

## **Large scale application of pulse oximeter and auscultation in screening of neonatal congenital heart disease**

Huang Y, Zhong S, Zhang X, Kong L, Wu W, Yue S, Tian N, Zhu G, Hu A, Xu J, Zhu H, Sun A, Qin F, Wang Z, Wu S. *BMC Pediatr.* 2022 Aug 12;22(1):483. doi: 10.1186/s12887-022-03540-7.

**Purpose:** To conduct a retrospective evaluation of a large clinical implementation of combined pulse oximeter (POX) and cardiac auscultation as a fast-screening device for congenital heart disease (CHD).

**Methods:** Every newborn in a large maternity healthcare center received auscultation and POX screening within 24 hours after delivery. When an abnormal heart murmur or SpO<sub>2</sub> level was detected, an echocardiogram was ordered to confirm the diagnosis of CHD.

**Results:** From January 1, 2018 to December 31, 2019, there were 44,147 livebirths at the studied hospital where 498 suspected CHD were identified: 27 newborns by POX screening and 471 by cardiac auscultation. The diagnosis was further confirmed in 458 neonates through echocardiogram. This result put forth an overall diagnosis rate of 92.0%. Cardiac auscultation detected the majority of CHD cases 438 (95.6%) while POX only screened 20 (4.4%) cases. Interestingly, no CHD case was detected by both auscultation examination and POX screening. Auscultation detected most of the common types of CHD, but POX excelled in identifying rare and critical cases. POX screening alone had a very low accuracy of 74.07% in positive predict value (PPV). On the other hand, auscultation functioned well in terms of PPV and negative predict value (NPV) (92.99 and 99.95%, respectively), but the addition of POX improved the overall screening performance resulting in 100% NPV. We also validate the finding with the data 6 months after the study period.

**Conclusion:** Our study demonstrated that addition of pulse oximetry to routine cardiac auscultation could be used as an accurate and feasible screening for early screening of CHD in newborns in large-scale clinical practice.