



CLINICAL PRACTICE GUIDELINE
KEMH Postnatal Wards

Pulse Oximetry Screening to Detect Critical Congenital Heart Disease

This document should be read in conjunction with the [Disclaimer](#)

Background

Critical congenital heart disease can be diagnosed by fetal ultrasound, however around 50% will still be missed. Babies may lack clinical signs in the first day of life, appearing pink despite a “cyanotic” heart lesion, with lack of murmur and apparently palpable femoral pulses in coarctations. A UK study estimated that 25% of babies with congenital cyanotic heart disease are not diagnosed until after discharge from the nursery. Delayed diagnosis can be associated with increased mortality and morbidity from multi-organ damage. At least 3 babies have been identified at KEMH over 8 years who were discharged with a critical congenital heart lesion undetected prior to screening.

There is a significant amount of data to suggest that routine use of pulse oximetry before discharge will diagnose a substantial proportion of babies who would have otherwise been missed by routine examination (~50%). The data is all from observational studies.

THIS MEANS for every 1000 babies screened about 7 cases need further evaluation with 1 in 5 of those having a critical heart lesion.

Timing of the screening is important, if done after 24 hours the screening outcomes were improved to a positive predictive value of 47%.

Another interesting and important finding in many studies is that babies with serious, potentially life-threatening, noncardiac, hypoxemic condition, such as respiratory or infective disorders, are also identified by POS. These babies are usually classified as false positives, but it is generally accepted that early detection of these babies, before they become unwell, is a potential advantage and the label of false positive is perhaps a misnomer.

The majority of the data comes from screening lower limb at $\geq 95\%$ cut off. Some studies have also included a measurement of the difference between upper and lower limb (to rule out coarctation of the aorta). Certainly coarctation of the aorta remains a diagnostic challenge and in the studies reviewed by AAP this is the cardiac lesion least likely to be found with the oximetry screening test. Due to the limitation on the numbers in the studies that used upper and lower limb saturation difference we have decided not to do both limbs but just the lower limb saturations.

Key Points

- Pulse oximetry can detect some critical congenital heart disease that would otherwise be missed on routine examination / antenatal USS.
- The ideal time for oximetry is around 24 hours of age.
- The probe should be sited on the **lower limb**.
- $\geq 95\%$ is considered normal and a baby can then be discharged as normal.
- Verbal consent should be obtained and the screen documented in the notes on MR410 form below day 1 check.

Screening Process

- Parents to be provided with information sheet and verbal consent should be obtained.
- Medical staff to screen all neonates born at KEMH prior to discharge (ideally at around 24 hours age, but for early discharge within 1 hour of discharge) with lower limb O_2 saturations.
- The screening should occur around the time of the RMO discharge review. Take the highest number the trace gets to as the screening number (the probe only needs be only on until a good steady trace is obtained which may take <1 minute). The baby should not be feeding and should be settled.

Normal $\geq 95\%$ oxygen saturation

- If O_2 saturations 91-94% → medical review to consider other causes (mainly sepsis). If well with a normal examination → repeat screening test in 3-4 hours when baby settled.
- If still abnormal after 2 repeated examinations → for a senior review (SR or Consultant) and refer to cardiology as necessary. This may be next day depending on timing and THIS MAY POSTPONE DISCHARGE (hence consent needed to do screen).
- If there are any concerns about baby they should be admitted to SCN.
- If O_2 saturations $\leq 90\%$ → admit to SCN immediately and for senior review and continuous oximetry. Other causes need to be excluded (with possible septic work up and IV antibiotics, CXR and assessment other problems: upper airway, neurological, polycythaemia, persistent pulmonary hypertension). Studies show up to 50% of babies screening positive have signs of sepsis on further evaluation.²
- If no other cause found echocardiogram to be performed at time dictated by Cardiologist (may be next day but prior to discharge).

Documentation

- The outcome of screening should be documented on the neonatal examination form MR 410.

- Any abnormal screening should also be documented in the inpatient history with the medical review.

References

1. Brown KL, Ridout DA, Hoskote A. et al. Delayed diagnosis of congenital heart disease worsens preoperative condition and outcome of surgery in neonates. *Heart* 2006;92:1298-1302
2. Mahle AT, Newburger JW, Paul Matherne G et al. Role of pulse oximetry in examining newborns for congenital heart disease: a scientific statement from the AHA and AAP. *Pediatrics* 2009;124: 823-836
3. Tautz J, Merkel C, Loersch F et al. Implication of pulse oxymetry screening for detection of congenital heart defects. *Klin Padiatr* 2010; 222(5):291-5
4. Riede FT, Worner C, Dahnert I et al. Effectiveness of neonatal pulse oximetry screening for detection of critical congenital heart disease in daily clinical routine- results from a prospective multicenter study. *Eur J Pediatr* 2010; 169: 975-981
5. De Whal Granelli A, Wennergren M et al, Impact of pulse oximetry screening on the detection of duct. *BMJ* 2009;338:a3037 dependent congenital heart disease: a Swedish prospective screening study in 39 821 newborns
6. Walsh W. Evaluation of pulse oximetry screening in Middle Tennessee: cases for consideration before universal screening. *J Perinat* 2011; 31, 125-129
7. Ewer EK, Middleton LJ et al. Pulse oximetry screening for congenital heart defects in newborn infants (Pulseox): A test accuracy study. *Lancet* 2011; 378(785-794)
8. Royal North Shore Sydney Hospital guidelines
9. Swiss National guideline: [Kuelling B](#), [Arlettaz Mieth R](#), [Bauersfeld U](#), [Balmer C](#). Pulse oximetry screening for congenital heart defects in Switzerland: most but not all maternity units screen their neonates. *Swiss Med Wkly* 2009 Nov 28;139(47-48):699-704
10. Ewer EK Screening for Critical Congenital Heart Defects with Pulse Oximetry: Medical Aspects. *Amer J Perinatol* 2016; 33(11): 1062-1066

Document owner:	Neonatal Directorate Management Committee		
Author / Reviewer:	Neonatal Directorate Management Committee		
Date first issued:	July 2012		
Last reviewed:	2 nd February 2017	Next review date:	2nd February 2017
Endorsed by:	Neonatal Directorate Management Committee	Date endorsed:	28 th February 2017
Standards Applicable:	NSQHS Standards: 1  Governance		

**Printed or personally saved electronic copies of this document are considered uncontrolled.
Access the current version from the WNHS website.**