CCHD Screening in the Newborn Nursery

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What is it?

CCHD stands for Critical Congenital Heart Disease. The screening process for CCHD uses pulse oximetry.

CCHD General Information:

CCHD screening targets 7 defects:

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

These defects…

- Account for 3% of infant deaths in the US
- Are usually found prenatally or shortly after birth, but some infants appear healthy and are sent home
- Can be associated with hypoxia
- Could result in significant morbidity and mortality
- Can often be treated

Why Should We Screen for CCHD?

It Could Save Lives:

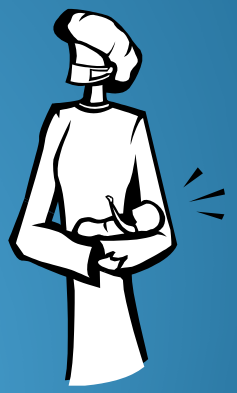
- Approximately 280 infants with unrecognized CCHD are discharged each year from U.S. hospitals.
- Pulse oximetry newborn screening can identify some infants with CCHD before they show signs of the condition.
- Once identified, babies with CCHD can be seen by cardiologists and can receive treatment that can prevent death or disability.

It Is Recommended by Scientific Literature:

- The Secretary's Advisory Committee on Heritable Disorders (SACHDNC) advised in September 2010 that CCHD screening be added to recommended screenings based on evidence from studies including over 80,000 babies.
- The American Academy of Pediatrics (AAP) and the American Heart Association (AHA) support the recommendations made by the SACHDNC.

Who Is Involved?

- *ALL* newborns in the newborn nursery will be screened for CCHD prior to discharge.
- The nurse caring for the couplet will complete the screening.



When Will the Screening be Done?

- At 36 hours of life

  or

- As close to discharge as possible if the infant is being discharged early

  and

- Not immediately following any potentially painful procedures (i.e. PKU, Hepatitis B vaccine)

How Will the Screening Process be Completed?

Procedure:

- The nurse will provide parents with the CDC's education sheet, "Pulse Oximetry Screening for Critical Congenital Heart Disease."
- The nurse will complete the screening in the patient room if possible.

  Equipment – 2 pulse oximeters; 2 clean probes

  - The nurse will apply a probe to the right upper extremity and right lower extremity *simultaneously or in direct sequence*.
  - The test is complete when the waveform on the oximeter's plethysmograph is stable or there is other indication that the device is appropriately tracking the infant's pulse rate.

Interpretation:

The results include the percent O2Sat of the right upper extremity (RUE), the percent O2Sat of the right lower extremity (RLE), and the percent difference between the two.

- "Pass" (*negative screen*) – At least one of the results is ≥95% and the difference between the two is ≤3%
- "Fail" (*positive screen*) – Either result is <90%
- "Repeat" the screen in 1 hour if both extremities are between 90% and 94% *OR* if the difference between the two is >3% (*positive screen*)

Nursing Response

- "Pass" or *negative screen* – Reassure parents that the test showed no signs of CCHD.
- "Fail" or *positive screen* – Notify pediatrics of the need for transfer to NICU. Ensure parents are notified of need for transfer. Transfer infant to a NICU for further evaluation. Reassure parents that pulse oximetry screening is not definitive for CCHD and further testing is needed.
- "Repeat" or *positive screen* – Assure parents that the test is not a definitive indicator of CCHD and that more testing is needed. Repeat the test in 1 hour (baby remains on unit). **Note – If the infant does not pass a second time, proceed with the response for a "Fail." Further evaluation will occur in the NICU.*

Documentation:

- Electronic documentation in IView is under development.
- There is a “downtime” form available for documentation as well.
- Documentation should include:
  - time of the screening
  - right upper and right lower extremity SaO2
  - % difference between the results
  - interpretation of results (i.e. “pass” or *negative*, “fail” or *positive*, or “repeat” also *positive*)
  - any interventions that were indicated
  - parent notification

Example 1:

- A newborn was delivered vaginally and is approaching 36 hours of life. The nurse completes the pulse oximetry screening and obtains the following results:

RUE - 96%

RLE – 93%

What is the nurse's next action?

Answer:

- The nurse should calculate the % difference between the two results.

96% - 93% = 3%

Since one result is ≥95% and the difference is not >3%, this is a negative screen. The nurse should assure the parents that the newborn has no signs of CCHD.

Document results.

Example 2:

- A mother is requesting early discharge at 24 hours after delivery. Her newborn was born at 37 weeks gestation via spontaneous vaginal delivery. The nurse completes the pulse oximetry screening shortly before discharge. She obtains the following results:

RUE – 94%
RLE – 90%

What is the nurse's next action?

Answer

- The nurse should note that both results are between 90% and 94%. Also, the % difference is >3% as follows:

94% - 90% = 4%

The infant will need a repeat test, on the postpartum floor, in one hour. The nurse should explain this result to the parents and document her findings and actions. The pediatrician does not need to be notified at this time.

Document results.

Example 3

- The newborn from the previous slide is due for repeat testing after 1 hour. The nurse obtains the following result from the repeat test:

RUE - 95%

RLE – 90%

What is the nurse's next action?

Answer

- The nurse should calculate the difference between the two results:

95% - 90% = 5%

Although one of the numbers is ≥95%, the difference is >3%. This is considered a *positive* screen. Since this result was obtained on the repeat test, the infant will be transferred to a NICU for further evaluation. The nurse should call pediatrics and ensure the parents are notified of the need for transfer.

Document results.

Example 4

- An infant born on his due date is approaching 36 hours of life. The nurse performs pulse oximetry screening and obtains the following results:

RUE – 95%

RLE – 89%

What is the nurse's next action?

Answer

- The nurse should note that one of the results is <90%. There is no need to perform any calculation or obtain a repeat screen. This is considered a positive screen and the infant will receive further evaluation in a NICU. The nurse should call pediatrics and ensure that the parents are notified of the need for transfer.
- Document results.

What happens in the NICU?

- The infant receives continuous pulse oximetry for 2 hours.
- If the results are negative (i.e. no indication of CCHD), the result is considered a "Pass," or negative screen, and the infant returns to the nursery at the discretion of the neonatologist.
- If the result is *positive* (i.e. concern for CCHD), an echocardiogram is ordered and the infant remains in the NICU until it is completed.
- There are reasons besides CCHD that may cause a baby to have a positive screen. The baby will also be evaluated for these reasons.

How Many Babies Will This Affect?

- There are approximately 5 - 10 CCHD cases per 1,000 live births (many of which are detected prenatally). This correlates to 50 – 100 cases per 10,000 live births.

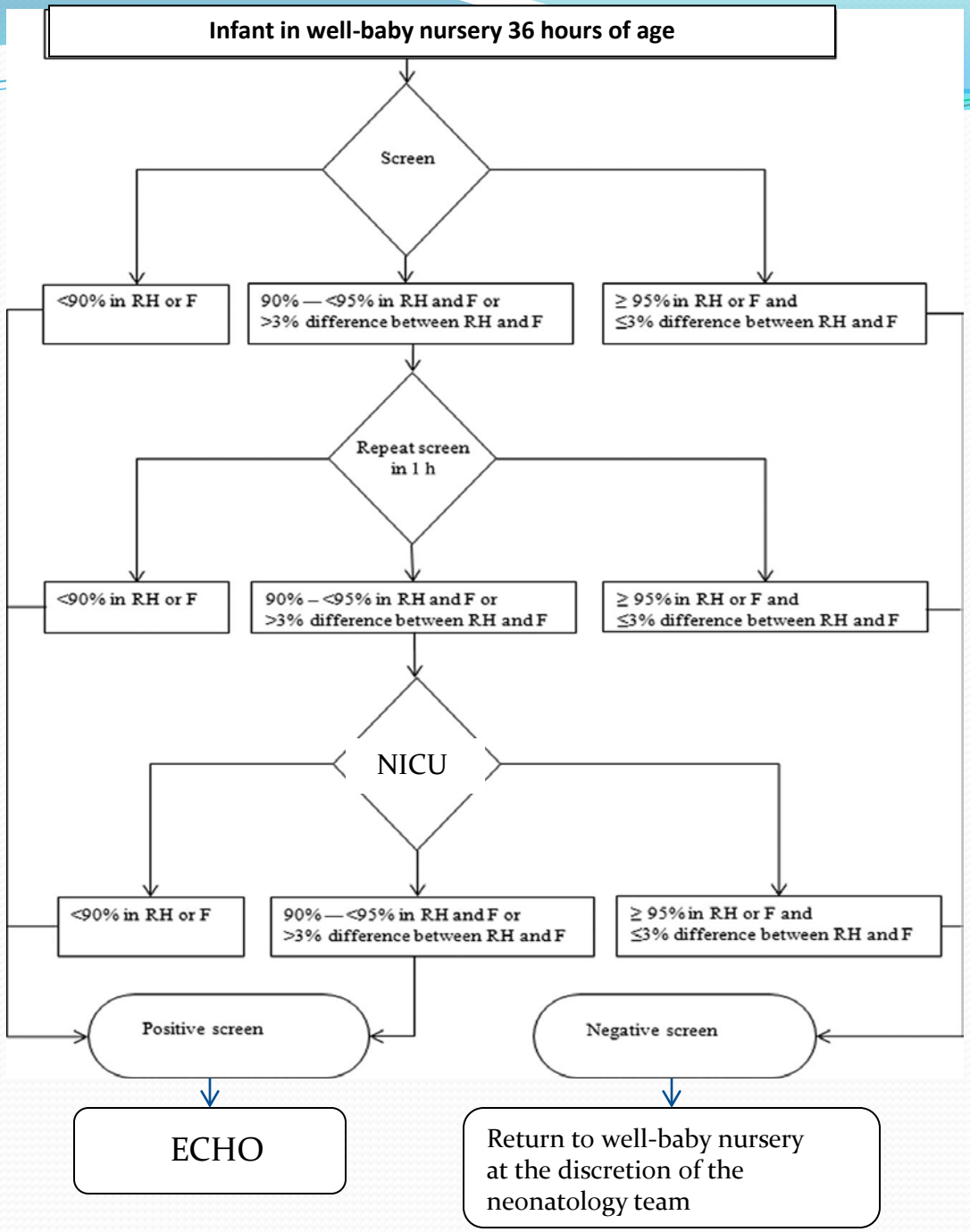
Heron, M., et al. (2009). Deaths: Final data for 2006. National Vital Statistics Reports, 57(14). U.S. CDC and Prevention.

- The false-positive rate for pulse oximetry screening for CCHD is 0.17%, or 17 per 10,000 live births.

Mahle, W.T., Newburger, J.W., Matherne, G.P., Smith, F.C., Hoke, T.R., Koppel, R., Gidding, S.S., Beekman III, R.H., and Grosse, S.D. (2009). Role of pulse oximetry in examining newborns for congenital heart disease: A scientific statement from the AHA and AAP. Pediatrics, 124 (2), 447 – 458. DOI: 10.1542/peds.2009-1397

Tips for Successful Screening:

1. Ensure infants are in a quiet state, preferably alert, and that they have not had any painful procedures prior to screening.
2. Be sure the pulse oximeter probes are properly applied.
3. Do not document results until the pulse oximeters are determined to be obtaining accurate measurements simultaneously (similar to car seat testing – we do not "fail" an infant when the pulse oximeter is not reading correctly).
4. Keep parents informed.
5. Refer to the algorithm on the next slide for assistance with interpretation of results. It will be laminated and hung in the nurseries.


Infant in well-baby nursery 36 hours of age
Screen
<90% in RH or F
90% — <95% 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 1 h
<90% in RH or F
90% – <95% in RH and F or >3% difference between RH and F
≥ 95% in RH or F and ≤3% difference between RH and F
NICU
<90% in RH or F
90% — <95% in RH and F or >3% difference between RH and F
≥ 95% in RH or F and ≤3% difference between RH and F
Positive screen
Negative screen
ECHO
Return to well-baby nursery at the discretion of the neonatology team

References:

Mahle, W.T., Newburger, J.W., Matherne, G.P., Smith, F.C., Hoke, T.R., Koppel, R., Gidding, S.S., Beekman III, R.H., and Grosse, S.D. (2009). Role of pulse oximetry in examining newborns for congenital heart disease: A scientific statement from the AHA and AAP. *Pediatrics*, 124 (2), 447 – 458. DOI: 10.1542/peds.2009-1397

Pulse Oximetry Screening for Critical Congenital Heart Disease Committee (2011). Newborn Medicine Clinical Consensus Recommendations for Implementing Pulse Oximetry Screening for Critical Congenital Heart Disease. *Magee Women's Hospital of UPMC*.