Congenital Heart Disease Screening Program
“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 CHD\(^1\)
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\(^3\)
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%
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

Saturation of 98%

PDA
Transposition of the Great Arteries

TGA

Saturation of 65%
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.  

♥ 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.
Congenital Heart Disease Screening Program

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

“Raise the (Red) Bar”
Congenital Heart Disease Screening Program

Screening Protocol 7, 8

Pulse Ox on Right Hand (RH) and One Foot After 24 Hours of Age

- Pulse Ox < 95% (both RH & foot) or Difference of >3% Between RH and Foot
  - FAIL
  - Repeat Pulse Ox in 1 Hour
  - FAIL
  - Repeat Pulse Ox in 1 Hour
  - FAIL
  - Clinical Assessment

- Pulse Ox ≥ 95% (RH or Foot) and Difference of ≤ 3% Between RH and Foot
  - PASS
  - Normal Newborn Care

RH Application Site

Foot Application Site
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
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
Questions?

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www.childrensnational.org/pulseox
References


