

ACCURACY OF MAIN-STREAM END-TIDAL CARBON DIOXIDE MEASUREMENT DURING THE ROAD TRANSPORT OF MECHANICALLY-VENTILATED PRETERM INFANTS

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Background: Non-invasive carbon dioxide (CO₂) monitoring in mechanically-ventilated preterm babies in the first few days of life is essential during neonatal stabilisation/transport. This helps to keep CO₂ levels in an acceptable range avoiding the risks associated with hypo- and hypercarbia, and minimises repeated arterial sampling and its associated complications. End-tidal CO₂ (EtCO₂) monitoring is of value in identifying certain ventilation problems, and proven to be effective in children and adults. The reports of its use in neonates are controversial.

Objective: To assess the accuracy of measurements of EtCO₂ during neonatal transport of mechanically-ventilated preterm infants as compared with the partial pressure of arterial CO₂ (PaCO₂) measurements collected simultaneously.

Design: Retrospective study on 221 paired EtCO₂/PaCO₂ recordings taken during stabilisation/road transport of 125 mechanically-ventilated PT infants. The paired CO₂ values were compared and the differences between both were analysed. The Bland-Altman method was used to assess bias and repeatability.

Results: EtCO₂ correlated significantly with PaCO₂. However, the correlation was extremely poor ($r=0.39$, $p<0.0001$, 95% limits of agreement: 0.1996 - 0.4428). EtCO₂ underestimated PaCO₂ at a significant level (mean [SD] 2.595 [1.418] kPa), and did not trend reliably over time within individual subjects ($r=0.15$, $p=0.12$). The EtCO₂ bias was independent of the PaCO₂ level range and lung disease severity in terms of gas exchange or shunting. After correction of EtCO₂ with the mean bias, 58% of EtCO₂ values fell within 1 kPa of PaCO₂ values.

Conclusions: EtCO₂ has an unacceptable under-recording bias when compared to the simultaneous PaCO₂ value.