

EDITORIAL VIEW

PERIOPERATIVE MEDICINE

Capnography; And why not?

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Summary

Capnography has been inducted as a standard of anesthesia monitoring during perioperative care of the patients. It's a simple, reliable and cost-effective tool having many clinical applications. Its uses range from operating rooms, accident and emergency wards, high dependency units, critical care units, pediatric critical care wards and post-operative recovery bays. Many factors, including non-availability, or lack of knowledge, negligence or laziness by the end-users, result in lack of use of such an essential monitoring resource at the expense of the patient safety. A change in attitude is the need of the hour for the medical staff towards its use and it has to be started now.

Key words: Capnography; Cardiopulmonary resuscitation; Monitoring; Perioperative care

Citation: Munir AA, Rana S. Capnography; And why not? *Anaesth. pain intensive care* 2022;27(1):01–02.

DOI: [10.35975/apic.v27i1.2129](https://doi.org/10.35975/apic.v27i1.2129)

Received: January 03, 2023; **Accepted:** January 06, 2023

Most of us must have heard (at least once in our lifetime) an Oscar and Golden globe winning song “*Take my breath away*” from an equally famous movie of 1986 “*Top Gun*”. What these lyrics meant, many of us did not know at that time until we joined anesthesia, and now we know why it's important. Now we know it meant to use side stream capnograph, whenever I put my patient under general anesthesia. You can use mainstream capnometer as well but this song is going to remind you at least once that capnography is mandatory for patients undergoing general anesthesia perioperatively.

Capnography; the graphic representation of CO₂ expired during a breathing cycle, has established benefits and uses. Many societies around the world have stressed upon its mandatory usage in patient care. It is mandatory in monitoring during anesthesia and cardiopulmonary resuscitation. American Society of Anesthesiologists (ASA) recommends use of end tidal CO₂ monitoring as mandatory during all procedures under anesthesia but particularly general anesthesia. It was included as standard of care in 1990. American Heart Association (AHA) recommends quantitative capnography use during cardiopulmonary resuscitation and endotracheal intubation as a guide for adequate ventilation in both adult and pediatric Advance Cardiac Life Support (ACLS).¹

World Health Organization (WHO) Surgical Safety Checklist unfortunately doesn't feature capnography as routine monitor unlike pulse oximetry. A UK practice audit - 4th National Audit Project (NAP4), giving recommendations for airway management safety has also highlighted importance of capnography in OR and ICUs.² NAP4 has recommended use of capnograph in all recovery areas with 44% rate of anesthetist compliance.

Capnography reliably detects esophageal intubation and is gold standard for endotracheal intubation. Its fall is a sensitive indicator of venous air embolism. Return of spontaneous circulation (ROSC) can be confirmed with capnography as well. Capnography patterns can give clue about many conditions including pulmonary embolism, malignant hyperthermia, and bronchospasm. A decrease in cardiac output can also be detected via different waveform patterns of this modality. In resuscitation capnography is associated with high quality CPR and chest compressions as one gets real time feedback and there are less pauses for pulse check as well. In Critical Care Units and emergency departments, adverse events like oxygen desaturation, hypotension, pulmonary aspiration and embolism can also be easily and instantly picked up with capnography.³

Capnography is in use since 1980s and despite it becoming a standard monitoring, there is a huge contrast in recommendations and clinical practice. ‘*Capnography*

Gap is defined as the difference between actually present and expected number of capnographs in a unit set-up.⁴ This modality isn't available in many developing countries, especially in emergency departments and critical care units. The resolve to use these monitors is even lower. At many places multiparameter monitors are purchased without capnograph modem, and in some setups where these capnograph are available, they are not always used.

Healthcare workers, who are using capnography in Critical Care Units and emergency departments also report variable interpretation of capnography patterns and some of them may even be unable to interpret.⁵

Many institutions have no policies for regular clinical use of capnography. This limited or no use of capnography isn't considered in clinical audits, checklists and patient care meetings. The barriers in its widespread application are two-fold. One is availability of equipment and the other is knowledge gap.⁶ Sadly, its use in post-anesthesia care units, critical care units and during resuscitation is seldom considered. In emergency departments and medical suites of gastroenterology, pulmonology, cardiology, radiology and pediatric ICUs sensitivity for capnography is even lower.

Even in developed countries, like United States, use of capnograph wasn't universal and continuous in general floor patients as depicted in Prediction of Opioid-induced respiratory Depression In patients monitored by capnographY (PRODIGY) Trial. This model recommended continuous use of pulse oximetry and capnography, which is associated with less adverse events and more cost benefit ratio.

Emphasis needs to be laid on procuring all multiparameter monitors with capnograph only, for its wide utilization. The Ministry of Health and the hospital policies should direct its routine use, ensuring its availability at every place, where it is recommended to be used. Proper training of healthcare staff of different cadres regarding capnography is also need of the hour.

Conflict of interest

The author reports no professional, commercial or academic conflict of interest.

Author's contribution

Both authors took part in the literature search and manuscript writing, editing and final approval.

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