

Capnography in Non-Anesthesiologist-Performed Procedural Sedation

In October 2010 (effective date July 1, 2011), the American Society of Anesthesiologists (ASA) House of Delegates amended their Standards for Basic Anesthetic Monitoring to include monitoring exhaled carbon dioxide (etCO₂) during moderate or deep sedation. Section 3.2.4 of the standards states:

“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.”¹

The ASA definition is, “Standards provide rules or minimum requirements for clinical practice. They are regarded as generally accepted principles of patient management. Standards may be modified only under unusual circumstances, e.g., extreme emergencies or unavailability of equipment.”²

Evidence Leading to Standard

Analyses of the ASA Closed Claims Database show that anesthesia care outside of the operating room resulted in substantially higher risks. In a review of injury and liability claims associated with monitored anesthesia care (MAC), respiratory depression was the most common specific damaging mechanism. Nearly half of these claims were judged as preventable with better patient monitoring, including capnography.³

A 2009 ASA closed claims analysis of risk and safety of anesthesia at remote locations shows the proportion of claims for death was almost double in remote location claims versus OR claims (54 vs. 29%).⁴ Respiratory damaging events were more than twice as frequent in remote location claims (44 vs. 20%), with inadequate oxygenation/ventilation the most common specific event, occurring seven times the rate as in the OR (21 vs. 3%). Of claims associated with over-sedation, 62% were judged to be preventable by better monitoring.

In a study of Propofol sedation in over 49,000 pediatric patients, the most prominent type of complication involved the airway, and affected one in 65 sedations.⁵ One in 70 cases required interventions to rescue the airway. Contributory mechanisms involved mostly respiratory depression, airway obstruction, and apnea.

In a review of the literature examining the role of the anesthesia care provider in mitigating risk of anesthesia or sedation outside the operating room, the authors note, “The bulk of reported complications are related to anesthetic, drug-induced respiratory depression or airway obstruction leading to hypoxemia or hypoventilation. There are several new studies highlighting the importance of capnography in detecting impending airway or respiratory adverse events.”⁶

Impact on Non-Anesthesiologist Delivered Sedation

The ASA has developed statements on granting privileges for administration of moderate⁷ and deep⁸ sedation to practitioners who are not anesthesia professionals. As the recognized experts in providing anesthesia and sedation, “The American Society of Anesthesiologists is vitally interested in the safe administration of anesthesia. As such, it has concern for any system or set of practices, used either by its members or the members of other disciplines, that would adversely affect the safety of anesthesia administration. It has genuine concern that individuals, however well intentioned, who are not anesthesia professionals may not recognize that sedation and general anesthesia are on a continuum and thus deliver levels of sedation that are, in fact, general anesthesia without having the training and experience to recognize this state and respond appropriately.”⁹

The intent of these statements is to “suggest a framework for granting privileges that will help ensure competence of individuals who administer or supervise the administration of moderate sedation.”¹⁰ Both statements clearly follow the requirement from the Standard on Basic Anesthetic Monitoring in using capnography to monitor adequacy of ventilation.

A video produced by the ASA on Practice Parameters for Sedation and Analgesia by Non-Anesthesiologists (2012) also echoes the ASA’s Basic Anesthetic Monitoring standard stating, “Pulse oximetry with an appropriate alarm is recommended for early detection of hypoxemia, but is not a substitute for monitoring ventilatory function. Monitoring of pulmonary ventilation is essential since drug-induced respiratory depression is a primary cause of morbidity associated with sedation/analgesia...Monitoring of exhaled carbon dioxide during moderate sedation should be performed unless precluded or invalidated by the nature of the patient, procedure, or equipment.”¹¹

Centers for Medicare and Medicaid Services (CMS) Position

In a December 2009 memorandum to State Survey Agency Directors, CMS clarifies the Interpretive Guidelines (IGs) for the Hospital Condition of Participation (CoP – i.e., conditions to bill for Medicare and Medicaid services) governing Anesthesia Services. The memo states, “Hospitals should conform to generally accepted standards of anesthesia care when establishing policies governing anesthesia administration by these types of practitioners as well as MDs or DOs who are not anesthesiologists.”

The ‘Summary of Changes: Revisions to the Appendix A, Survey Protocol’ states, “Anesthesia services throughout the hospital (including all departments in all campuses and off-site locations where anesthesia services are provided) must be organized into one anesthesia service, under the direction of a qualified doctor of medicine (MD) or doctor of osteopathy (DO). Areas where anesthesia services are furnished may include (but are not limited to):

- Operating room suite(s), both inpatient and outpatient
- Obstetrical suite(s)
- Radiology department
- Clinics
- Emergency department
- Psychiatry department
- Outpatient surgery areas
- Special procedures area (e.g., endoscopy suite, pain management clinic, etc.)

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ASA Standard 3.2.4, requiring monitoring of exhaled CO₂, applies to all anesthesia services listed in the Summary, both on and off-site, and to the non-anesthesiologist clinicians responsible for sedating patients.

Patient Safety through Capnography Goes Worldwide

Subsequent to adoption of capnography as a standard of care by the ASA, anesthesia societies around the world have begun following suit in passing recommendations for monitoring CO₂ during procedural sedation.

In May 2011, the Association of Anaesthetists of Great Britain & Ireland (AAGBI) released a statement that included, “Continuous capnography should be used for all patients undergoing moderate or deep sedation, and should be available wherever any patients undergoing anaesthesia or moderate or deep sedation are recovered.”¹² In January 2012, the Canadian Anesthesia Society (CAS) updated *Guidelines to the Practice of Anesthesia* requiring the use of capnography during general anesthesia and deeper levels of sedation (Ramsey Sedation Scale 4-6).¹³

Summary

Clinical papers and anesthesia societies clearly recognize the importance of using capnography for patient safety during anesthesia and sedation, both inside and outside the OR. Both anesthesiologists and non-anesthesiologists who are responsible for providing moderate and deep sedation should closely follow the recommendations of the experts to maximize patient safety.

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