Pulse oximetry screening to detect critical congenital heart diseases in asymptomatic neonates

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Background: Critical congenital heart diseases (CCHDs), 10% to 25% of all CHD, are duct-dependent defects that are life threatening without intervention in the neonatal period or infancy. One third of neonates with CCHDs are discharged home undetected and have a poorer outcome. Pulse oximetry screening before discharge is increasingly being used to diagnose CCHDs in developed countries.

Methods: This prospective observational study conducted at a tertiary care hospital from September 2016 to March 2019 screened all asymptomatic intramural neonates after 24 hours of life using a Masimo pulse oximeter with signal extraction technology using the standard American Academy of Pediatrics algorithm. A positive screen was followed by a confirmatory echocardiography (gold standard) and a negative screen by clinical examination at 6, 10 and 14 weeks and identification of readmissions during the study period.

Results: A total of 1855 neonates (82.99% of the eligible 2235 neonates) underwent screening at a mean (SD) age at screening of 32.4 (6.8) hours and took a mean (SD) time of 3.5 (1.2) minutes. The sensitivity, specificity, positive and negative predictive value of pulse oximetry screening for detection of CCHDs in asymptomatic neonates was 75% (95% CI: 28.91% to 96.59%), 99.29% (95% CI: 98.79% to 99.60%), 18.75% (95% CI: 5.80% to 43.80%) and 99.94% (95% CI: 99.66 to 99.99%), respectively.

Conclusion: Pulse oximetry screening of asymptomatic neonates between 24 and 48 hours of life improved the detection of CCHDs with high specificity and negative predictive value, moderate sensitivity and a reasonably low false positivity rate.