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Critical Congenital Heart Disease Screening in Newborns Is Both Efficient and Effective

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As a young physician in training, I was surprised to learn that universal newborn screening using pulse oximetry for critical congenital heart disease (CCHD) had not been recommended by the American Academy of Pediatrics (AAP) until 2011. The practice and protocol appeared so strongly and rigorously implemented that I had initially believed it had been around for many decades. It is humbling to realize that universal screening has not always been the case, within the United States nor internationally.

There have been multiple studies strongly suggesting pulse oximetry screening is a feasible and efficient tool for newborn screening of CCHD. In a study being early released in *Pediatrics* this week entitled, "Comparing Strategies for CCHD Newborn Screening," Dr. Pei-Chen Tsao and colleagues from several institutions in Taiwan set out to investigate the test accuracy and the efficiency of pulse oximetry screening for CCHD, after the Taipei City Government implemented a modified version of the AAP recommendation for CCHD screening in 2013 (10.1542/peds.2022-057862).

Between April 2014 and June 2017, a newborn CCHD screening program using pulse oximetry was expanded to include 30 birthing facilities representing 87.9% (93,093 of 105,869) of the total deliveries in Taipei. All newborns delivered in these facilities were eligible for inclusion; all centers followed the same

protocol for newborn screening and referral. The screening protocol used in this study is comparable with current AAP recommendations, barring one major difference: the Taipei protocol allowed for an additional pulse oximetry screening test for cases with SpO2 <90% at first measurement (current AAP recommendations support not rescreening in these cases and instead placing immediate referral for evaluation). This study cohort was then used to retrospectively estimate outcomes based on different CCHD screening protocols.

Using the Taipei protocol, Dr. Pei-Chen Tsao and colleagues found that among the >90,000 of newborns screened without prenatal suspicion for CCHD:

- 355 (0.38%) required a second oximetry measurement.
- Ultimately, 156 (0.17%) newborns failed their second oximetry screening and were referred for further evaluation. The referral rate of these newborns within 48 hours of life in this study was 87.82%.
- Of the referral cases, 117 (75%) had a final diagnosis before 72 hours of life, most common of which included CCHD, non-critical congenital heart disease, respiratory illness, or sepsis.
- The false-positive rate of CCHD screening was 0.12% (114). Importantly, 42 cases of CCHD were detected in newborns without prenatal suspicion, and 97.6% were diagnosed within the first 72 hours of life.
- Only 4 infants who passed the screening ultimately were diagnosed with CCHD providing a false-negative rate of 0.004%.

The authors concluded that the Taipei protocol, using a second oximetry screening for those who initially failed the first screening with SpO2 <90%, is an efficient and effective screening tool for CCHD. They also found that implementing current AAP guidelines, which would immediately refer to pediatric cardiology in such cases, would further decrease their false-negative rate. It thus appears that the important take home message here is that oximetry screening in the first few days of life is important, regardless of whether a second screen is performed. The final Taipei proposed protocol, which aligns with the AAP guidelines, should enable effective and efficient nationwide screening in Taiwan and other regions with similar medical care systems.