Using Current Evidence to Implement Capnography Monitoring For Patients Undergoing Moderate Procedure Sedation

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Background
- Currently, two standards of care exist in our Procedure Center.
- Patients receiving sedation administered by anesthesiologists are monitored using capnography, but patients receiving sedation administered by registered nurses under the direction of a provider are monitored using oximetry.
- All patients receive cardiac monitoring.

What is Respiratory Depression?
- Respiratory depression is inadequate ventilation, which may lead to hypercapnia and respiratory acidosis.
- Decreased oxygen saturation is a late indicator of respiratory depression.

What is Capnography?
- Capnography is the quantitative measurement of carbon dioxide in exhalation.
- End tidal carbon dioxide is the concentration of CO₂ at the end of expiration.

The Evidence
Current evidence suggests that capnography is more accurate than oximetry in identifying symptoms of respiratory depression in patients undergoing moderate sedation.
- Meta-analysis of 8 prospective studies showed respiratory depression is 28 times more likely to be detected in patients monitored by capnography (D’Arcy, 2013).
- Retrospective review of adverse events during moderate procedural sedation showed that the most common unplanned event was oversedation leading to apnea (Karamnov et al., 2014).
- Patients have potential to move from moderate to deep sedation, and capnography is an inexpensive and effective tool for monitoring patients for respiratory depression (Gerstenberger, 2010).
- The American Society of Anesthesiologists recommends that capnography be used for all patients undergoing moderate sedation (ASA, 2011).

PICOT Question
In moderate procedural sedation, is capnography more accurate than oximetry in identifying patients with symptoms of respiratory depression?

Methodology
- Project protocol was approved by the University’s Institutional Review Board and the Hospital’s Administrative Research Review Committee.
- Nurses administering moderate sedation were requested to voluntarily and anonymously fill out a survey tool.
- No identifying data on survey related to nurses or patients.

Survey Questions
- Did the patient’s respiratory rate go below 8 at any time during the procedure?  • If so, what was the lowest value?
- Did the oxygen saturation go below 92% at any time during the procedure?  • If so, what was the lowest value?
- Was stimulation (verbal or tactile) initiated to stimulate respirations at any time during the procedure?  • If so, how many times?

Sample
- No capnography group: October 2015 (n=102)
- Capnography group: February 2016 (n=57)

Analysis
- IBM SPSS, version 21® statistical package was used for data management and analyses.
- Descriptive statistics were used to explore the data.
- The Mann-Whitney test was used to compare respiratory rate, oxygen saturation, and use of stimulation to initiate respiration between the capnography and no capnography groups (p<.05).

Results
- A significantly greater number of patients in the capnography group experienced respiratory rates below 8 versus the no capnography group (p=.004).
- There was no significant difference in the lowest oxygen saturation value for patients in the capnography group versus the no capnography group (p=.188).
- A significantly greater number of patients in the capnography group required stimulation to initiate respiration versus the no capnography group (p=.011).

Conclusions
- The use of capnography enabled nurses to identify patients experiencing signs of respiratory depression earlier and more frequently than with the use of oximetry and cardiac monitoring alone.

Limitations
- Sample size was not large enough to detect differences in the frequency data.

References

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