Pulse Oximetry in Transport of Poorly Perfused Babies.

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Background

Conventional pulse oximetry can be adversely affected by a low signal-to-noise ratio. During poor perfusion) low signal) or monitoring site motion (high noise), inaccurate or absent values can occur. We evaluated the results of motion and low peripheral (cardiac shunt) on the reliability of pulse oximetry in five sick infants during inter-hospital transport via air and land. A new pulse oximeter technology with Masimo SET (Masimo Corp., Irvine, CA) and a conventional pulse oximeter (Nellcor Puritan Bennett, Pleasanton, CA) were compared.

Methods

Two pulse oximeters were tested; the Nellcor N-200 and a prototype from Ohmeda (Louisville, C)) which contained Masimo SET (a patented sensor and software algorithm designed for conditions of motion and poor perfusion). One Nellcor N-200 pulse oximeter monitored pure-ductal saturation on the right wrist and post-ductal; SpO2 was monitored by a Nellcor N-200 as well as an Ohmeda (Masimo SET) pulse oximeter on opposing feet. Two transport settings were used; air via rotorcraft and land with a van ambulance (in past experience both settings produced frequent failures with various models from multiple manufacturers of conventional oximeters). All infants were intubated, had cardiac shunting due to persistent pulmonary hypertension or the newborn (PPHN), and were referred for extracorporeal membrane oxygenation (ECMO) or nitric oxide (NO) therapy. Prior to departure, all pulse oximeters functioned and matched ABG values within the manufacturer's specifications. A pulse oximeter failure was defined as a SpO2 display of zero or any SpO2 value where the oximeter pulse rate and ECG heart rate were not within 5 beats/minute. Failures and the reason for failures were noted by a designated member of the transport team.

Results

Both Nellcors failed 100% of the time during rotocraft takeoff and landing, and during periods of high road vibration and patient motion, whereas, Masimo SET had no failures. Shunting reduced post-ductal (peripheral) perfusion with associated pulse oximeter failures: 5% with Masimo, 74% with Nellcor.

Conclusion

Access to the continuous output of post-ductal oximetry was extremely valuable to the clinical management of PPHN during transport. Pulse oximetry with Masimo SET has dramatically fewer failures than conventional pulse oximetry during inter-hospital transport of poorly perfused infants.