Early pulse oximetry screening

Introduction

Infants born at RPA Hospital have an early postnatal examination to detect abnormalities and a subsequent examination to detect abnormalities that are not apparent in the early period or may have been undetected on the initial examination. One study reported an abnormality was detected in 8.8% infants on initial newborn examination within 24 hours, with additional abnormality detected in 4.4% on a 2nd newborn examination. Of these, 11% would have been present on first examination and 11% were considered important. Thus an important finding was detected in 1 in 200 infants by a 2nd examination. It is recommended that all infants have an initial brief examination within the first few minutes of life, a subsequent full and detailed examination and a follow up examination should be performed later in the first week.

Seemingly healthy newborn babies may be admitted to the postnatal wards or well baby nursery with hidden malformations or unrecognized symptoms of disease. Despite looking pink to health workers observing them, the babies may have low arterial oxygen saturation, a sign of disease. Screening with pulse oximetry has been put forth as a useful strategy for detecting defects with decreased arterial oxygen saturation (SpO2) before heart failure and circulatory collapse develops. Pulmonary diseases and other disorders may also be detected.

Epidemiology

Unexpected early sudden collapse resulting in death or prolonged need for resuscitation occurs in 0.15 to 0.4 per 1000 live births. In addition, congenital heart disease (CHD) occurs in 9 of every 1000 live births. Approximately one quarter of these children will have critical congenital heart disease (CCHD), which by definition requires surgery or catheter intervention in the first year of life. Congenital malformations are one of the leading causes of infant death in developed nations, and CCHD is responsible for more deaths than any other type of malformation.

Early oxygen saturation screening

Pulse oximetry screening of apparently healthy babies in the first day alerts staff to a considerable number of potentially severe disorders. CHDs and pulmonary diseases were the most common conditions detected. Most of the CHDs that were discovered might have been life-threatening if left undiagnosed.

Early pulse oximetry screening has been evaluated in a large prospective multicenter study conducted in 14 hospitals in Norway. Post ductal (foot) arterial oxygen saturation (SpO2) in apparently healthy newborns was performed after transfer from the delivery suite to the nursery at a median age of 6 hours (range, 1-21 hours). SpO2 <95% led to further diagnostic evaluation.

Of 57,959 live births, 50,008 (86%) were screened. CHDs were prospectively registered and diagnosed in 658 newborns (1.1%), of whom 35 (5%) were classified as critical (ductus dependent, cyanotic). Of the infants screened, 324 (0.6%) failed the test. Of these, 43 (13%) had CHDs (27 critical), and 134 (41%) had pulmonary diseases or other disorders. The remaining 147 infants (45%) were healthy with transitional circulation. For identifying critical CHDs, the pulse oximetry screening had sensitivity 77% (95% CI 59-89), specificity 99.4% (95% CI 99.3-99.5) and false-positive rate 0.6% (95% CI 0.5-0.7). The authors concluded that early pulse oximetry screening promotes early detection of critical CHDs and other potentially severe diseases. The sensitivity rate for detecting critical CHDs is high, and the false-positive rate is low.
Who and when to screen?

All newborn infants must have a newborn examination after delivery and prior to 6 hours of age performed and documented in Medical Record by attending midwife or doctor. Infants with detected abnormalities or with cardiorespiratory abnormalities should be reported to the Neonatal Team.

All newborn infants should also have pulse oximetry screening performed prior to 6 hours of age. This is best performed by integrating into the usual infant cares after birth (eg initial baby examination, with the first feed or on admission to the postnatal ward). For infants still in delivery areas at 6 hours of age, this should be performed in the delivery area.

How to screen?

Post ductal saturation screening is performed by placing a pulse oximetry probe on the infant’s foot.

Pulse oximetry is performed using the Masimo Rad5 or 7 Portable Pulse Oximeter. It is recommended that the test be performed prior to disturbing the infant while the baby is still settled. First, a reusable probe is cleaned with antiseptic and the probe secured to the baby’s foot using Coban tape. Next, switch on the pulse oximeter and allow some time for the pulse to register and the signal to stabilise. This usually takes about 30 seconds. Finally record the result on the newborn examination page and in the infant’s Powerchart record. Record it as, for example, “SpO2 98% foot.” In all cases the baby will be breathing room air. The accepted normal SpO2 is 95% or greater. Response to the SpO2 result is detailed in the flow diagram. Contact the Neonatal Medical Officer.

Screening pathway
Assessment of infant with low oxygen saturation screening

All infants assessed as having a low oxygen saturation screen should be assessed by the Neonatal Medical Team. The following should be assessed:

- History for risk factors for newborn infection, respiratory and cardiac problems should be obtained;
- Infant’s observations: temperature, pulse rate, respiratory rate (abnormal >60bpm) and respiratory effort (observe for nasal flare, grunt, tracheal tug, chest recession)
- Infant condition – appears well, alert and interested in feeding or otherwise
- Repeat foot pulse oximetry screen
- Full newborn examination

If the infant is normal on newborn examination with no risk factors and repeat pulse oximetry screen SpO2 ≥ 95%, then no further action is required.

If the infant has persistent SpO2 <95% and / or any abnormal signs then senior Neonatal review is required (fellow or consultant). If appropriate (usually) the infant should be admitted to the RPA Newborn Nursery for monitoring and management.

A diagnosis of transitional circulation should only be made after assessment of risk factors and full newborn examination, supplemented by appropriate testing and echocardiography.

References

2. Unit TRACoP-HP. Paediatric Policy: Examination of the Newborn. RACP. 2005.


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