

End-Tidal CO₂ Levels vs. Arterial CO₂ Levels in Children with TBI



For patients with Traumatic Brain Injury (TBI), the partial pressure of CO₂, arterial (PaCO₂) can be adjusted to help with the regulation of cerebral perfusion. However, this can prove difficult to carry out in children. The non-invasive method of capnography measures end-tidal CO₂ (EtCO₂) and is often used for paediatric patients as an alternative to arterial cannulation.

EtCO₂ measurements have previously been used to predict PaCO₂ levels in adults but as such, no major clinical evidence is available to confirm or deny the accuracy of this method in paediatric patients with TBI. The Brain Trauma Foundation has published guidelines that recommend avoidance of prophylactic hyperventilation and PaCO₂ less than 30mm Hg in the initial 48 hours after submission. But there is no recommendation either for or against the use of EtCO₂. This study was conducted to evaluate the validity of using EtCO₂ as an indicator of PaCO₂ in children and adolescents. Using secondary analysis, researchers explored the agreements of PaCO₂-EtCO₂ measurements in 137 patients in the PICU.

Study findings show that less than 50% of the PaCO₂-EtCO₂ pairs were in agreement, with only moderate correlation in the first 24 hours. Results suggest that PaCO₂-EtCO₂ substitutions may be even more unreliable within the first 8 hours of admission, as the differences in PaCO₂-EtCO₂ were largest during this period.

Findings also show that the presence of Paediatric Acute Respiratory Distress Syndrome (PARDS) in the first 24 hours of admission to the PICU was associated with a lower likelihood of PaCO₂-EtCO₂ agreement. On average, PaCO₂ was 9.9mm Hg higher than its paired EtCO₂ value in patients who developed PARDS within the first 24 hours of admission. The median PaCO₂-EtCO₂ differences were found to be higher overall with those that developed PARDS in the week after TBI, compared to those who did not develop PARDS. However, more research is needed for the use of PaCO₂-EtCO₂ differences in indicating PARDS occurrence.

Based on these results, EtCO₂ should not be substituted for PaCO₂ measurements in paediatric patients. Researchers recommended that PaCO₂ should be used when monitoring CO₂ levels in the first 24 hours after TBI.

Source: [JAMA Network Open](#)

Image Credit: [iStock](#)

Published on : Fri, 23 Aug 2019