

Comparison of Two New Generation Pulse Oximeters with Arterial Oxygen Saturation in Critically Ill Children

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Objectives

To compare the performance of two new generation pulse oximeters, one with enhanced signal extraction technology (SET) and other without enhanced SET in detecting hypoxemia and to correlate it with arterial blood gas analysis.

Methods

Forty-eight patients, admitted to pediatric intensive care unit (PICU) of a tertiary care teaching hospital in India for critical care and support during the study period, who had an arterial catheter in situ were included. Children with those disease conditions known to interfere with pulse oximetry and blood gas analysis were excluded. 184 set of observations were made during the study period. Each set had oxygen saturation (SpO₂) measured from both the pulse oximeters and the corresponding arterial oxygen saturation (SaO₂). The values were compared for occurrence of true and false alarms during periods of normal BP, hypotension and varying degrees of hypoxia.

Results

The mean arterial SaO₂ in the study was 94.4 % ± 4.9. The mean SpO₂ recorded in conventional and enhanced signal extraction technology (SET) pulse oximeters were 94.9 % ± 4.5 and 97.2 % ± 4.7 respectively. Enhanced signal extraction technology pulse oximeter detected 4/27 (15 %) of true hypoxemic events and 1 event was a false alarm. Conventional pulse oximeter detected 11/27 (41 %) true hypoxemic events but recorded 6 false alarms.

Conclusions

Both pulse oximeters were not found to be performing satisfactorily in picking up hypoxemia in the study. There was good correlation with mean SpO₂ from pulse oximeters and arterial SaO₂. The reliability of pulse oximetry decreases with worsening hypoxemia and hypotension, and the sensitivity for picking up hypoxemia can be as low as 15 %.