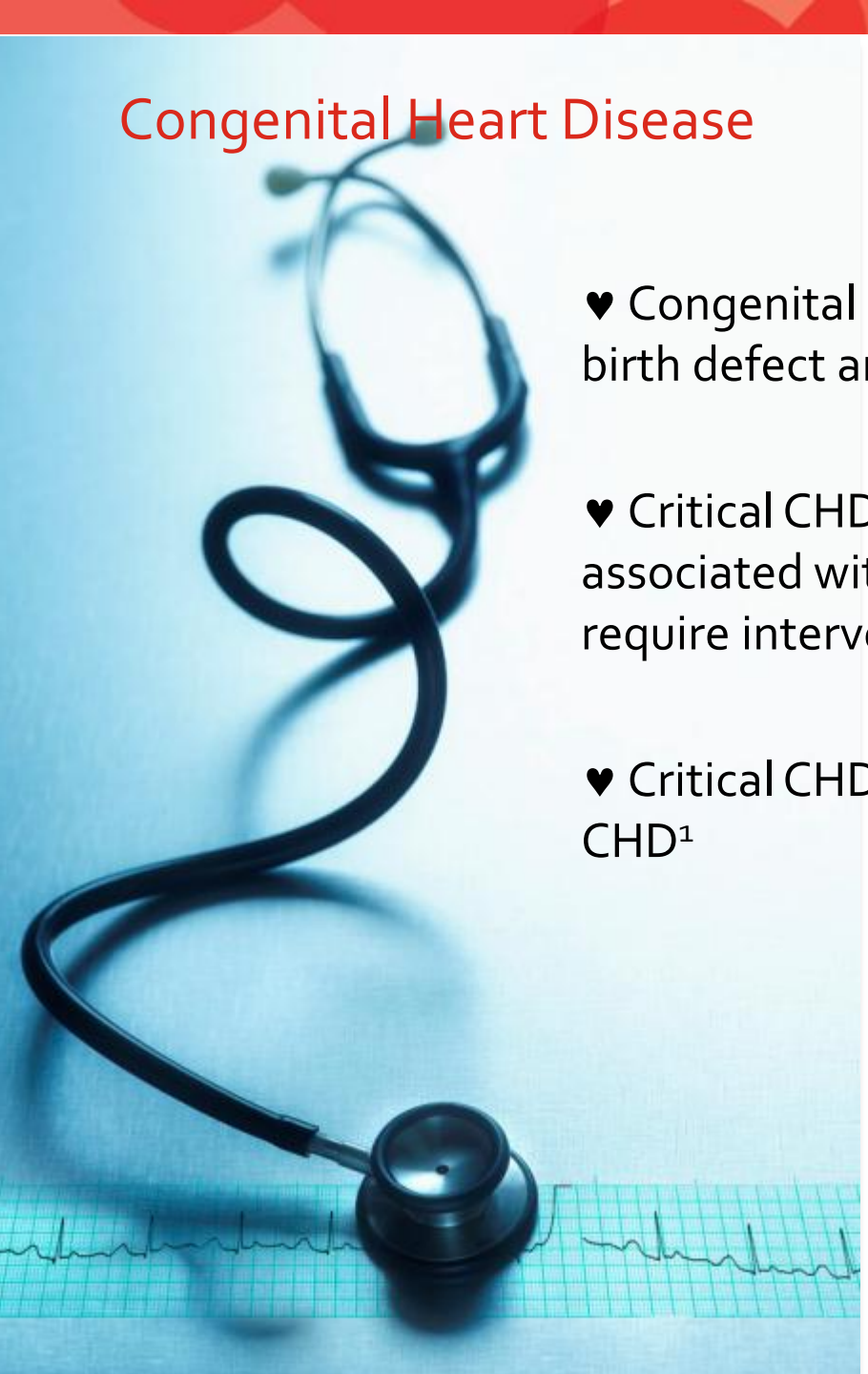
Congenital Heart Disease



♥ 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 CHD[1]

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Congenital Heart Disease

CHD is important cause of morbidity & mortality in infants:

- Accounts for approximately 40% of deaths from congenital anomalies[2]
- Majority of deaths occur among infants during the first year of life[2]
- 10% of infants who died with CHD before one year of age were first diagnosed with CHD at the time of autopsy[3]

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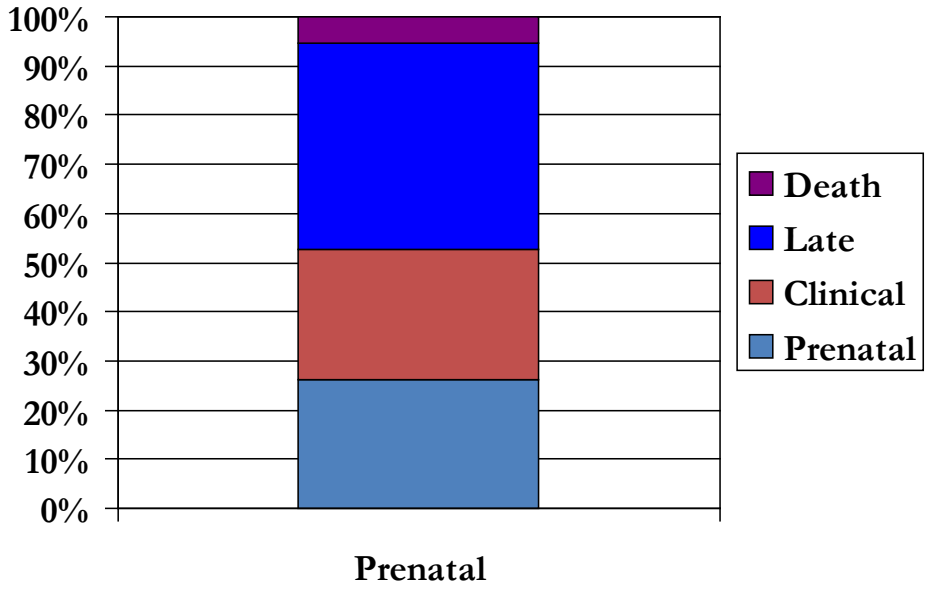
Congenital Heart Disease

- 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



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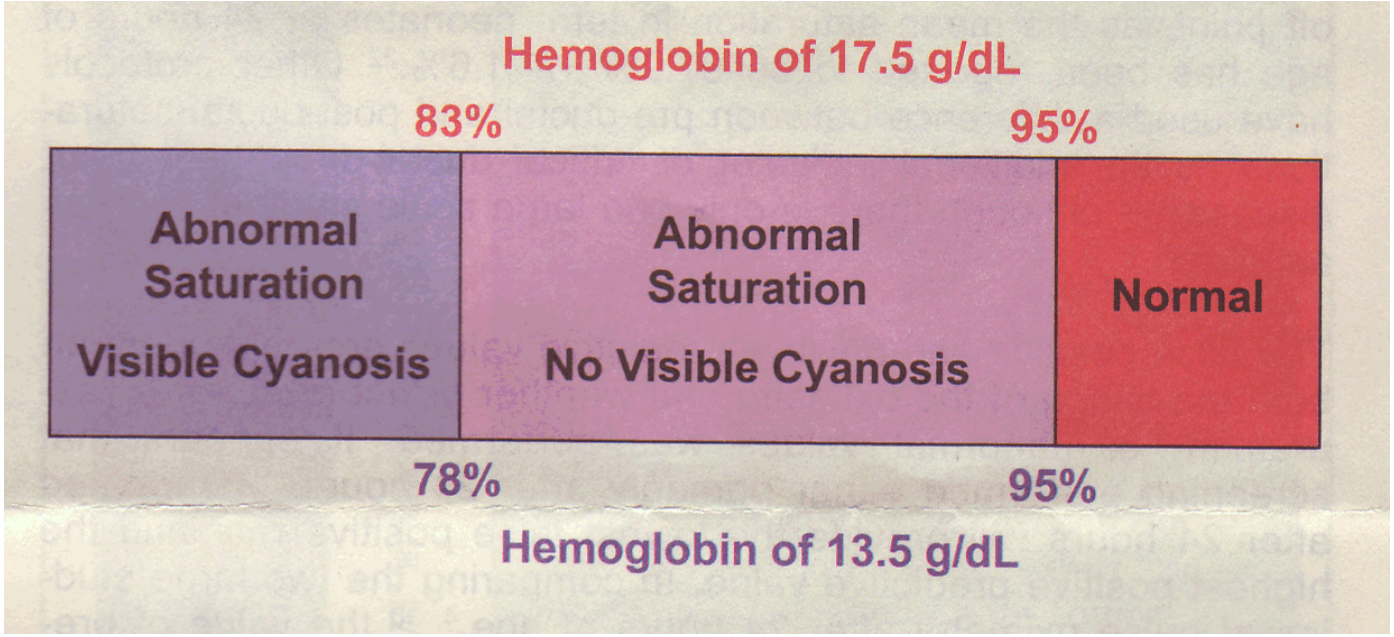
Why is CCHD Missed?

Visual recognition of cyanosis is difficult

Mean threshold for detection 69% [4]



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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

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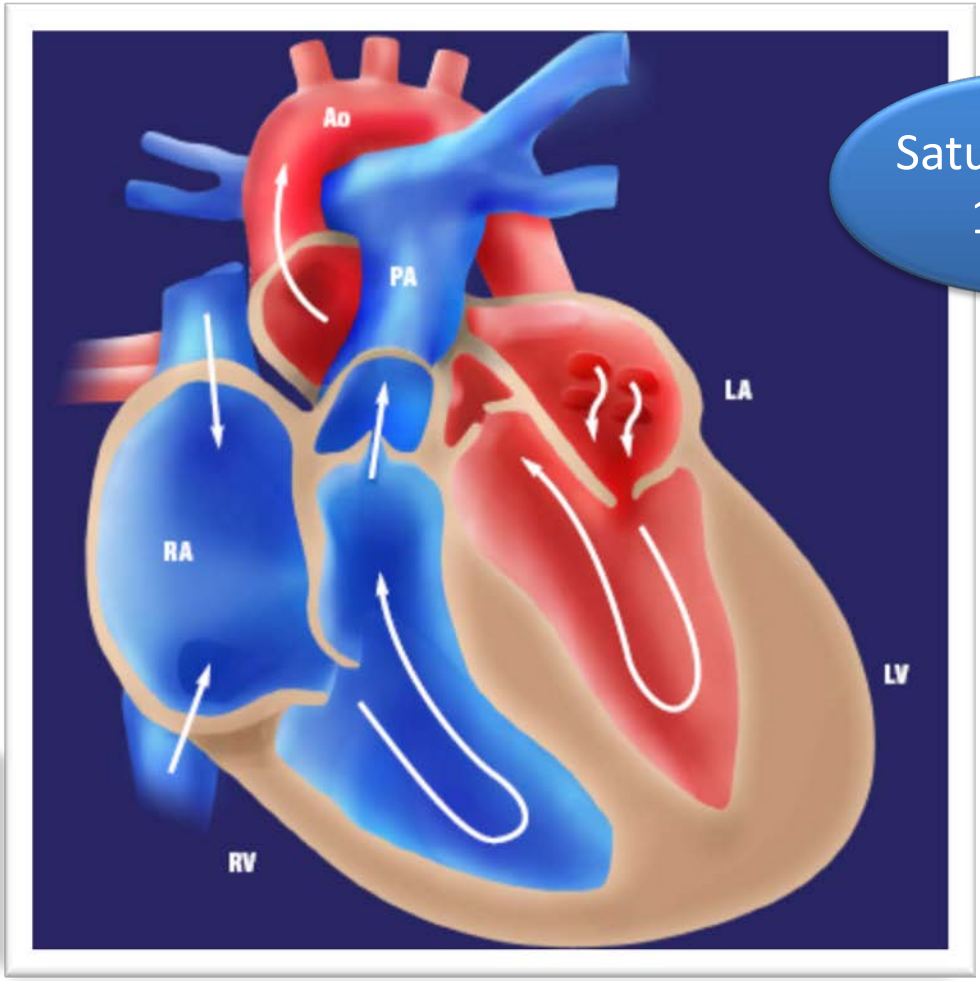
Pulse Oximetry as a Screening Method

Normal Heart

No Mixing of Systemic and Pulmonary Venous Blood Flow



Saturation of 100 %

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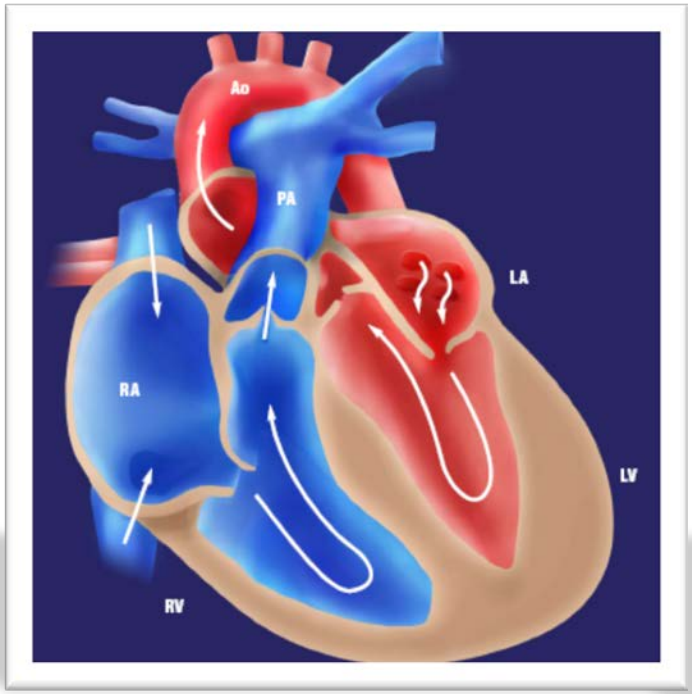
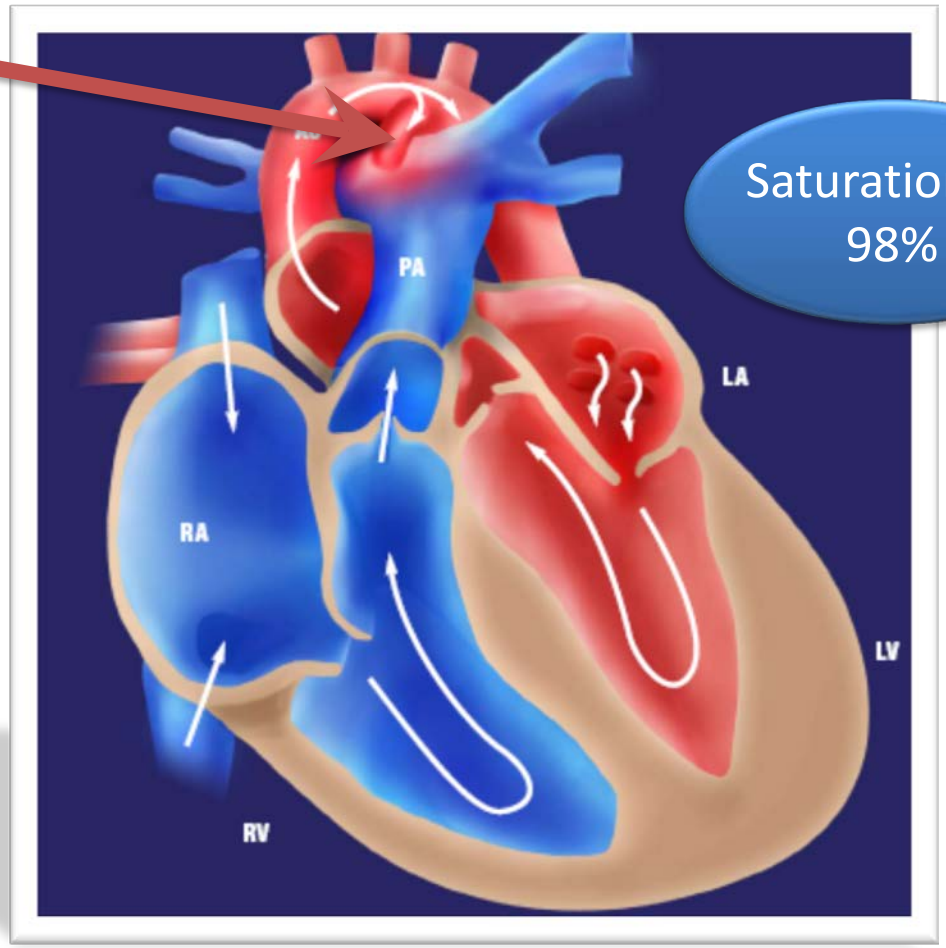
Fetal Circulation



PDA



Saturation of 98%

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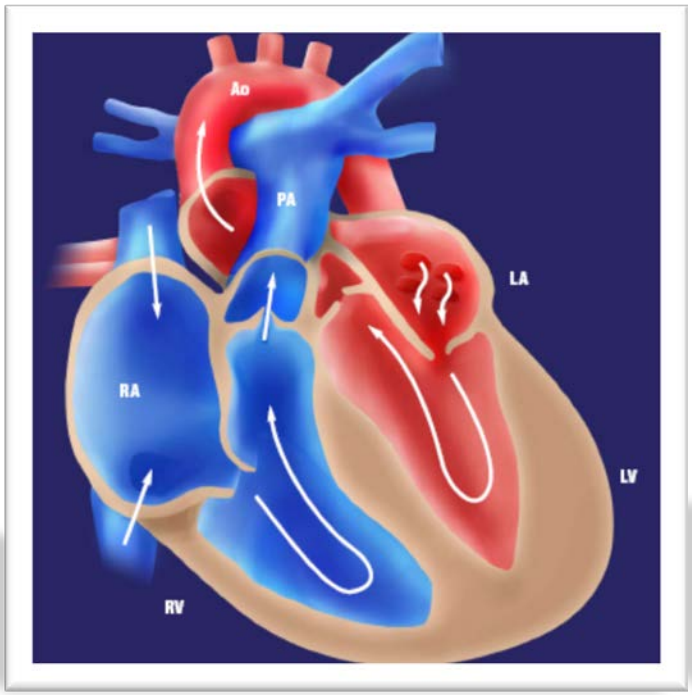
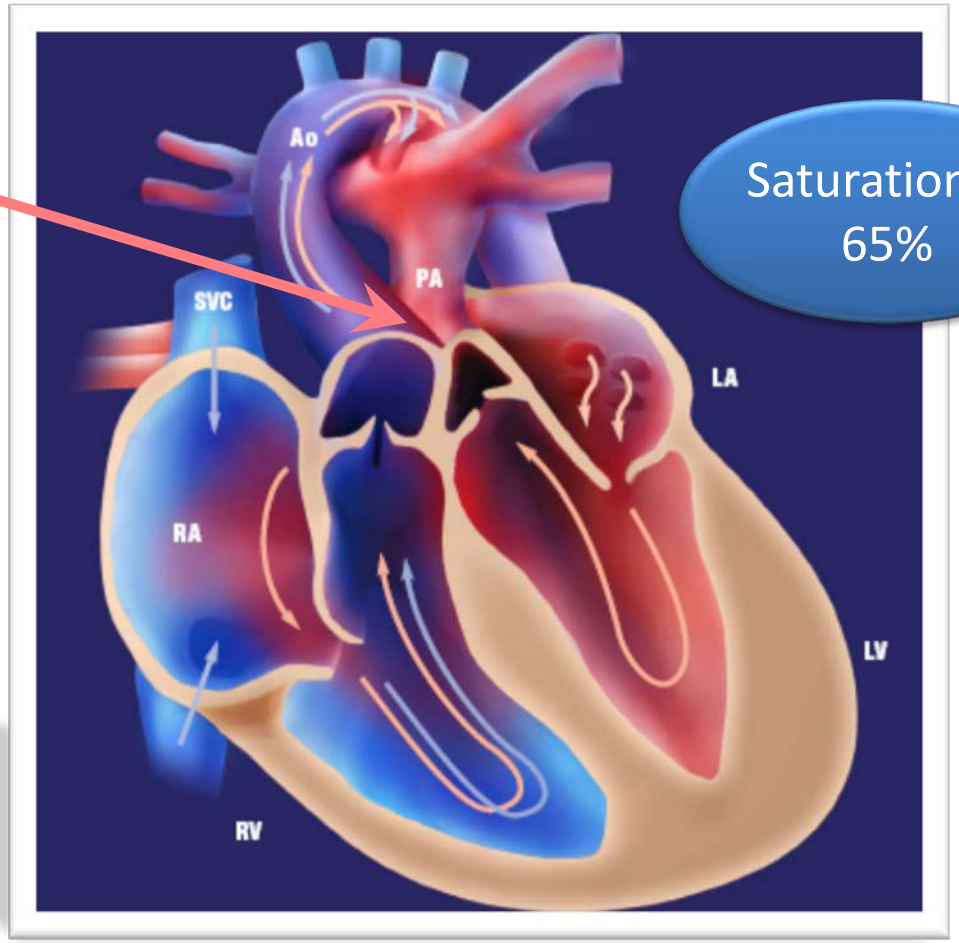
Transposition of the Great Arteries

TGA





Saturation of 65%

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Pulse Oximetry as a 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]

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Vision

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

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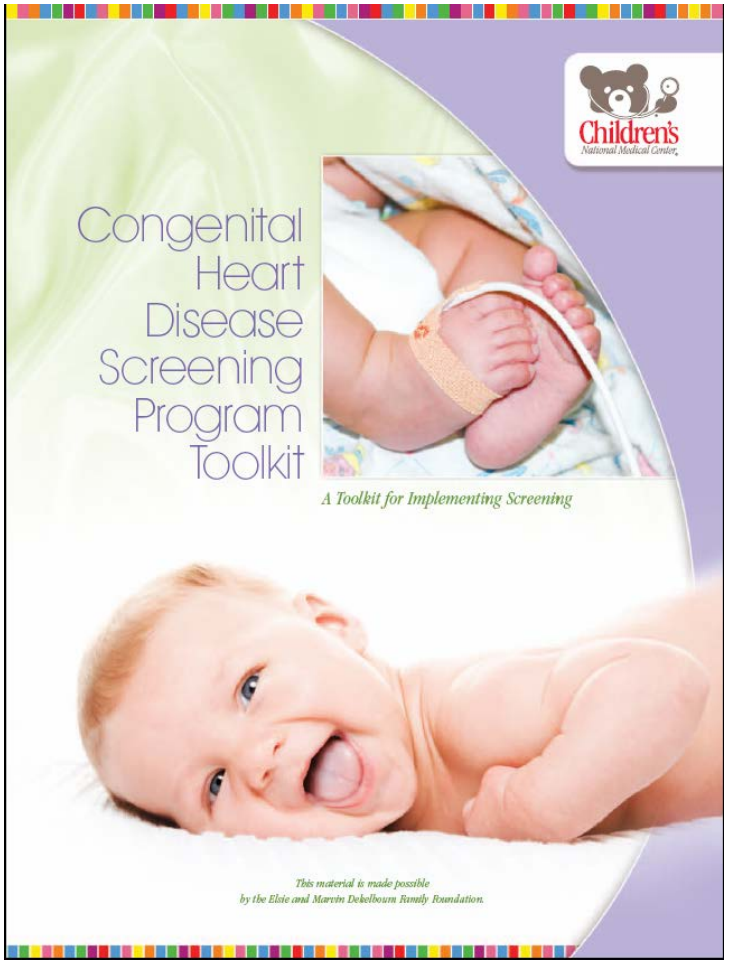
Congenital Heart Disease Screening Program

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



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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

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Placement of Pulse Oximetry Sensor

Application with
Disposable Probe

"Star to the Sky"

Application with
Reusable Probe

"Raise the (Red) Bar"

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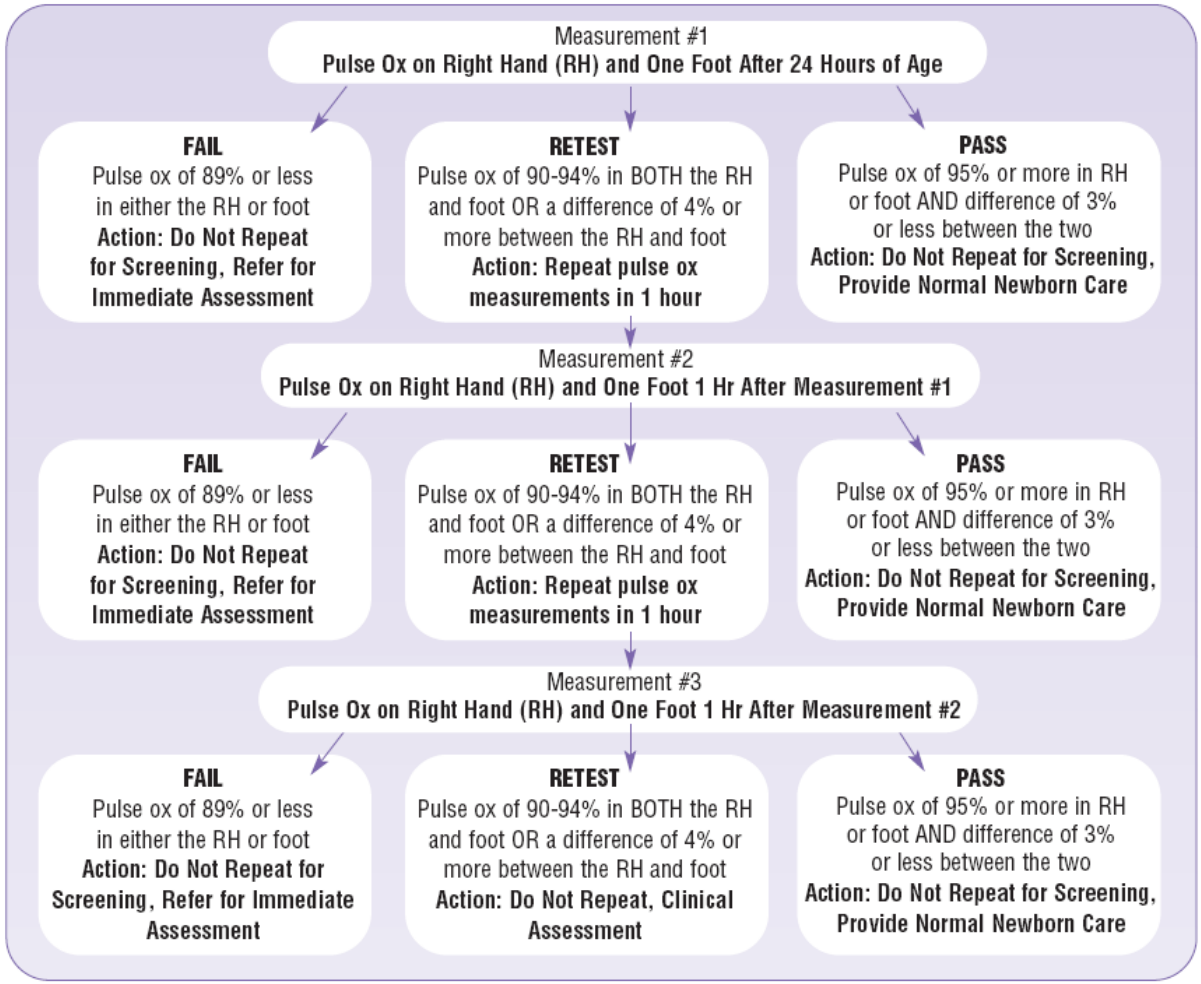
Congenital Heart Disease Screening Program

Screening Protocol [7, 8]



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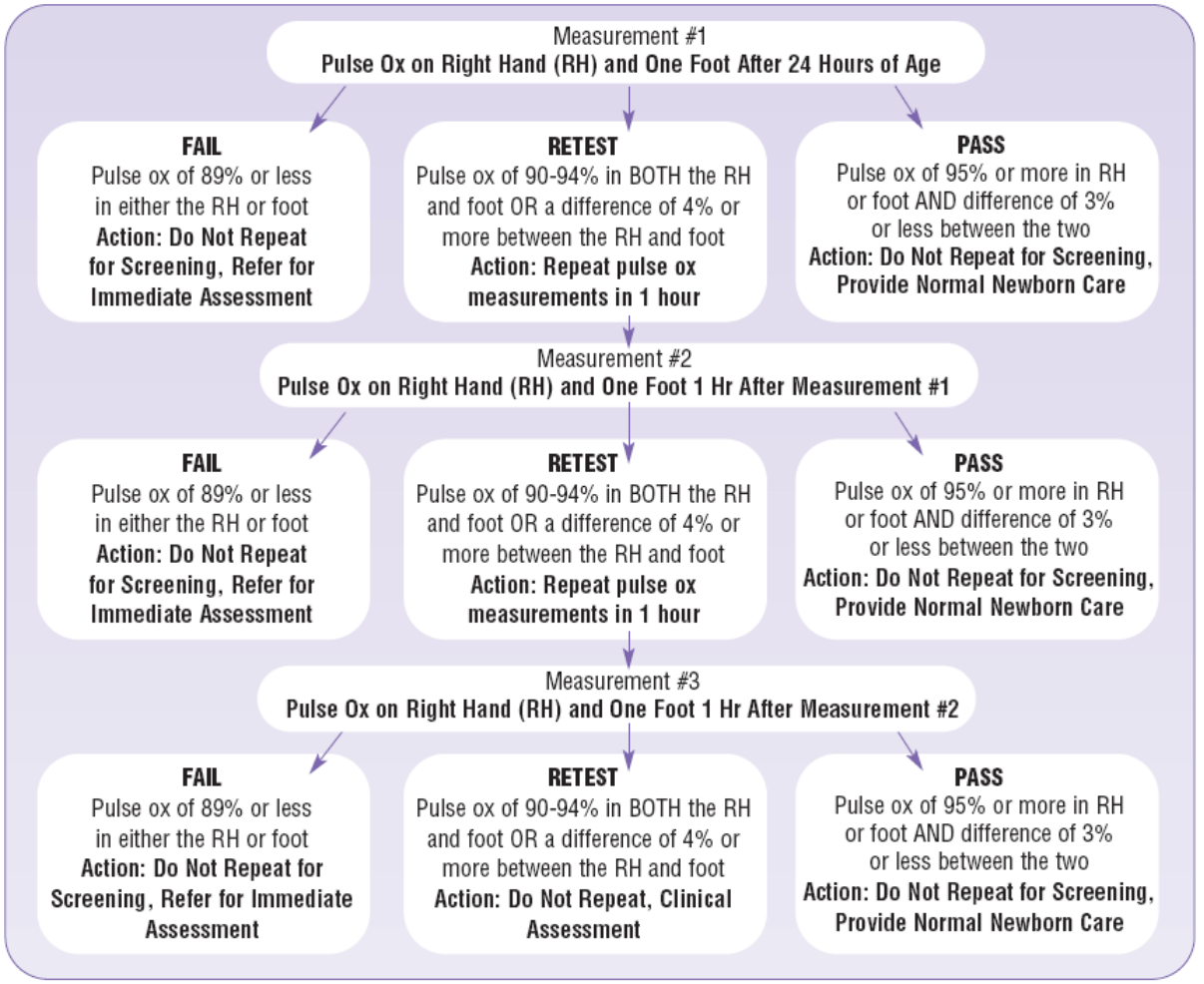
Example 1

UE Sat - 100%

LE Sat - 96%

a. PASS

b. FAIL



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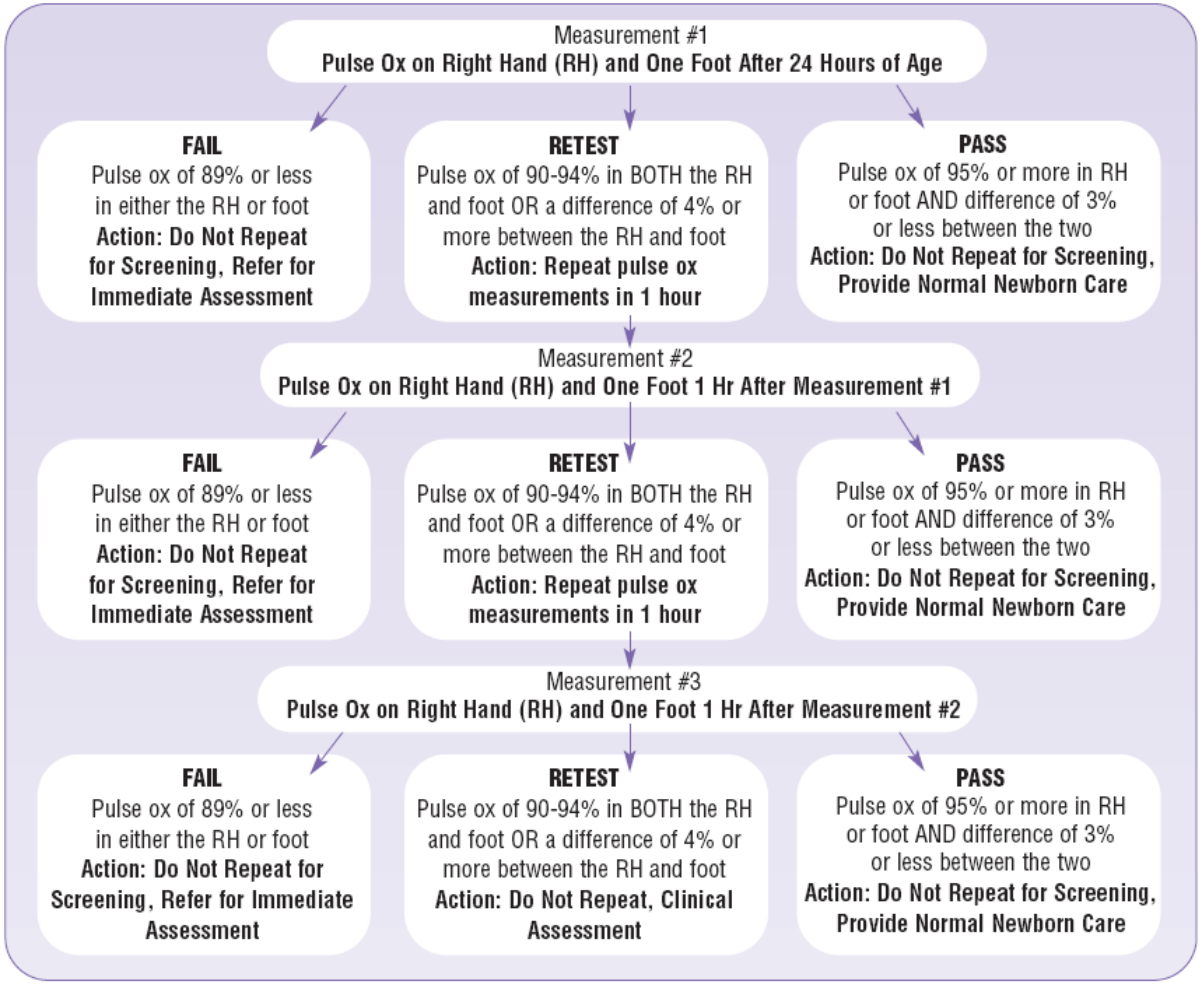
Example 1

UE Sat - 100%

LE Sat - 96%

a. PASS

b. **FAIL**



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Example 1

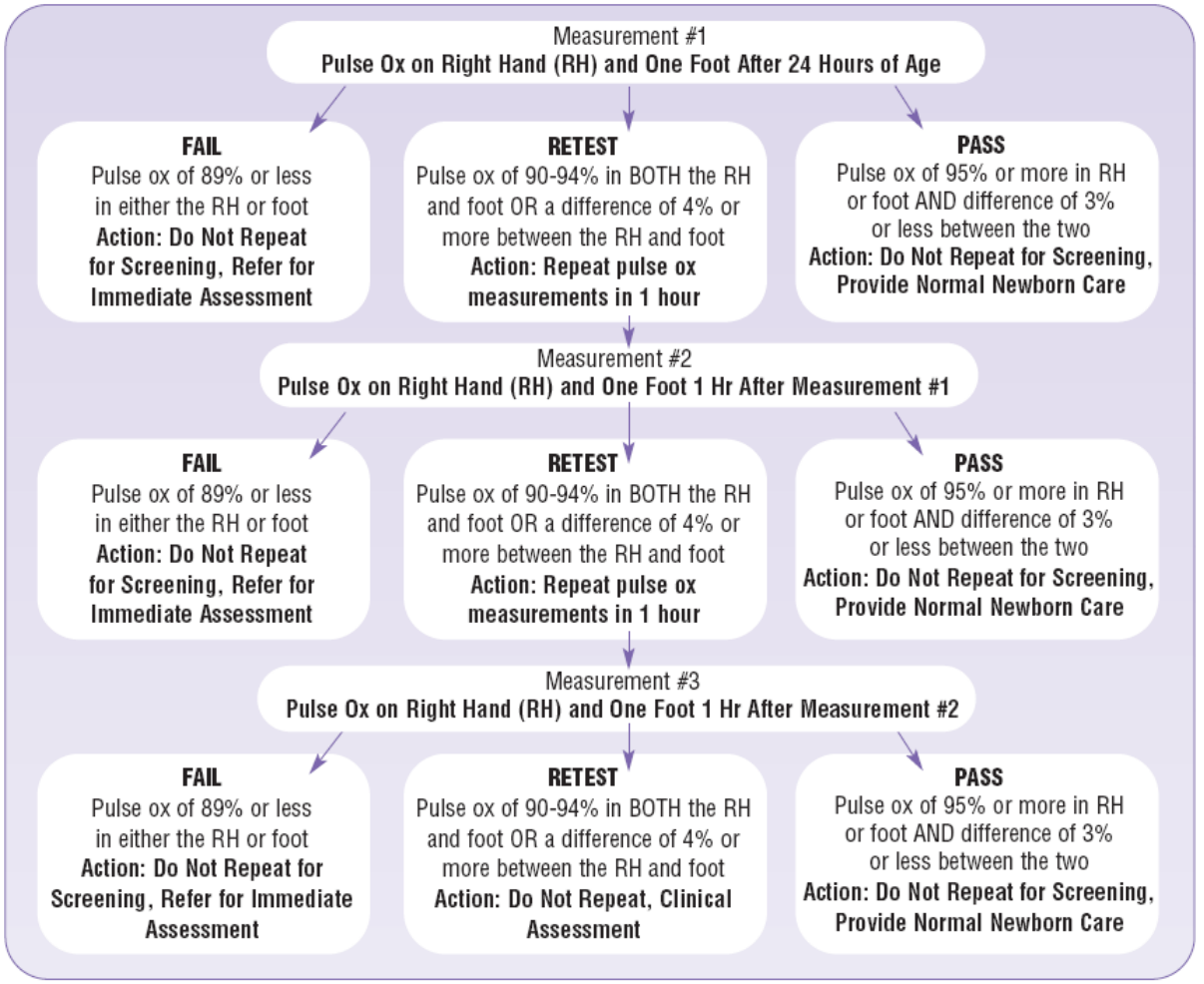
2nd Screen:

UE Sat – 99%

LE Sat – 98%

a. PASS

b. FAIL



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Example 1

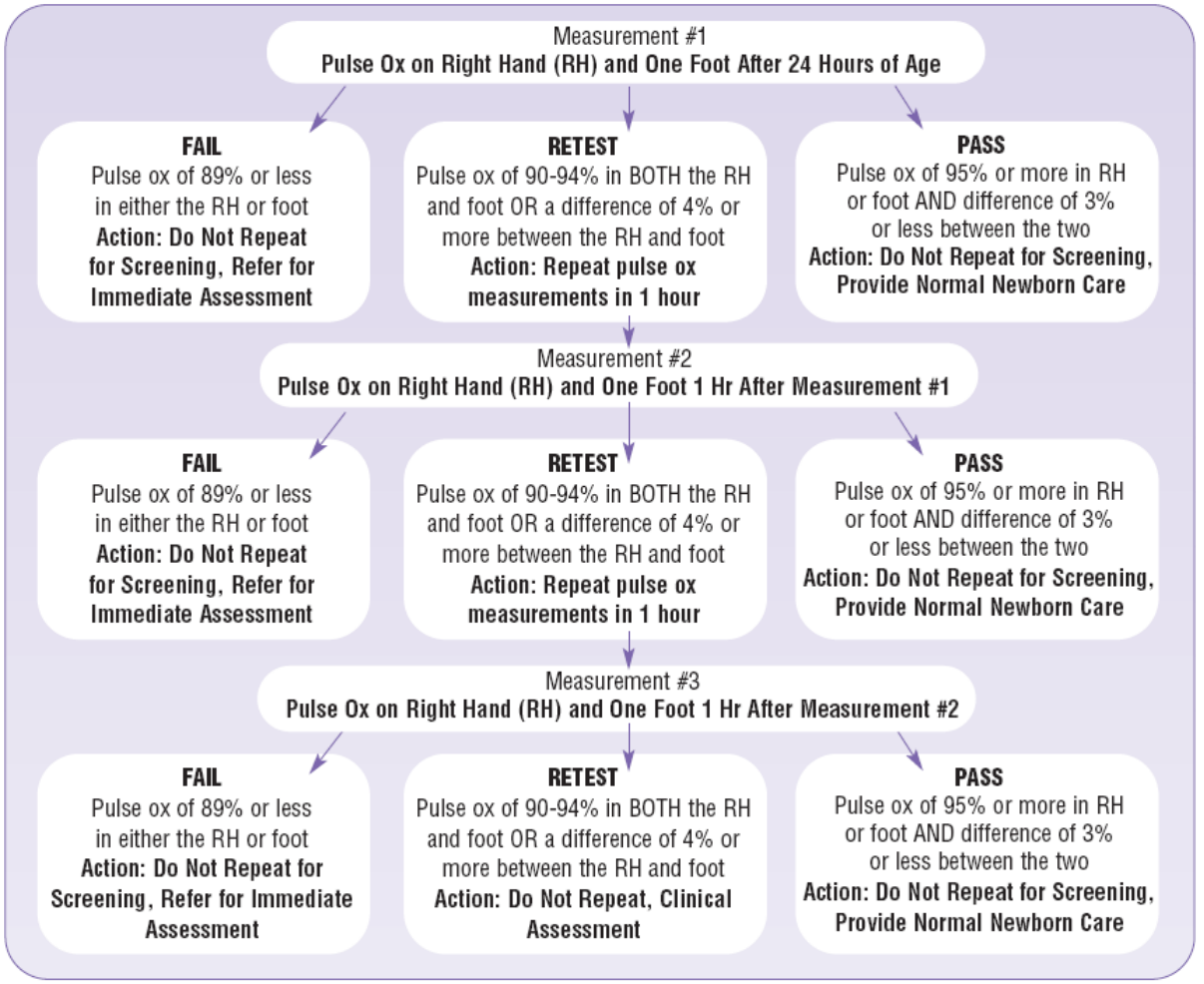
2nd Screen:

UE Sat – 99%

LE Sat – 98%

a. **PASS**

b. FAIL



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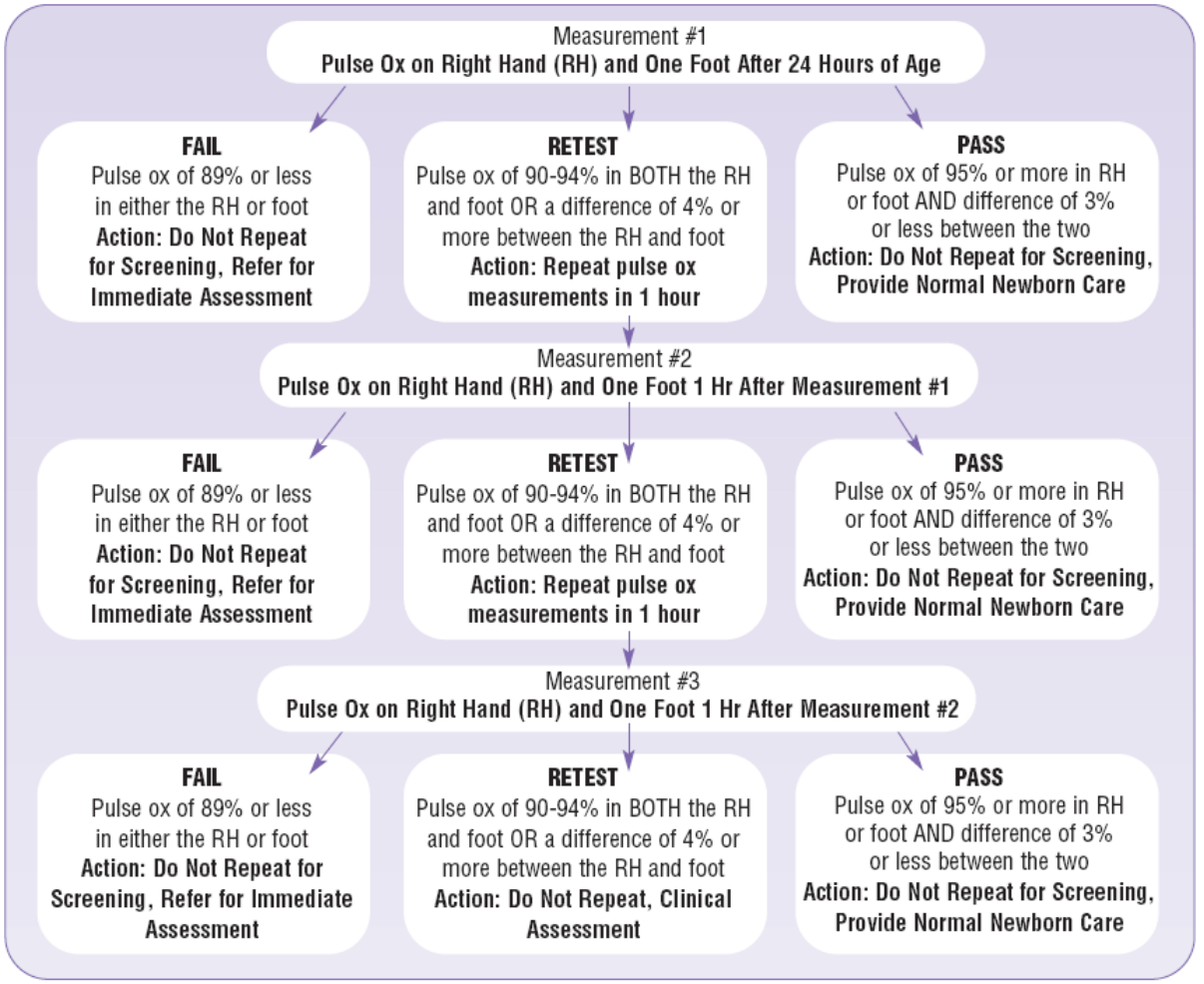
Example 2

UE Sat - 96%

LE Sat - 94%

a. PASS

b. FAIL



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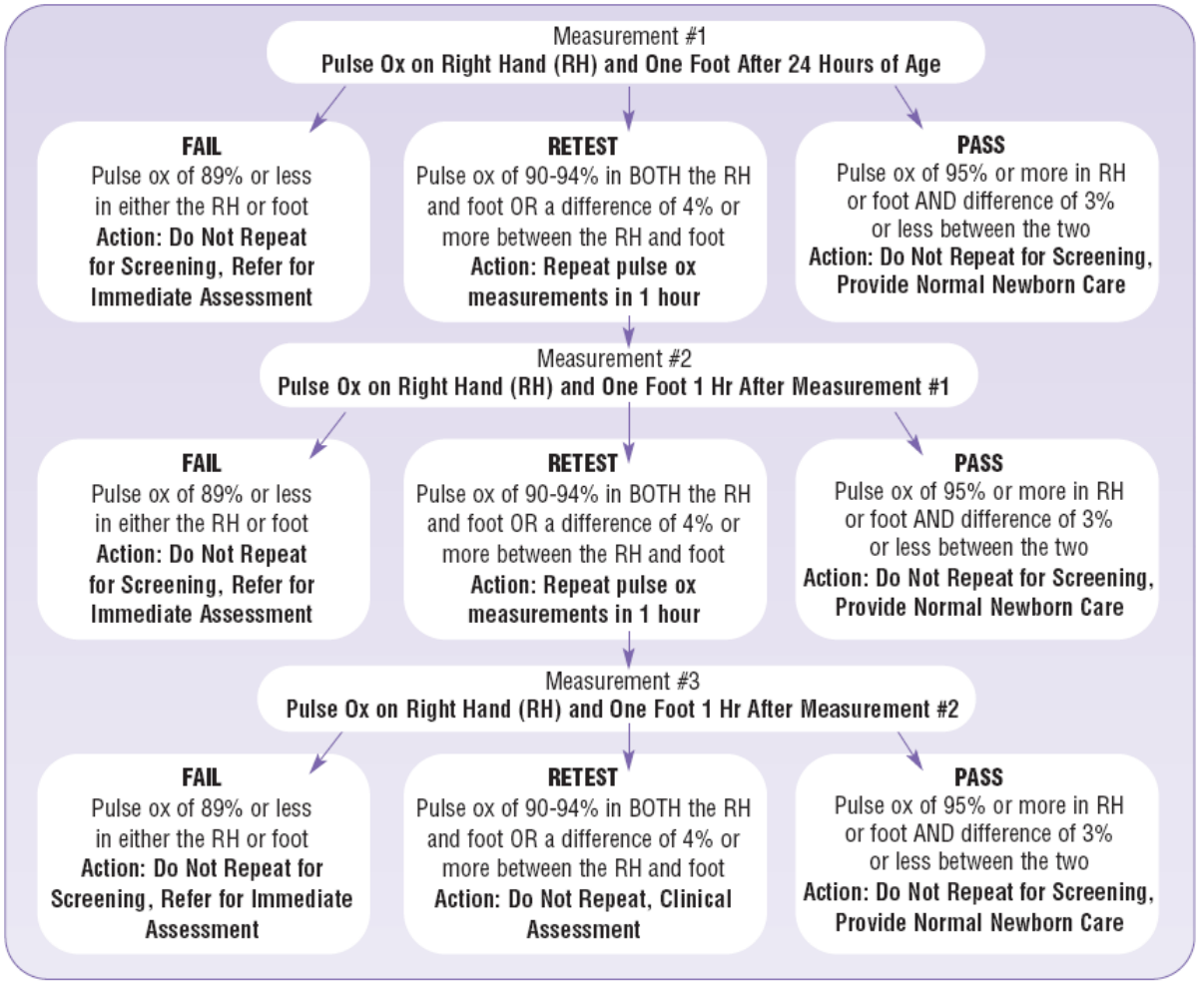
Example 2

UE Sat - 96%

LE Sat - 94%

a. **PASS**

b. FAIL



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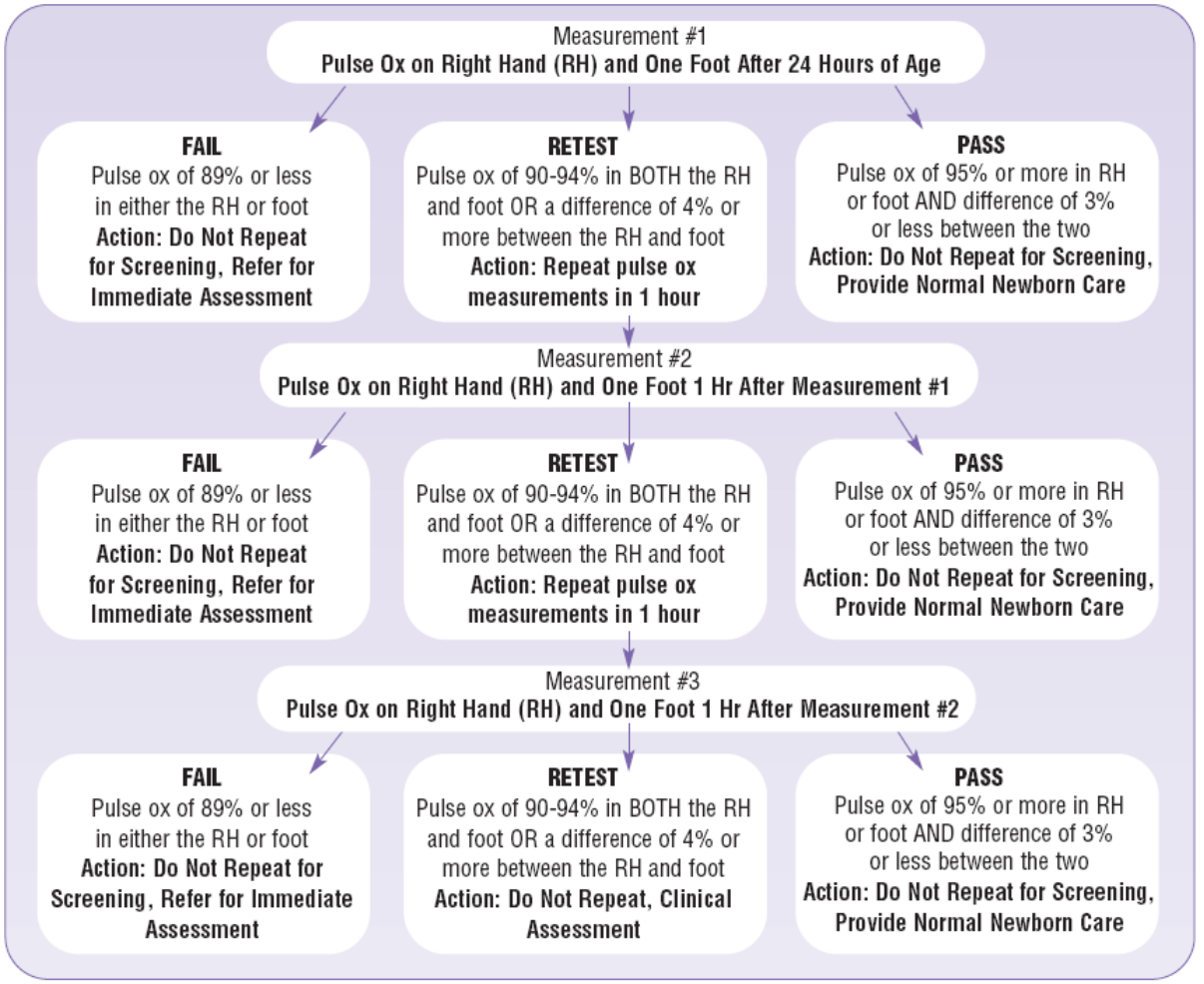
Example 3

UE Sat - 89%

LE Sat - 87%

a. PASS

b. FAIL



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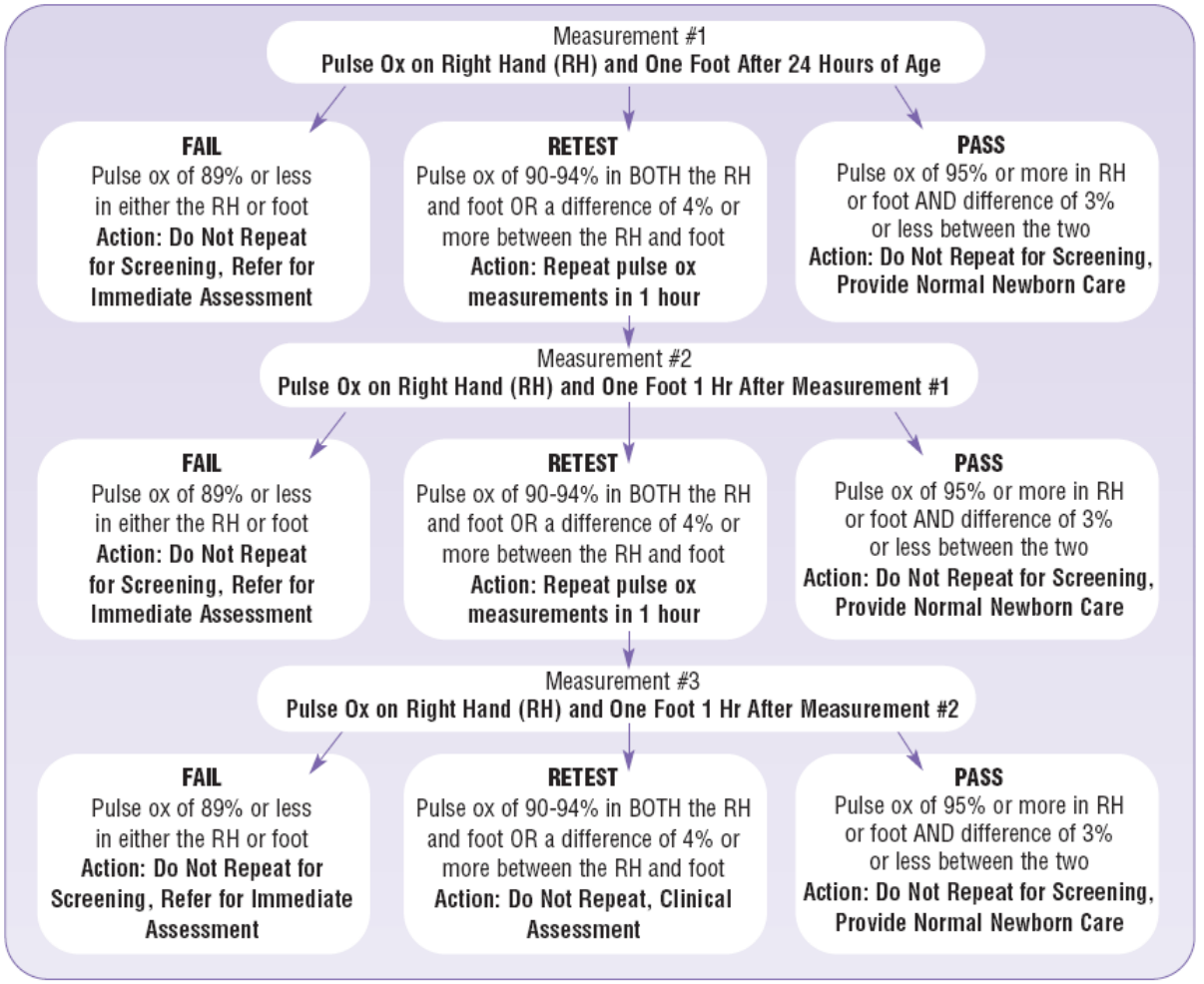
Example 3

UE Sat - 89%

LE Sat - 87%

a. PASS

b. FAIL



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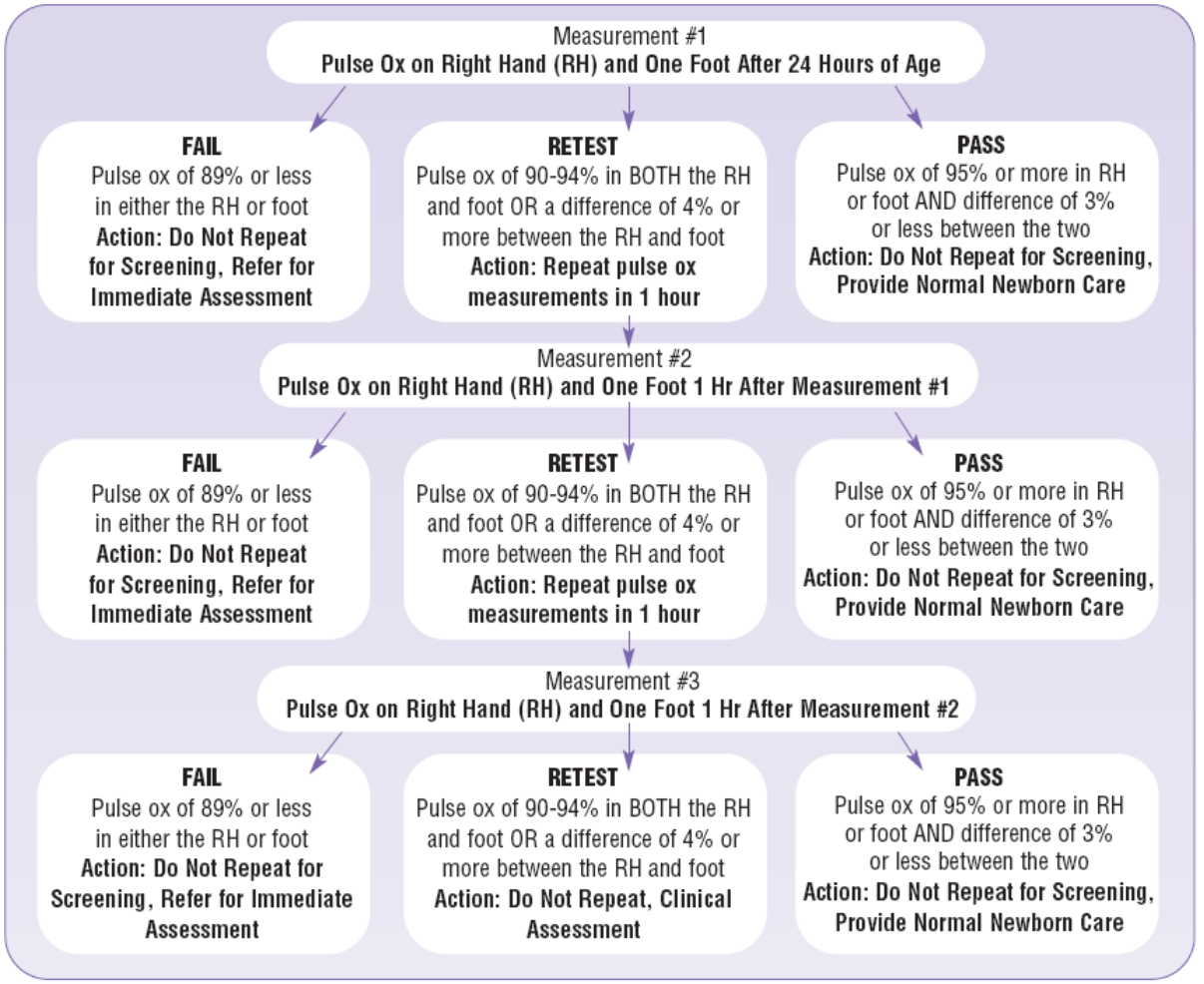
Example 4

UE Sat - 92%

LE Sat - 96%

a. PASS

b. FAIL



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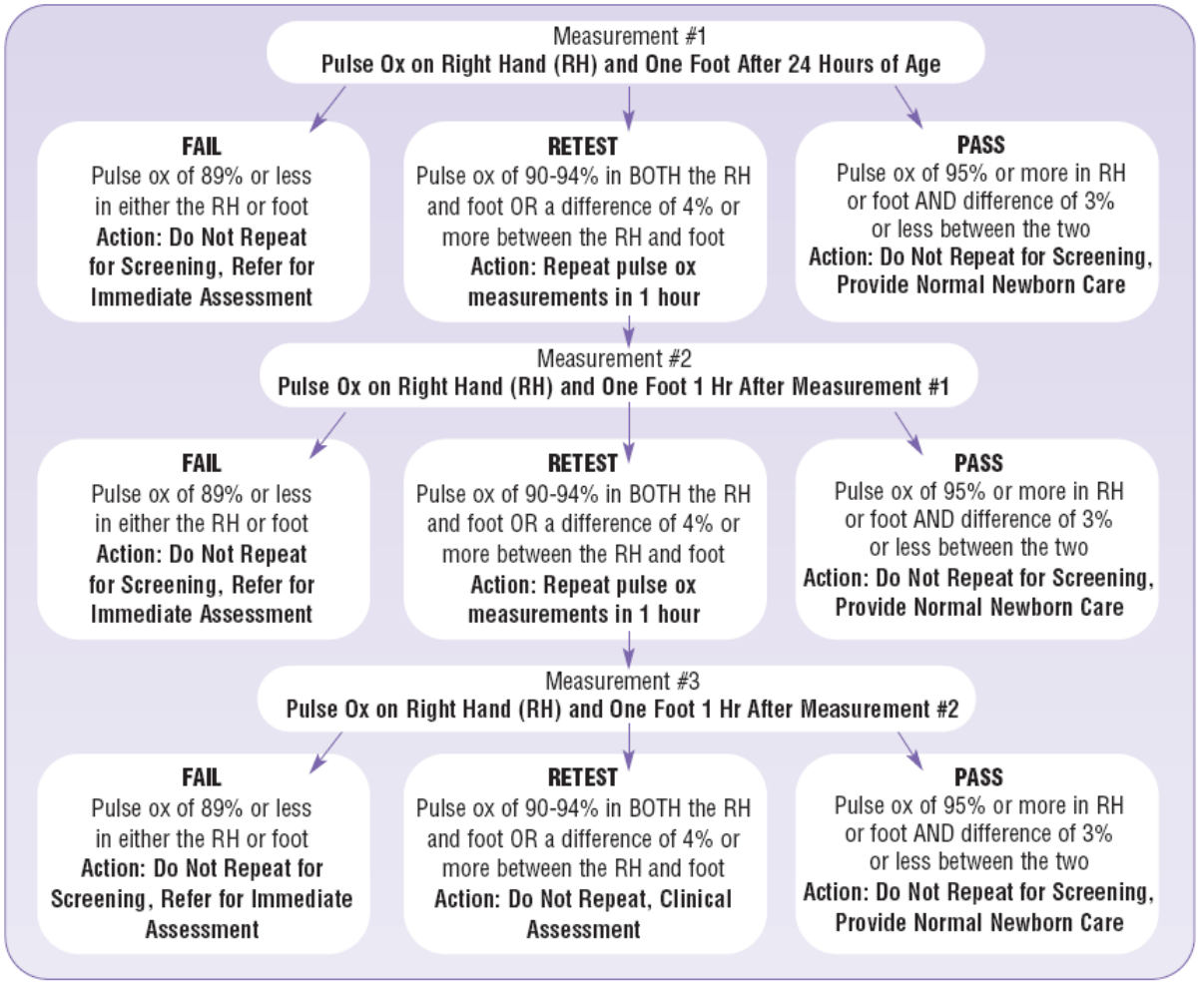
Example 4

UE Sat - 92%

LE Sat - 96%

a. PASS

b. FAIL



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Example 4

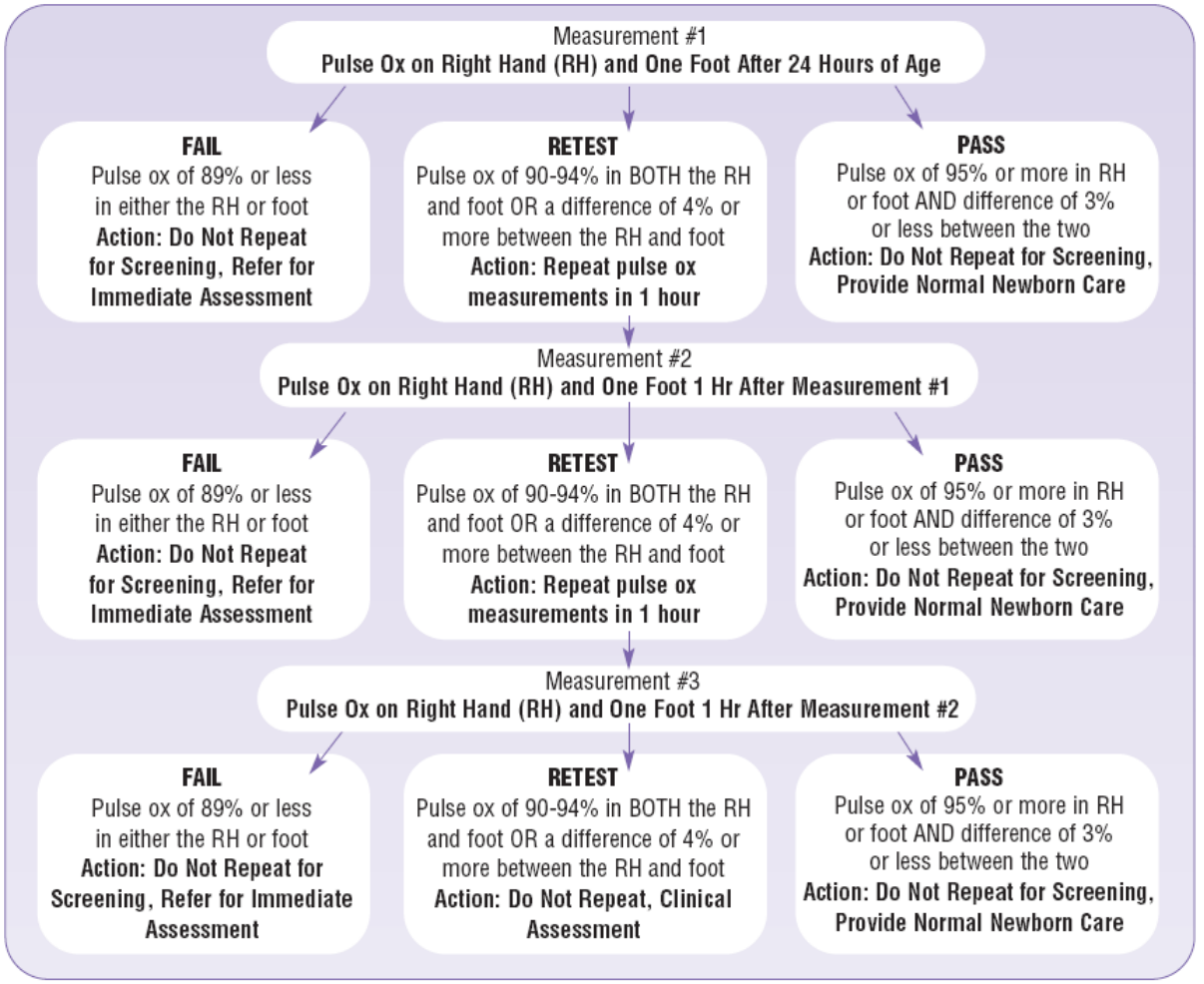
2nd Screen

UE Sat - 92%

LE Sat - 94%

a. PASS

b. FAIL



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Example 4

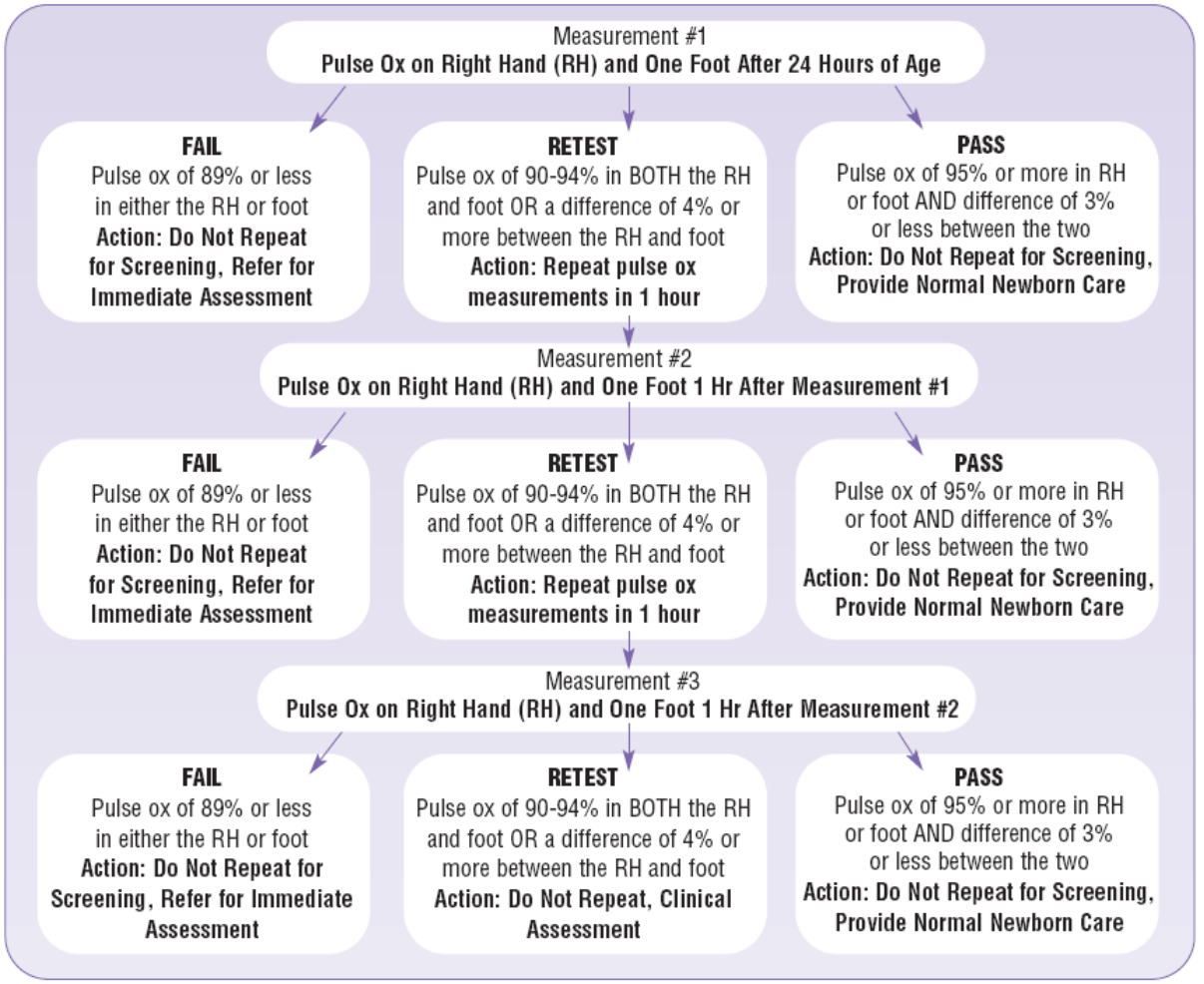
2nd Screen

UE Sat - 92%

LE Sat - 94%

a. PASS

b. FAIL



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Example 4

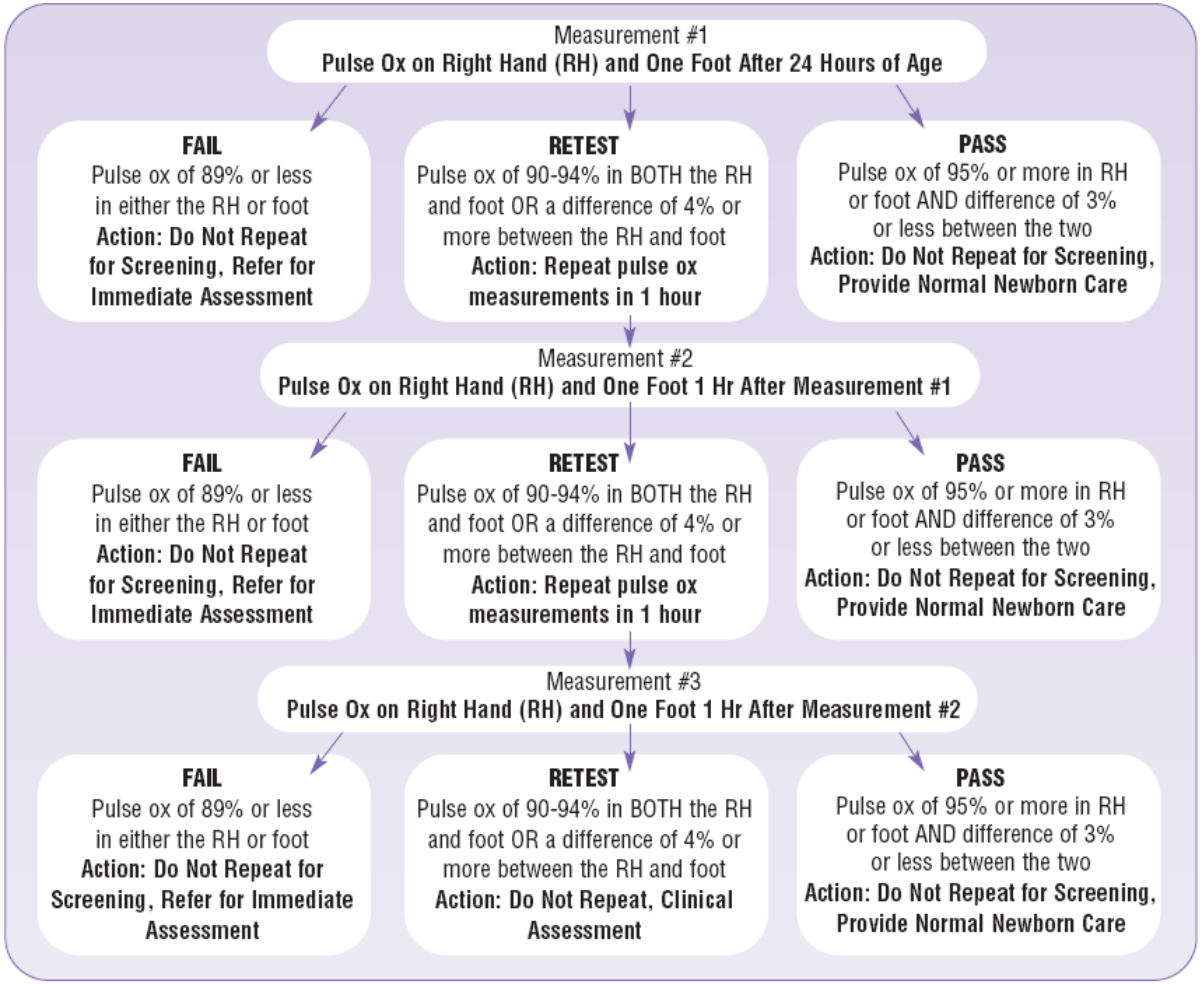
3rd Screen

UE Sat - 92%

LE Sat - 92%

a. PASS

b. FAIL



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Example 4

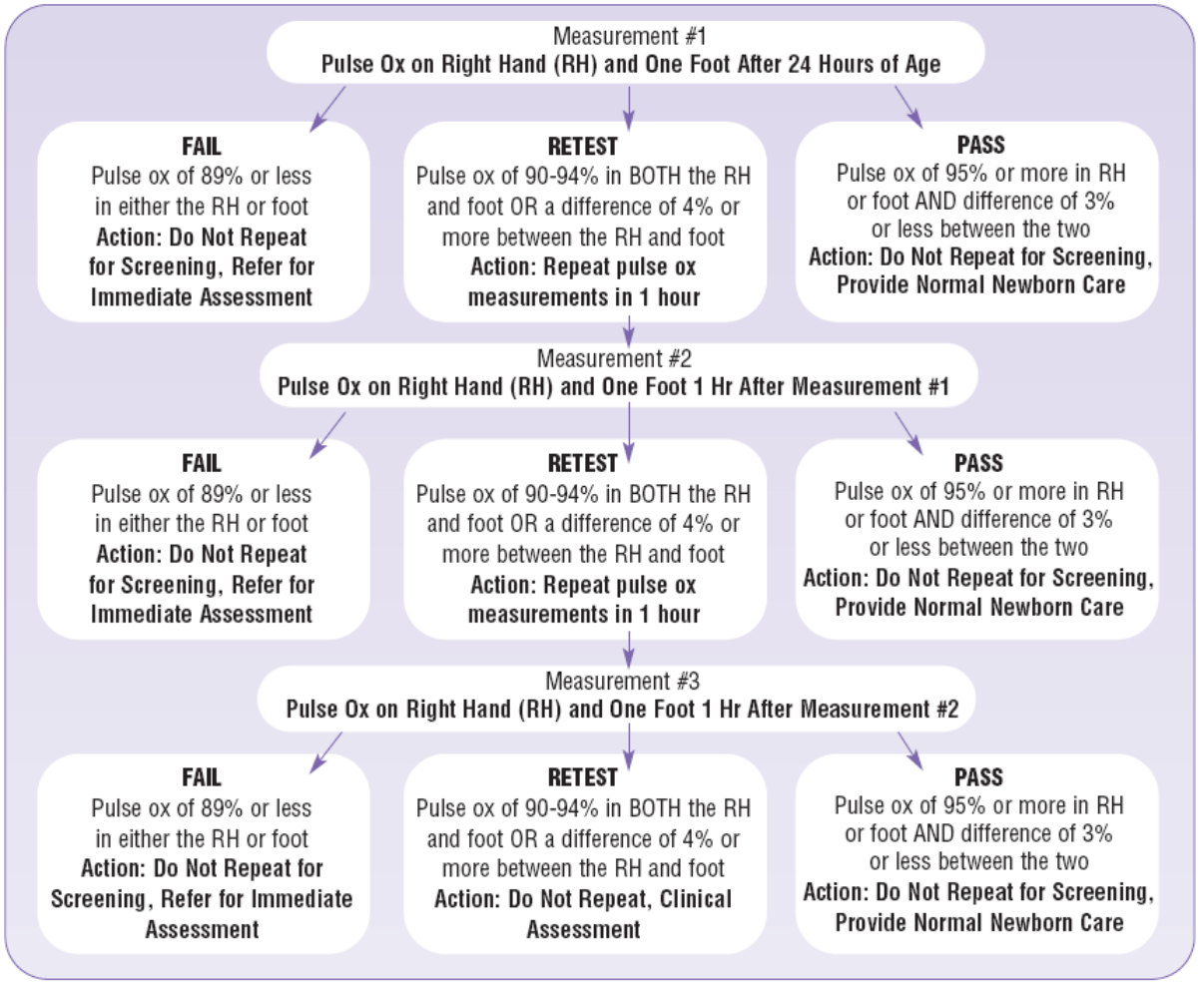
3rd Screen

UE Sat - 92%

LE Sat - 92%

a. PASS

b. FAIL



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Congenital Heart Disease Screening Program

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