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Capnography – Nursing Perspective

NANDEESH KUMAR P R

Lecturer, Medical Surgical Nursing, Cauvery College of Nursing, Mysuru

ABSTRACT

Advancements in technology such as capnography, the monitoring of the partial pressure of expired carbon dioxide ($PetCO_2$), provide nurses with a means to ensure the improvement of care delivery, provide a safe environment, and effectively achieve successful procedural sedation.

- *The use of pulse oximetry as a surrogate measure for ventilation fails to adequately identify ventilatory effort by the virtual of its intended measurement.*
- *Capnography can detect almost immediate ventilatory changes, and in an apneic patient this will appear as a flat line. This can be especially useful when visual assessment of a patient during a procedure is limited or obscured.*
- *The addition of capnography along with standard monitoring during procedural sedation can greatly enhance the procedural nurses' ability to safely monitor and sedate a patient and decrease the incidence of adverse respiratory events (ARE) within this unique and evolving environment.*
- *Changes from the baseline capnographic waveform should prompt timely interventions by the sedation nurse to avoid the progression to a hypoxic event.*

The use of supplemental oxygen during procedural sedation may prolong the recognition of apnea due to hypoventilation/apneic oxygenation. Capnography provides a real-time assessment of ventilation and is superior to the pulse oximetry when assessing hypoventilation/apneic oxygenation.

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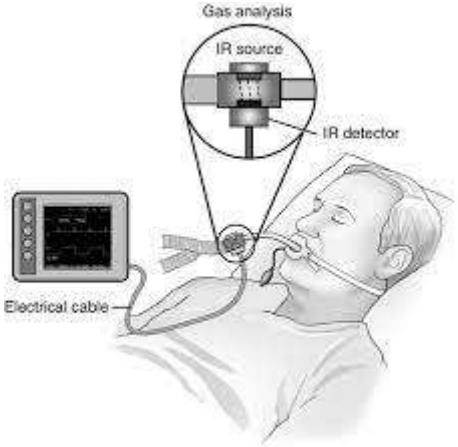
I. CAPNOGRAPHY



Capnography is a non-invasive measurement during inspiration and expiration of the partial pressure of CO2 from the airway. It provides physiologic information on ventilation, perfusion, and metabolism, which is important for airway management.

End tidal CO2 or EtCO2 is the maximum partial pressure of CO2 obtained at the end of exhalation. While a capnometer reports numeric values as a result, a capnograph adds a graphic display of a waveform, which represents expired CO2 as a function to either volume or time and the created waveform is referred to as capnogram.

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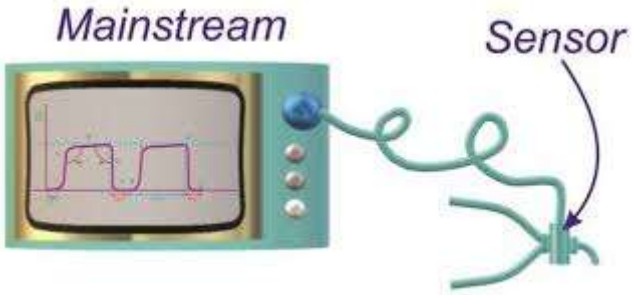

NURSING CONSIDERATIONS

The use of capnography aims to decrease adverse events, more specifically adverse respiratory events (ARE), within the delivery of procedural sedation. AREs include, but are not limited to: hypoxemia, hypercapnia, tachypnea, disordered ventilation, apnea, and respiratory failure.

Practice recommendations for the use of capnography are as follows:

1. **Pre-procedure**

- In addition to standard assessments prior to procedural sedation: assess patient positioning requirements and/or limitations; orthopnea, sleep apnea, obesity, physical limitations due to orthopedic or surgical issues.
- Pay particular attention to these contributing co-morbidities which may impact capnography assessment: COPD/asthma, severe cardiac disease, CKD/ESRD, sleep apnea
- Educate the patient regarding monitoring technology used during their procedure

2. **Intra-procedure**

- Position the patient according to procedural needs while maintaining optimal airway access
- In addition to standard monitoring devices: cardiac monitor, NIBP, SpO2, RR, apply capnometry sampling device and adjust to patient's requirements i.e. face mask oxygen, tracheostomy/laryngectomy collar, mouth breathing patient
- Ensure clear visualization of the cardiac monitor with adequate display of vital signs and capnography. Adjust equipment and/or surgical drapes as necessary to ensure visualization of the patient. Maintaining close monitoring of capnography and vital signs is paramount in the early detection of ensuing adverse respiratory events.
- Optimize capnography sampling device to deliver accurate waveform/capnogram
- Review monitoring alarm settings* and ensure alarms are audible
  - Low alarm limit: 8
  - High alarm limit: 26
  - Limits need to reflect the patient's current respiratory rate

- Capnography Interpretation
  - Is the $PetCO_2$ waveform present?
  - If absent, check pulse, airway, or for accidental disconnection

- Does $PetCO_2$ waveform start and end at the baseline?
  - If not, consider air trapping/breath stacking, moisture in adapter
- What is the height, width and frequency (quality of respiration) of the waveform?
  - Wide and tall: bradypnea/hypercapnia
  - Narrow and short: tachypnea/hypocapnia

- What is the waveform pattern?
  - Waveform returns to baseline (if no, consider air trapping/breath stacking, moisture in adapter)
  - Note shape of waveform: sloping (loss of alpha angle), notching, prolonged (altered beta angle)

- Evaluate respirations, numeric capnographic value and capnograms. Identify and intervene for any impending adverse respiratory events:

a. Check and adjust capnography sampling device as needed
b. Encourage deep breaths
c. Manage pain and/or anxiety
d. Adjust airway i.e. chin lift or reposition head
e. Tactile stimulation to increase arousability
f. Assist ventilations with Bag-Valve-Mask, consider nasal or oral airway
g. Consult with physician/proceduralist/advanced practice provider regarding use of reversal agents
h. Consider need for emergent intubation

- Documentation *
- Preprocedure
- Baseline vital signs, including respiratory rate
- Capnogram
- $PetCO_2$ value
- Use of accessory muscles

- Intraprocedure
- Note changes in rate and waveform
- Provide continuous capnographic monitoring
- Every 5 minutes, document capnometry value/presence or absence of a waveform according to organization policy
- Evaluate the capnograms and intervene appropriately**
- Document intervention(s) performed

3. **Post procedure**

- Monitor patient until discharge criteria is met or transferred to recovery area *
- Provide clear and complete Hand Off on transfer of patient*
- Change capnography sampling device and components per manufacturer recommendation

REFERENCES

[1]. Https://Www.Arinursing.Org/ARIN/Assets/File/Public/Practice-Guidelines/Capnography_CPG_Final_031918.Pdf
[2]. Https://Www.Physio-Pedia.Com/Capnography
[3]. Https://Pubmed.Ncbi.Nlm.Nih.Gov/28993038/
[4]. Brast, S., Bland, E., Jones-Hooker, C., Long, M. & Karen Green. (2016) Capnography For The Radiology And Imaging Nurse: A Primer. Journal Of Radiology Nursing, Vol. 35, Issue 3. 173 – 190
[5]. Https://Www.Sciencedirect.Com/Science/Article/Abs/Pii/S108994721400389X