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# Pulse Oximetry Testing for Screening for Congenital Heart Defects in Newborns: A Literature Review of the Effectiveness and Accuracy

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# Cedarville University School of Nursing

## Pulse Oximetry Testing for Screening for Congenital Heart Defects in Newborns: A Literature Review of the Effectiveness and Accuracy

Amanda Custer and Bethany Teixeira

### PATIENT CARE ISSUE

#### Background & Significance

- Pulse oximetry detects the level of oxygen in the blood
- A deficiency of oxygen can indicate the presence of CHD
- Congenital Heart Defects (CHD) are the number one birth defect in newborns
- CHD contributes to 3% of infant mortality and 46% of deaths from congenital malformations in the first year of life (Turska-Kmiec et al., 2012)

### EVIDENCE-BASED PRACTICE QUESTION

**Question:** Is pulse oximetry a practical and reliable method to screen for CHD and increase early detection of complex congenital heart defects in newborns?

**P-**Asymptomatic newborns

**I-** Using a pulse oximetry test to screen for Congenital Heart Defects

**C-** Pulse oximetry vs. not using pulse oximetry to screen and detect for CHD

**O-** Using a pulse oximetry is a simple, non-invasive, and cost-effective test that increases the early detection of critical congenital heart defects and thus should be implemented according to specific guidelines.

### REGISTERED NURSE INTERVIEW

- Interviewed an RN from Miami Valley Hospital's women's center on policy
- August 1, 2012 they implemented pulse ox screening for CHD at 24 hrs. old
- Tested on the right hand and either foot for 2 min each
- Test will be negative for CHD if O<sub>2</sub> is above 95%
- If below 95%, test again every hr for three hrs
- Physician will be called if still below 95%

### METHODS

- Articles in past five years (2007-2012) \*One exception
- Articles examining asymptomatic newborns

#### Database Search

| Database | Keywords   | Number of Articles Found | Number of Articles Used |
|----------|--|--------------------------|-------------------------|
| Medline  | "Pulse Oximetry"<br>"Newborn"<br>"Congenital Heart Disease"            | 36                       | 7                       |
| Pubmed   | "Congenital Heart Defect detection in the newborn"<br>"Pulse Oximetry" | 14                       | 1                       |

### LIMITATIONS

- Varying definitions of CHD were used among studies
- Inclusion and exclusion criteria for newborns varied among studies

### RESULTS

- Pulse oximetry testing has a sensitivity of 76.5%
- Specificity for pulse oximetry testing was 99.9%
- Test is moderately accurate for CHD detection
- Test is high for a negative screen for CHD

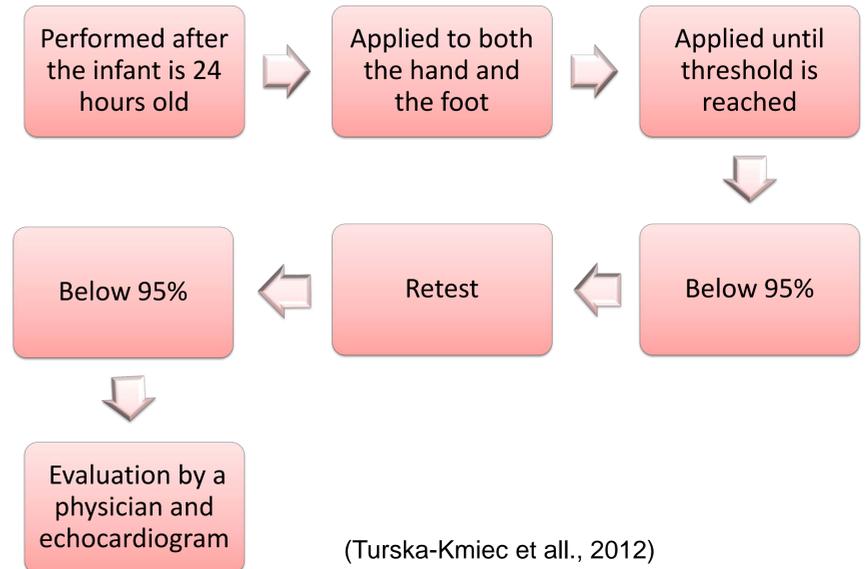
(Thangaratinam et al., 2012)

### SYNTHESIS OF EVIDENCE

- Studies used both the hand and foot for screening
- All included a positive test cut off O<sub>2</sub> range of 94%-96% with the majority of 95%
- Screening was performed after birth either at 24 hrs., 6-12 hrs., 2-24 hrs., or at discharge
- Type 2 errors were noted and decreased when screened after 24 hrs. after birth
- Retest was performed if under the oxygen saturation cut off
- Physician consult and echocardiogram was ordered if still below cut off

(Thangaratinam et al., 2012; Riede et al., 2008; Griebisch et al., 2007)

### EVIDENCE-BASED PRACTICE RECOMMENDATIONS



### REFERENCES

- Arlettaz, R., Seraina Bauschatz, A., Monkhoff, M., Essers, B., & Bauschatz, U. (2005). The contribution of pulse oximetry to the early detection of congenital heart disease in newborns. 94-98.
- Burns, N., Grove, S. K., & Gray, J. (2011). *Understanding nursing research: Building an evidence-based practice*. Maryland Heights, MO: Elsevier/Saunders.
- Chang, R., Rodriguez, S., & Klitzner, T. (2008). Screening newborns for congenital heart disease with pulse oximetry: Survey of pediatric cardiologists. *Pediatric Cardiology*, 30, 20-25.
- Griebisch, I., Knowles, R. L., Brown, J., Bull, C., Wren, C., & Dezateux, C. (2007). Comparing the clinical and economic effects of clinical examination, pulse oximetry, and echocardiography in newborn screening for congenital heart defects: A probabilistic cost-effectiveness model and value of information analysis. *Internal journal of technology assessment in health care*, 23(3), 192-204.
- Reich, J. D., Connolly, B., Bradley, G., Littman, S., Koepfel, W., Lewycky, P., & Liske, M. (2008). The reliability of a single pulse oximetry reading as a screening test for congenital heart disease in otherwise asymptomatic newborn infants. *Pediatric Cardiology*, 29, 885-889.
- Riede, F. T., Worner, C., Dahnert, I., Mockel, A., Kostelka, M., & Schneider, P. (2009). Effectiveness of neonatal pulse oximetry screening for detection of critical congenital heart disease in daily clinical routine-results from a prospective multicenter study. *European Journal of Pediatrics*, 169, 975-981.
- Thangaratinam, S., Daniels, J., Ewer, A., Zamora, J., & Khan, K. S. (2007). Accuracy of pulse oximetry in screening for congenital heart disease in asymptomatic newborns: a systematic review. *Archives of Disease in Childhood: Fetal & Neonatal*, 92, 176-180.
- Thangaratinam, S., Brown, K., Zamora, J., Khan, K., & Ewer, A. (2012). Pulse oximetry screening for critical congenital heart defects in asymptomatic newborn babies: a systematic review and meta-analysis. *Lancet*, 379, 2459-2463.
- Turska-Kmiec, A., Borszewska-Kornacka, M., Blaz, W., Kawalec, W., & Zuk, M. (2011). Early screening for critical congenital heart defects in asymptomatic newborns in mazovia province: Experience of the polkard pulse oximetry programme 2006-2008 in poland. *Kardiologia Polska*, 70(4), 370-376.