



CLINICAL GUIDELINE

End Tidal CO₂ Monitoring

Scope (Staff): Nursing and Medical Staff

Scope (Area): NICU KEMH, NICU PCH

Child Safe Organisation Statement of Commitment

The Child and Adolescent Health Service (CAHS) commits to being a child safe organisation by meeting the National Child Safe Principles and National Child Safe Standards. This is a commitment to a strong culture supported by robust policies and procedures to ensure the safety and wellbeing of children at CAHS.

This document should be read in conjunction with this [DISCLAIMER](#)

End tidal CO₂ (ETCO₂) is a type of non-invasive monitoring of carbon dioxide levels in ventilated neonates ¹. It provides a constant surveillance of expired CO₂ in ventilated infants. ETCO₂ can be used to detect trends in PaCO₂ and ETCO₂ alarm limits can be usefully used to maintain PaCO₂ within an acceptable range. **An important use of continuous ETCO₂ monitoring is for the immediate detection of accidental extubation.**

Many studies have shown a good correlation between ETCO₂ and PaCO₂ and PvCO₂ in full term as well as preterm infants ^(2,3,4) whereas some have not⁵. Recent studies have shown ETCO₂ monitoring to be feasible in delivery room resuscitation of preterm infants ⁶. Some studies have reported that transcutaneous CO₂ (TcCO₂) monitoring is a more precise method of monitoring PaCO₂ than ETCO₂⁵. Hence, EtCO₂ and TcCO₂ monitoring should be viewed as complementary technologies of assessing PaCO₂ in the NICU¹. In addition, regular correlation with PaCO₂ is important with either of the methods.

While a 'good' ETCO₂ trace and reading gives assurance that the ETT is in the airway, it does not provide information about the exact position of the ETT in the airway. The ETT could be too high or low (main stem bronchus) and still give an acceptable ETCO₂ trace and reading.

Inclusion Criteria

The NICUs of KEMH and PCH as well as NETS-WA use ETCO₂ monitoring on babies on conventional ventilation. At PCH and NETS-WA, all babies on conventional ventilation are to use ETCO₂ monitoring, including all ventilated infants being transferred between departments, e.g. operation theatre, radiology department and NETS transports. At KEMH, ETCO₂ monitoring is used at the Neonatologist's discretion or as a trouble shooting strategy.

Key Points

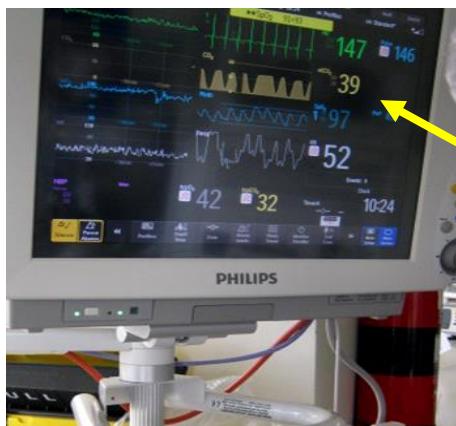
- There are two basic types of ETCO₂ monitors: Side stream; and in line monitors.
- Side stream (Phillips Microstream) is the preferred system in the NICU.

- The end tidal devise has a dead space of 0.5mL.
- End tidal CO₂ Filter Line Sampling sets are single patient use and can last up to 72 hours. This time will be reduced with increased ETT secretions and condensate. To reduce condensate accumulating in the Filter Line set, keep the sampling line facing upward as much as possible. If there is moisture condensation in the device, remove the device from the ETT (reconnect ventilator to the patient), air dry the unit and reinsert.
- TCMs should be re-membraned prior to use with each new patient and used in conjunction with End Tidal CO₂ monitoring.
- The module should not be used for 4 hours after administration of surfactant.
- End tidal CO₂ readings are not accurate if there is moderate to large leak around ETT.
- ETCO₂ is not possible for infants on high-frequency oscillators or jet ventilators as the volume of each breath is less than dead space.

Application

The ETCO₂ module is attached to the X2 monitor. The sample line is positioned between the patient's ETT and the flow sensor of the ventilator and connects into the ETCO₂ module. Reading starts immediately, no calibration is required. A wave form is displayed on the monitor with an end tidal CO₂ value.

If monitoring is required for patient transfer the X2 unit and Microstream extension is removed with from the Monitor and placed in a MP50 (KEMH) or Mx450 (PCH). This allows reading of > 3 wave forms and provides a power source to run the Microstream extension unit.



End tidal CO₂ Microstream in X2 monitor, yellow CO₂ wave form and value displayed on monitor screen.



End tidal CO₂ Microstream inserted between ETT and ventilator flow sensor.

Sample line facing upwards direction.

References

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3. Tingay DG, Mun KS, Perkins EJ. End tidal carbon dioxide is as reliable as transcutaneous monitoring in ventilated postsurgical neonates. Arch Dis Child Fetal Neonatal Ed. 2013 Mar;98(2):F161-4.
Trevisanuto, D. et al End tidal Carbon Dioxide Monitoring in very low birth weight infants: correlation and agreement with arterial carbon dioxide. Pediatric Pulmonology. 2012 Vol 47, 4, 367-372.
4. Takahashi D et al. Effect of tidal volume and end tracheal tube leakage on end-tidal CO₂ in very low birth weight infants. J Perinatol. 2020 Aug 4.
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6. Hawkes GA et al. A Randomized Controlled Trial of End-Tidal Carbon Dioxide Detection of Preterm Infants in the Delivery Room. J Pediatr. 2017; Mar;182:74-78.e2.

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Standards Applicable:	NSQHS Standards:  Child Safe Standards: 1, 10				
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