

Standards for Capnography

American Society of Anesthesiologists (ASA) – Standards for Basic Anesthetic Monitoring
2010 Update

RESPIRONICS
Envisioning tomorrow. Improving today.

SUMMARY

The American Society of Anesthesiologists (ASA) - Standards for Basic Anesthetic Monitoring, updated in 2010, now notes that the adequacy of ventilation during both general anesthesia and moderate and deep sedation shall be continually evaluated by both “qualitative clinical signs” and monitoring of expired carbon dioxide (1). This safety improvement long in the making identifies the monitoring of expired carbon dioxide as means to assess the adequacy of ventilation and has been implemented in part due to the risks associated with procedural sedation. (2)

In the United States, the standards relevant for carbon dioxide monitoring during anesthesia include clinical standards from the primary professional medical society of anesthesia practitioners in the United States, the American Society of Anesthesiologists (ASA) and international consensus standards for respiratory gas monitoring equipment (i.e. ISO/IEC 80601-2-55). The ASA clinical standards, termed minimum standards for basic anesthetic monitoring, were approved by the ASA House of Delegates¹ on October 21, 1986, and last amended at the 2010 Meeting of the ASA (October 20, 2010) with an effective date of July 1, 2011 and a later date with respect to continued coverage of professional liability insurance by some providers (3). This amendment expanded the use of exhaled carbon dioxide to include moderate or deep sedation. The ASA clinical standards have been widely adopted by anesthesia providers in the United States and now define the standard of care in the United States.

This standard requires that during all anesthetics, the continuous evaluation of the patient’s oxygenation, ventilation, circulation and body temperature. Section 3.1 Ventilation is intended to “ensure adequate ventilation of the patient during all anesthetics.” It includes 4 sections under methods which directly and indirectly require the use of carbon dioxide monitoring during general anesthesia, the placement and use of airway devices such as endotracheal tubes and laryngeal masks, mechanical ventilation and moderate and deep sedation. The carbon dioxide monitoring requirements with respect to each of these sections is summarized below.

SECTION 3.2.1

ADEQUACY OF VENTILATION DURING GENERAL ANESTHESIA

“Every patient receiving general anesthesia shall have the adequacy of ventilation continually evaluated.”

This includes qualitative clinical signs and monitoring. It notes that “Continual monitoring for the presence of expired carbon dioxide shall be performed unless invalidated by the nature of the patient, procedure or equipment.” Also, it notes “quantitative monitoring of the volume of expired gas is strongly encouraged.”

SECTION 3.2.2

ASSESSMENT OF ENDOTRACHEAL TUBE AND LARYNGEAL MASK POSITION

This section includes (besides clinical assessment) requirements for using expired carbon dioxide analysis from the placement of the patient interface (endotracheal tube or laryngeal mask) to its removal. This includes the availability of an audible alarm based upon the end-tidal CO₂ value. During placement, carbon dioxide must be identified in the expired gas but afterwards quantitative analysis of expired carbon dioxide gas is required.

SECTION 3.2.3

DISCONNECTION FROM A MECHANICAL VENTILATOR

This section requires the continuous use of a device to detect disconnection of components of a breathing system and the use of an audible alarm signal if a threshold has been exceeded.

The monitoring of proximal carbon dioxide (at or near the wye) can help this requirement to be met.

¹ The House of Delegates is the primary legislative and governing body of the ASA.

SECTION 3.2.4 MODERATE AND DEEP SEDATION

This section has mandated the assessment of the “adequacy of ventilation” by monitoring for the presence of exhaled carbon dioxide. Other surrogates, such as respiratory rate, a qualitative measure of ventilation, do not allow assessment of the “adequacy of ventilation.” A capnometer provides a quantitative measurement of the presence of exhaled carbon dioxide as well as a measure of the respiratory rate. With the 2010 amendments, this section (shown below) has been revised and the bar has been raised by requiring monitoring of exhaled carbon dioxide during moderate and deep sedation.

“During regional anesthesia (with no sedation) or local anesthesia (with no sedation), the adequacy of ventilation shall be evaluated by continual observation of qualitative clinical signs. During moderate or deep sedation the adequacy of ventilation shall be evaluated by continual observation of qualitative clinical signs and monitoring for the presence of exhaled carbon dioxide unless precluded or invalidated by the nature of the patient, procedure, or equipment.”

Carbon dioxide monitoring is required based upon the level of sedation, moderate or deep, irrespective of location (e.g. hospital, surgery center; doctors office) or type of anesthesia (inhaled or IV) or anesthetic used.

REFERENCES

1. ASA Standards for Basic Anesthetic Monitoring, Standards and Practice Parameters (Approved by the ASA House of Delegates on October 21, 1986, and last amended on October 20, 2010 with an effective date of July 1, 2011) - viewed 7-18-12 (www.asahq.org)
2. “No Patient Shall be Harmed by Opioid-Induced Respiratory Depression”, APSF, Fall 2011, The Official Journal of the Anesthesia Patient Safety Foundation.
3. PPM Anesthesia & the Law - A Risk Management Newsletter; Issue 31.1.