

LifeSense in pre-hospital care

Measuring EtCO₂ is a standard procedure during intensive care and anesthesia. The monitors used to be bulky and expensive, but today's technology makes them both compact and inexpensive. The combination of pulsoximetry and capnography is an effective tool in the postoperative care. Being able to monitor the ET/CO₂ concentration gives prehospital providers useful information about both ventilation and perfusion making the EtCO₂ monitors a useful prehospital tool.

Endotracheal intubation



Endotracheal intubation is a common and lifesaving procedure, and proper management in the prehospital setting is essential. Unrecognized esophageal intubation can result in catastrophic hypoxia, a major cause of mortality and morbidity¹. EtCO₂ for endotracheal intubation verification has been studied in humans. EtCO₂ has been shown to be superior to pulse oximetry in the early detection of oesophageal intubation especially if patients are preoxygenated with 100% O₂. This is because the absence of CO₂ is detected in the very next breath after displacement of the endo-tracheal tube, while it takes a little while for O₂ saturations to drop, and for physiological changes to take place.

Capnography is superior other methods for detecting endotracheal intubation² and the combination pulsoximetry/capnography is a very useful tool during this procedure.

Oxygen management

Measuring saturation is a standard procedure when giving oxygen. A good saturation is an important parameter but does not say everything about the respiration. If oxygen is administered the patient can have a normal saturation but the pulmonary respiration is not enough to exhale the CO₂ produced by the body. High concentration of CO₂ during exhalation is a strong indication of insufficient respiration. The EtCO₂ value together with the SpO₂ gives a good picture of the quality of respiration, the uptake of oxygen, but also the ability to breath out the CO₂.

Cardiopulmonary resuscitation, CPR

During cardiac arrest, EtCO₂ levels falls to low levels abruptly and increases after the onset of effective CPR and returns to normal levels at return of spontaneous circulation. During effective CPR, EtCO₂ has been shown to correlate with cardiac output, coronary perfusion pressure, efficacy of cardiac compression and even survival. The initial EtCO₂ has been shown to be markedly elevated and then decrease to low levels during CPR finally increasing at spontaneous circulation. This is due to accumulation of CO₂ in the lungs after respiratory arrest and prior to cardiac arrest. EtCO₂ of at least 10 mm Hg during first 20 minutes was shown to be associated with the time for return of spontaneous circulation (ROSC). EtCO₂ of 10 mm or less at 20 minutes predicted death and concluded that CPR could be reasonably terminated in those patients³. So EtCO₂ has been found to be a useful tool during CPR, and could be potentially useful in determining when to terminate CPR⁴.

References

¹ Bhende MS, LaCovey DC. End-tidal carbon dioxide in the prehospital setting. *Prehosp Emerg Care* 2001;5:208-213

² Grmec S, Comparison of three different methods to confirm tracheal tube placement in emergency intubation. *Intensive Care Med* 2002; 28:701-704

³ Bhende MS, Capnography in the pediatric emergency departement, *Pediatric Emergency Care*. February. 1999:64-69

⁴ Grmec S, Klemen P, Does the end-tidal carbon dioxide (ET/CO₂) concentration have prognostic value during out-of-hospital cardiac arrest? *European Journal of Emergency Medicine*, 2001, **8**, 263-269

