Screening for Congenital Heart Defects (CHD) Using Pulse Oximetry

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(Cascade Healthcare Products, 2016.)

PICO RESEARCH QUESTION
In newborns, is the use of pulse oximetry an accurate screening in early detection of congenital heart defects?

BACKGROUND
- According to the CDC, 1 in 125 live births in US are affected by congenital heart defects (CDC, 2015).
- Early detection of CHD is crucial to preventing mortality of newborns less than 28 days old.
- Currently, an objective, inexpensive CHD screening method does not exist.
- Pulse oximetry is an inexpensive, objective, quick, non-invasive procedure that can be performed prior to discharge.
- Pulse oximetry measures the oxygen level (oxygen saturation) of the blood. It measures how well oxygen is being sent to various parts of your body.
- RNs can be easily trained to accurately complete the pulse oximetry CHD screening.
- RNs can conduct preductal and postductal measurements.
- These measures help identify potential asymptomatic cases of CHD.
- Risks include potential for false positives.

SEARCH STRATEGIES
- Databases: CINAHL, ProQuest Nursing & Allied Health Source, PubMed, Cochrane Database and Systematic Reviews, Ebsco and Database of Abstracts of Reviews of Effects
- Terms and MeSH Terms: “pulse oximetry,” “newborns,” “neonates,” “heart defects,” “congenital heart defects” and any combination of these terms
- Years Searched: 2010-2015
- Selection: 16 reviewed with 8 selected
- Criteria: objective, calculated sample size, education or training provided, protocol procedures, cost and false positives

CLINICAL RECOMMENDATIONS
- Evidenced Based Practice Recommendations
  - Education and training is key to accurate screening for CHDs.
  - Follow the American Academy of Pediatrics guidelines for neonates passing CHD screenings.
  - Oxygen saturation is ≥95% in the right hand and foot and the difference is three percentage points or less between hand and foot.
  - Proper training of RNs and implementation will yield cost savings, provides early identification and intervention of CHD and improves patient outcomes.
  - Pulse oximetry screening compliments prenatal ultrasonography and physician assessments.

REVIEW OF LITERATURE

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<tr>
<th>STUDY</th>
<th>DESIGN</th>
<th>LEVEL OF EVIDENCE</th>
<th>CONCLUSIONS</th>
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| Ewer, Middleton, Furmston, Bhuyar, Daniels, Thangaratinam, Deeks, Khan. 2011 | Quasi-Experimental | Level III | • Pulse oximetry is a safe, non-invasive and reasonably accurate test
• Antenatal anomaly screening, postnatal examination, and pulse ox. will reduce number of babies sent home without a diagnosis
• Ability to identify other illnesses |
| Pfluegisen, Amoroso, Zook, Welke, Reedy, Park. 2015 | Quality Improvement | Level V | • The use of QA increases sustainability
• Pulse ox. is a cheap, sustainable practice capable of being embedded in routine discharge care of newborns
• Implementation of AAP guidelines in addition to hospital preferences and adaptations can significantly change the outcome results of pulse ox. |
| Riede, Worner, Dahntert, Mockel, Kostelka, Schneider. 2010 | Quasi-Experimental | Level III | • Pulse ox. can be a tool complementing prenatal ultrasound, physical examination and clinical observation.
• Pulse ox. closes the diagnostic gap between solely ultrasound and physical examination and ultrasound, physical examination with pulse ox down to 4.4% |
| Thangaratinam, Brown, Zamora, Khan, Ewer. 2012 | Systematic Review | Level I | • Pulse oximetry is highly specific for the detection of cCHD in asymptomatic newborn babies, with moderate sensitivity |
| Walsh. 2011 | Public Health Initiative | Level IV | • Before universal screening can be implemented, a system of care must be defined to address the educational and referral issues |
| Amsbaugh, Scott, Foss. 2014 | Qualitative Study | Level VI | • Partnership with staff nurses will be of great importance to develop screening programs that are feasible for individual units without causing an increased burden in an already demanding workforce |
| Bradshaw, Cuzzi, Kiernan, Nagel, Becker, Martin. 2012 | Prospective Study | Level IV | • Newborn pulse ox. screening for cCHD is feasible and can be successfully implemented in a community hospital with limited resource drains |

STRATEGIES TO IMPROVE CLINICAL PRACTICE BASED ON RECOMMENDATIONS

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<th>PATIENTS</th>
<th>HEALTHCARE PROVIDERS</th>
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<td>Attend prenatal visits to understand risks of CHD and have ultrasound</td>
<td>Become educated and trained on how to accurately perform pulse oximetry screenings</td>
<td>Provide routine educational seminars, training health professionals proper screening protocol</td>
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<td>Understand and ask about neonatal screenings for CHD</td>
<td>Advocate and educate parents who may not understand or have knowledge of CHD</td>
<td>Implement QA in order to refine protocols and address trends in practice</td>
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EVALUATION OF EFFECTIVENESS

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<td>Perform survey about prenatal visits, discharge education and parent questions about CHD to determine parental awareness of CHD</td>
<td>Assess healthcare provider’s ability to perform accurate pulse oximetry screenings</td>
<td>Complete review of current CHD screening practices when changes have been made in order to determine effectiveness</td>
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<td>Survey staff about confidence in performing screening and necessary changes to practice</td>
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REFERENCES

(CDC, 2011)