

RECOMMENDATIONS OF CLINICAL SOCIETIES AND ORGANIZATIONS

Standards and guidelines for capnography monitoring during procedural sedation

A rapidly increasing number of clinical societies and patient safety organizations continue to recommend capnography to help improve patient outcomes by monitoring oxygenation and adequacy of ventilation. Organizations that have most recently released capnography statements and recommendations for the use of capnography monitoring during procedural sedation include the following:

Organization	Recommendation	Implemented
Academy of Medical Royal Colleges ¹	Capnography should be considered a developmental standard for patients receiving sedation, where it's not already a fundamental standard.	2013
Accreditation Association of Ambulatory Health Care's Institute for Quality Improvement ²	Use continuous capnography during the procedure if the patient requires moderate sedation.	2012
American Association of Oral and Maxillofacial Surgeons ³	Unless hindered or invalidated by the nature of the patient, procedure, or equipment, evaluate ventilation adequacy during moderate or deep sedation and general anesthesia by: <ul style="list-style-type: none">▪ Continually observing qualitative clinical signs▪ Monitoring for exhaled carbon dioxide	2012
American College of Emergency Physicians and Emergency Nurses Association ⁴	For patients undergoing procedural sedation and analgesia, capnography can be used: <ul style="list-style-type: none">▪ In addition to pulse oximetry and clinical assessment to detect hypoventilation and apnea earlier than pulse oximetry and clinical assessment would do so alone▪ To assess ventilation adequacy	2014
American Society For Gastrointestinal Endoscopy ⁵	Consider capnography with extended monitoring during deep sedation since it may decrease the risks.	2002
American Society of Anesthesiologists ⁶	Unless hindered or invalidated by the nature of the patient, procedure, or equipment, evaluate ventilation adequacy during moderate or deep sedation and general anesthesia by: <ul style="list-style-type: none">▪ Continually observing qualitative clinical signs▪ Monitoring for exhaled carbon dioxide	2011

<p>American Society of Anesthesiologists^{7,8}</p>	<ul style="list-style-type: none"> ▪ Use capnography for moderate to deep sedation of MRI patients. ▪ When the anesthesia care provider isn't in zone IV, make a monitor available to view vital signs from zone III. ▪ During moderate and deep sedation, automated apnea monitoring — by exhaled carbon dioxide detection or other methods — may help decrease risks. ▪ Consider monitoring exhaled carbon dioxide for all patients receiving deep sedation and whose ventilation can't be directly observed during moderate sedation. ▪ Caution: While ventilation and oxygenation are related, they're separate physiological processes. So monitoring oxygenation by pulse oximetry shouldn't substitute monitoring ventilatory function. 	<p>2015</p>
<p>Association of Anaesthetists of Great Britain and Ireland⁹</p>	<p>Consider continuous capnography for all patients receiving:</p> <ul style="list-style-type: none"> ▪ Deep sedation ▪ Moderate sedation and whose ventilation can't be directly observed 	<p>2011</p>
<p>Association of Perioperative Registered Nurses^{10,11}</p>	<p>When caring for patients receiving moderate sedation/analgesia¹⁰:</p> <ul style="list-style-type: none"> ▪ Include respiratory rate, SpO₂ by pulse oximetry, and end-tidal CO₂ by capnography in baseline patient monitoring and documentation ▪ Include respiratory rate, SpO₂ by pulse oximetry, and end-tidal CO₂ by capnography in intraoperative patient monitoring and documentation <p>Fifteen studies cited in the guideline support using monitoring end-tidal CO₂ for patients receiving moderate sedation.</p> <p>In a randomized, controlled trial with patients receiving propofol for moderate sedation during colonoscopy procedures, Beitz et al studied the use of capnographic monitoring to reduce arterial oxygen desaturation incidences. They concluded that early intervention from additional capnographic monitoring of ventilatory activity reduced oxygen desaturation and hypoxemia incidences during sedation.¹¹</p>	<p>2016</p>
<p>Association for Radiologic & Imaging Nursing¹²</p>	<p>Consider capnography monitoring during moderate and/or deep sedation.</p>	<p>2014</p>
<p>Association for Radiologic & Imaging Nursing¹³</p>	<ul style="list-style-type: none"> ▪ Routinely use capnography for all patients receiving moderate sedation/analgesia during imaging environment procedures. ▪ Capnography gives the critical information needed to detect respiratory depression, hypoventilation, and apnea — allowing for timely and appropriate interventions. ▪ Capnography use is linked to improved patient outcomes. ▪ Use capnography at all times, whether sedation is administered by an anesthesia provider or a registered nurse credentialed to administer moderate sedation/analgesia medications. 	<p>2016</p>
<p>British Cardiovascular Society and the British Heart Rhythm Society¹⁴</p>	<ul style="list-style-type: none"> ▪ Capnography monitoring of end-tidal CO₂ and ventilation is strongly recommended. Training on correct capnography usage is required. ▪ A dedicated nurse-sedationist is crucial. The scrubbed cardiologist performing the procedure shouldn't also deliver sedation and monitor the patient. ▪ In a catheterization lab environment, the nurse responsible for sedation should be: <ul style="list-style-type: none"> – Responsible for patient monitoring and drug delivery during the procedure – Answerable to the consultant performing the ablation procedure 	<p>2015</p>

British Royal College of Anaesthetists / British Society of Gastroenterology ¹⁵	Using continuous waveform capnography to monitor respiration is: <ul style="list-style-type: none"> ▪ Recommended for all sedated patients ▪ Essential for patients whose ventilation can't be directly observed These widely available devices should be used for patients receiving propofol sedation for endoscopic retrograde cholangiopancreatography (ERCP).	2014
Canadian Anesthesia Society ¹⁶	Use capnography monitoring for all patients undergoing general anesthesia and deeper sedation levels.	2012
College of Physicians of Quebec ¹⁷	Monitoring carbon dioxide allows for: <ul style="list-style-type: none"> ▪ The early identification of complications like excessive sedation, hypoventilation, and apnea ▪ Better control of the sedation level based on the implemented diagnostic and therapeutic intervention 	2015
European Board of Anaesthesiology ¹⁸	Use continuous capnography to monitor all patients undergoing moderate or deep sedation.	2011
European Society of Gastrointestinal Endoscopy / European Society of Gastroenterology and Endoscopy Nurses and Associates ¹⁹	In nonanesthesiologist administration of propofol (NAAP) for gastrointestinal endoscopy: <ul style="list-style-type: none"> ▪ Consider capnographic monitoring in specific situations including high-risk patients, intended deep sedation, and long procedures ▪ Using visual inspection to detect hypoventilation and apnea is unreliable. Capnography gives an "early warning" window for improved ventilation interventions. Lag times from start of apnea to capnographic findings and to hypoxemia are about 5 seconds and another 10–20 seconds. ▪ Two respiratory clinical trials reported that hypoxemia was more frequently and reliably detected if capnography was available. 	
Institute for Healthcare Improvement ²⁰	Use pulse oximeters and capnographs to monitor patients for respiratory depression as shown by decreased oxygen saturation or increased carbon dioxide levels.	2012
Netherlands Healthcare Inspectorate ²¹	Capnography is expected to meet an important need in the early detection of respiratory depression and airway obstruction. Measuring end-tidal CO ₂ by capnography is recommended especially in procedures where continuous visual and audible observation is impossible or unreliable.	2012
Society of Interventional Radiology ²²	Interventional radiologists performing cases using moderate sedation should consider learning about CO ₂ capnography, including: <ul style="list-style-type: none"> ▪ How it works ▪ Its benefits over oximetry ▪ How to use it in clinical practice 	2013
Society of Gastroenterology Nurses and Associates ²³	Capnography monitoring may reduce risks during moderate and deep sedation.	2016
Spanish Society of Gastrointestinal Endoscopy ²⁴	Capnography may help with seriously ill patients who: <ul style="list-style-type: none"> ▪ Have multiple conditions ▪ Will undergo long-term sedation for prolonged or complex endoscopy procedures (ERCP, prosthesis placement, etc.) This type of monitoring: <ul style="list-style-type: none"> ▪ Measures ventilation activity ▪ Predicts potential respiratory depression before a pulse oximeter may detect desaturation 	2006

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