New guidelines from the American Heart Association (AHA) and the European Resuscitation Council (ERC) for cardiopulmonary resuscitation (CPR) emphasize the use of capnography for adults and pediatrics, expressly validating the value and significance of waveform capnography in saving lives.

The new guidelines—the “2010 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care” and the “2010 European Guidelines on Resuscitation”—stress the critical importance of waveform capnography to confirm and monitor endotracheal tube placement, assess the quality of CPR and detect return of spontaneous circulation (ROSC).

Background

On October 18, 2010, the International Liaison Committee on Resuscitation (ILCOR), AHA and European Resuscitation Council (ERC) put forth new guidelines to assist in CPR. The guidelines are based on a transparent, expert review of scientific evidence, informed by the clinical expertise of the writing teams and designed to provide rescuers and clinicians with a strategy for action that can save lives from cardiac arrest.

The changes to the 2005 guidelines were prompted by input from 356 resuscitation experts from 29 countries who reviewed, analyzed, evaluated, debated and discussed research and hypotheses through in-person meetings, teleconferences and online sessions (webinars) during the 36-month period leading up to the 2010 Consensus Conference.

The 2010 Guidelines are powerful in regards to waveform capnography. Included in both the AHA and ERC guidelines is specific language regarding capnography.

American Heart Association Recommendations

The 2010 AHA guidelines state that “Continuous quantitative waveform capnography is now recommended for intubated patients throughout the peri-arrest period. When quantitative waveform capnography is used for adults, applications now include recommendations for confirming tracheal tube placement and for monitoring CPR quality and detecting ROSC based on end-tidal carbon dioxide (PetCO₂) values.”

The following are citations from the AHA guidelines where capnography is recommended.

Endotracheal Tube (ET) Placement

Class I recommendation for adults in terms of airway management for the use of continuous quantitative waveform capnography for confirmation and monitoring of ET placement.

Capnography is recommended as confirmation of tracheal tube position for neonates, infants and children with perfusing rhythm in all settings (Class I).

“Continuous waveform capnography is recommended in addition to clinical assessment as the most reliable method of confirming and monitoring correct placement of an endotracheal tube.”

“Although other means of confirming endotracheal tube placement are available, they are not more reliable than continuous waveform capnography.”

“Providers should observe a persistent capnographic waveform with ventilation to confirm and monitor endotracheal tube placement in the field, in the transport vehicle, on arrival at the hospital, and after any patient transfer to reduce the risk of unrecognized tube misplacement or displacement.”

“Detection of exhaled CO₂ is one of several independent methods of confirming endotracheal tube position. Studies of waveform capnography to verify endotracheal tube position in victims of cardiac arrest have shown 100% sensitivity and 100% specificity in identifying correct endotracheal tube placement.”
CPR Quality and ROSC Detection
It is reasonable to consider using quantitative waveform capnography in intubated patients to monitor CPR quality, optimize chest compressions and detect ROSC (Class IIb) S740

“Because blood must circulate through the lungs for CO₂ to be exhaled and measured, capnography can also serve as a physiologic monitor of the effectiveness of chest compressions and to detect return of spontaneous circulation (ROSC).”

“Monitoring PetCO₂ trends during CPR has the potential to guide individual optimization of compression depth and rate and to detect fatigue in the provider performing compressions.”

“Persistently low PetCO₂ values (<10 mmHg) during CPR in intubated patients suggest that ROSC is unlikely ... An abrupt sustained increase in PetCO₂ during CPR is an indicator of ROSC.”

Pediatric Advanced Life Support (PALS)
In PALS, continuous capnography, if available, may be beneficial during CPR to help guide therapy, especially the effectiveness of chest compressions (Class IIa)

“PetCO₂ values consistently <10 to 15 mm Hg suggest that efforts should be focused on improving chest compressions and making sure that ventilation is not excessive. An abrupt and sustained rise in PetCO₂ may be observed just before clinical identification of ROSC, so use of PetCO₂ monitoring may reduce the need to interrupt chest compressions for a pulse check.”

European Resuscitation Council Recommendations²
The following are citations from the ERC guidelines where capnography is recommended.

Advanced Life Support (Section 3)
Increased emphasis on the use of capnography to confirm and continually monitor tracheal tube placement, quality of CPR and to provide an early indication of return of spontaneous circulation (ROSC).

Paediatric life support (Section 6)
Monitoring exhaled carbon dioxide (CO₂), ideally by capnography, is helpful to confirm correct tracheal tube position and recommended during CPR to help assess and optimize its quality.

Resuscitation of babies at birth (Section 7)
Detection of exhaled carbon dioxide in addition to clinical assessment is recommended as the most reliable method to confirm placement of a tracheal tube in neonates with spontaneous circulation.

Conclusion
The new 2010 guidelines from the American Heart Association (AHA) and European Resuscitation Council (ERC) for cardiopulmonary resuscitation (CPR) expressly validate the value and significance of waveform capnography in saving lives. The AHA and ERC now recommend capnography to confirm and monitor endotracheal tube placement, assess the quality of CPR and detect return of spontaneous circulation (ROSC). The use of capnography will help healthcare facilities and providers that resuscitate patients to comply with AHA and ERC guidelines.

1. American Heart Association (AHA) Guidelines for Cardiopulmonary Resuscitation (CPR) and Emergency Cardiovascular Care (ECC). Highlights of the 2010 American Heart Association Guidelines for CPR and ECC.

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