S. Thangaratinam, K. Brown, J. Zamora, et al. Pulse oximetry screening for critical congenital heart defects in asymptomatic newborn babies: a systematic review and meta-analysis. Lancet 379 (9835) (2012 Jun 30) 2459–2464

Objective: This study assessed the performance of pulse oximetry as a screening method for the detection of critical congenital heart defects (CHD) in asymptomatic newborn babies.

Background: Screening for critical congenital heart defects in newborn babies can aid in early recognition, which may lead to improved outcome. The potential predictive value of using pulse oximetry to screen for significant cyanotic CHD in newborns has been unclear. One difficulty of determining the potential value of universal screening of newborns with pulse oximetry from previous studies is that the relative infrequency of CHD made any individual study less able to demonstrate benefit. This meta-analysis with 229,421 newborn babies makes this a more powerful study.

Methods: In this meta-analysis, the authors searched Medline (1951–2011), Embase (1974–2011), Cochrane Library (2011), and SciSearch (1974–2011) for studies that assessed the accuracy of pulse oximetry for the detection of critical CHD in asymptomatic newborn babies. Two reviewers selected studies that met the predefined criteria for population, tests, and outcomes, and sensitivity, specificity, and corresponding 95% CIs for individual studies were determined.

Results: This meta-analysis identified 13 studies, published from 2001 to 2011, that screened 229,421 asymptomatic newborn infants for critical CHD (defined as disorders from which infants died or required invasive procedures or surgery in the first 28 days of life). The overall sensitivity of pulse oximetry for detection of critical CHD was 76.5%. The specificity was 99.9%, with a false-positive rate of 0.14%.

Measurement of pulse oximetry before 24 h of age improved sensitivity from 77.5% to 84.8% (a nonsignificant difference) but increased the false-positive rate from 0.05% to 0.5% (a significant difference; $p = .0017$). Location of the pulse oximeter probe did not affect sensitivity or the frequency of false-positive results. Thangaratinam and colleagues concluded that pulse oximetry is a highly specific test for detection of critical CHD in newborn infants, and that the false-positive rate is low, especially when done after 24 h of age.

Conclusion: Pulse oximetry is highly specific and moderately sensitive for detection of critical CHD and it meets the criteria for universal screening.

Clinical perspective

Pulse oximetry screening can lead to the early detection of lesions such as coarctation of the aorta, interrupted aortic arch, transposition of the aorta, aortic and pulmonary stenosis, tetralogy of Fallot, pulmonary atresia and total anomalous pulmonary venous connection. Early correction of these lesions before the onset of acidosis and decompensation can lead to an improved outcome.

The American Academy of Pediatrics endorsed universal newborn screening with pulse oximetry earlier this year and stated that screening should be performed after 24 h of age and should include readings from both the right hand and either foot. They recommend a "pass" oxygen saturation level of 95%, repeat screens at oxygen saturations of 90%–95%, and immediate evaluation in infants whose pulse oximetry readings are less than 90%.

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Summary of ROMICAT II study

The ROMICAT II study was a multi-centric study aimed to evaluate the effectiveness of coronary computed tomographic angiography (CCTA) in suspected patients of acute coronary syndrome (ACS) seen in the emergency room (ER). Eligibility criteria were patients with acute chest pain not showing ischemic changes in the ECG and having normal troponin levels. Out of a total 1000 acute chest patients enrolled, 501 were randomly assigned to the investigation group where CCTA, performed as early as possible, was the first diagnostic test. The remaining 499 patients were given standard emergency room care. The following end points were compared in the two groups, both at baseline and after 28 days: (i) duration of hospitalization (ii) time to diagnosis (iii) direct discharge rate from ER (iv) re-hospitalization after 28 days (v) adverse cardiac events after 28 days.

A total 8% patients with acute chest pain had acute coronary syndrome (mean age 54 ± 8, male 53%) .When compared to patients receiving standard evaluation, patients undergoing CCTA were observed to have shorter hospital stay (reduced by 7.6 h, $P < 0.001$), duration of hospitalization (23.2 ± 37.0 h vs. 30.8 ± 28.0 h, $P < 0.001$), and a higher incidence of discharge done directly from the emergency room (47% vs. 12%, $P < 0.001$). The incidence of adverse cardiac events and re-hospitalization, and the cost of care ($4289 (Rs. 239540) vs. $ 4060 (Rs. 226751)), were found to be comparable in the two groups.

Emergency use of CCTA in ACS patients, reduced the time to diagnosis by quicker exclusion of CAD, leading to faster discharge (done directly from ER) and lesser need for hospital admission at the initial presentation (30% vs. 60%, P, 0.001). The overall morbidity and readmission rates (at 1 month) and cost of care were however not reduced. Significantly, in patients in whom ACS was diagnosed, duration of hospitalization was similar in the two groups (86.3 ± 72.3 vs. 83.8 ± 61.3, $P = 0.87$).

Clinical perspective

The ROMICAT II study shows that in patients presenting with acute chest pain, use of coronary computed tomography