Experience of application in Russia pulsoxymetry as screening for detecting critical states in the newborns: critical congenital heart defects and pulmonary hypertension

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Despite the improvement in the last decades of prenatal ultrasound diagnosis and clinical examination of newborns, even in countries with developed health care, up to 28% of newborns with critical congenital heart defects (CHD) are discharged from the hospital without a diagnosis. Early detection of persistent pulmonary hypertension in newborns (PPHN) is often associated with certain difficulties, which leads to a delayed diagnosis of this syndrome and a later start of therapy.

Objective: to improve the methods of diagnosing the early detection of newborns with hypoxemia due to critical CHD or persistent pulmonary hypertension of the newborn, as well as to achieve a reduction in infant mortality.

Materials and methods: during the study period - from April 2017. to February 2018 using the developed algorithm for performing screening of critical conditions in newborns using pulse oximetry, 8,358 newborns were examined on the basis of maternity hospitals of the Republic of Tatarstan, which accounted for 88.4% of 9459 births registered. A modified two-band pulse oximetry technique was used, followed by echocardiography of the newborn with a positive screening result.

Results: The introduction of pulse oximetry screening in the early neonatal period (3rd hour of life) allowed the timely detection of 95 children with a positive test result, whose conditions caused the greatest risk to the health of newborns, which accounted for 1.14% of all children studied. Thanks to the screening, in 13 newborns in the first hours of life, congenital heart defects that were not diagnosed in utero were detected, 5 of them were critical. Persistent pulmonary hypertension was detected in 20 patients. Intrauterine pneumonia was diagnosed in 30 newborns. Among the critical CHDs, the following diagnoses were established: transposition of the great vessels - 2 children, aortic coarctation - 1 child, total abnormal pulmonary vein drainage - 1 child, Taussin-Bing anomaly - 1 child. Evaluation of the effectiveness of the screening showed that a positive result had a decisive role in the timely diagnosis of critical CHD and persistent pulmonary hypertension of the newborn.

Conclusions: Pulse oximetry helps to identify both systemic hypoxemia and postductal desaturation, which is characteristic of both critical CHD and PPHN, and can be used to screen newborns for these conditions. Pulse oximetry is an easily accessible, non-invasive, painless method that can be included in a regular examination of the newborn. The advantages of pulse oximetry also include simplicity and short procedure time.