Beyond Critical Congenital Heart Disease: Newborn Screening Using Pulse Oximetry for Neonatal Sepsis and Respiratory Diseases in a Middle-Income Country.

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BACKGROUND: Studies on pulse oximetry screening for neonatal sepsis and respiratory disease in a middle-income country are lacking. Newborn screening for critical congenital heart disease (CCHD) using pulse oximetry is an effective and life-saving strategy in developed countries. While most studies have reported false-positive results during CCHD screening, they have not elaborated on the detected disease types. We studied the effectiveness and outcomes of pulse oximetry newborn screening for non-cardiac hypoxemic diseases such as neonatal sepsis, respiratory diseases, and CCHD in a middle-income country.

METHODS AND FINDINGS: In a pilot study performed at the University Malaya Medical Centre (UMMC), Malaysia, all apparently healthy term newborns, delivered at UMMC were screened pre-discharge using pulse oximetry. Echocardiography was performed for newborns that had positive screening results on two separate occasions, 1-h apart. Newborns with normal echocardiograms were evaluated and treated for other non-cardiac diseases. Fifteen of 5247 term newborns had positive screening results. The median age at screening was 20 h. Thirteen newborns (0.24%) had significant non-cardiac diseases: sepsis (n = 2) and respiratory diseases (n = 11) that required hospitalization and treatment. The remaining two newborns with normal antenatal ultrasonograms had positive screening test and confirmed to have CCHD. Another 18 newborns with negative screening test were later admitted for treatment of sepsis (n = 16) and penumonia (n = 2). All newborns were treated and alive at the end of the study. The sensitivity and specificity of pulse oximetry screening for non-cardiac diseases were 42% and 99.9% respectively, and 100% and 99.7% for CCHD, respectively.

CONCLUSIONS: Routine pulse oximetry screening test was effective in identifying newborns with CCHD and other hypoxemia illnesses, which may led to potential life-threatening condition. This study showed that the expanded use of pulse oximetry has immediate implications for low- and middle-income countries contemplating strategies to reduce neonatal mortality and morbidity.
ABBREVIATIONS: ASD, atrial septal defect; CCHD, critical congenital heart disease; CRP, C-reactive protein; CXR, chest radiographs; NDI, neurodevelopment impairment; PPHN, persistent pulmonary hypertension of the newborn; PDA, patent ductus arteriosus; PFO, patent foramen ovale; TGA, transposition of great artery; TTN, transient tachypnoea of the newborn; VSD, ventricular septal defect.