

Pulse Oximetry Screening for Critical Congenital Heart Disease in the Neonatal Intensive Care Unit (Revised from 7-31-14)

Background: Pulse oximetry screening (POS) to detect unrecognized critical congenital heart disease (CCHD) using a formal protocol has been shown to be effective in asymptomatic term neonates. These protocols are designed to detect the hypoxia associated with ductal dependent cardiac lesions before the onset of symptoms. Although there is at least one case report of missed CCHD after neonatal intensive care unit (NICU) discharge, babies admitted to a NICU are presumably at lower risk to be discharged home with missed CCHD than their asymptomatic term counterparts. Although exemptions to state POS requirements for NICU patients have been proposed, these recommendations remain controversial. This study was performed to provide additional information regarding POS in NICU patients.

Methods: Clinical and POS information on all infants born in 2012 and 2013 and admitted to the Meriter Hospital NICU (Madison, WI) was reviewed. NICU policy recommended POS for all patients at 24 hours of age unless the infant had already been diagnosed with CCHD or was receiving supplemental oxygen. For these infants, delayed POS was performed once weaned from oxygen or on a stable home oxygen regimen. Babies with CCHD or those in whom extracorporeal membrane oxygenation was considered were usually transferred to the cardiovascular intensive care unit before POS was performed.

Results: 1030 neonates born in 2012 or 2013 were admitted to the NICU. The average length of stay was 17 days. 763 babies were discharged home from the NICU, 195 babies were transferred to an in-house well baby nursery before discharge, 57 babies were transferred to other facilities, 16 died, and one left against medical advice. 28 were discharged home on supplemental oxygen.

804 neonates passed their POS, POS was not performed in 212, POS was incomplete in 12, and 2 neonates failed their POS (coarctation-1, dilated cardiomyopathy-1).

18/1030 (1.75%) babies had CCHD (coarctation-6, transposition-2, truncus arteriosus-2, single ventricle-2, Ebstein's anomaly-1, hypoplastic left heart-1, pulmonary atresia-1, total anomalous pulmonary venous return-1, tetralogy of Fallot-1, and tricuspid atresia-1). One baby with coarctation passed POS and one with coarctation failed POS. The other 16 with CCHD were not screened.

POS was completed in 804/1012 (79.4%) of babies without CCHD and one newborn with a dilated cardiomyopathy failed the POS screening. 292/1012 (28.9%) had echocardiography as part of their care. 59/1012 (5.8%) had a moderate or large patent ductus arteriosus (PDA). 13 had an echocardiographic diagnosis of persistent fetal circulation or pulmonary hypertension. 199 had echocardiograms that were considered normal for age or had small PFOs, ASDs, VSDs, or PDAs that were not felt to be hemodynamically significant.

Discussion: Despite having health concerns significant enough to justify admission to the NICU, no baby with a normal heart failed their POS screening using a delayed POS screening strategy. In addition to POS, all patients had some form of oximetry performed, many had an echocardiogram that would have confirmed or excluded CCHD, and most were discharged at an age when the ductus arteriosus would typically have closed. This study provides additional information on NICU patients with regard to the benefits of POS in the NICU population.