Increasing Utilization of End Tidal Carbon Dioxide Monitoring in PACU

Team Leaders: Karrie Camacho, BSN, RN, CCRN & C J. Marshak, MN, RN, CPAN
Team Members: Terry Bertignoli, BSN, RN, CPAN, CAPA; Heide Bradley, BSN, RN; Maria Centeno, BSN, RN; Vincent Trieu, BS; & Sadeeka Al-Majid, RN, PhD
MemorialCare Orange Coast Medical Center, Fountain Valley, California

Background

Ventilatory compromise following general anesthesia is a serious side effect that can lead to increased morbidity and mortality.

Oxygen saturation, measured by pulse oximetry (SpO2), is the most commonly used method for monitoring oxygenation status in patients in the PACU.

Patients may experience severe respiratory compromise before changes in SpO2 are detected.

Inadequacy of ventilation is detected earlier, and more reliably, using capnography, which allows monitoring of partial pressure of carbon dioxide during exhalation (EtCO2).

Monitoring ventilatory status in PACU patients using capnography can result in early detection and treatment of ventilatory events, by prompting the PACU nurse to intervene.

ASPN Practice Recommendation 2 entitled, Components of Assessment and Management for the PeriAnesthesia Patient, states that “vital signs are monitored, including EtCO2 (capnography) if available and indicated”

Problem

Our PACU patients were not consistently monitored using capnography. In 2019, EtCO2 was monitored in only 0.4% of PACU patients

Purpose and Objectives

Purpose: to increase the use of capnography to monitor ventilatory status in at risk PACU patients.

Objectives:
1. Increase PACU nurses’ awareness of value of capnography monitoring
2. Increase nurses confidence in their ability to interpret EtCO2 waveforms and values
3. Increase the number of EtCO2 monitored patients by at least 50% compared to 2019.
4. Document the number of ventilatory events detected by capnography, and were treated, before any changes in SpO2 were detected

Iowa Model of Evidence-Based Practice Used as a Guide

Identify triggers/opportunities
- Ventilatory status in PACU patients is not optimally assessed
- Identification of ventilatory compromise is delayed
- Capnography technology to assess ventilation is not consistently used

Question/Purpose
- Increase use of capnography to monitor ventilatory status in all at risk PACU patients

Is topic a priority?
- Increasing patient safety is a priority for our institution

Form Team
- J Marshall (PACU educator) and Karrie Camacho (Clinical Nurse IV) obtained approval/support from Manager; and formed a team of 5 RNs, 1 data support person and the in-house Nurse Research Scientist

Assemble, appraise and synthesize evidence
- 2 team leaders assembled, appraised and synthesized current literature consulting with Nurse Research Scientist

Is there sufficient evidence?
- Evidence suggests that using capnography to monitor PACU patients can result in early detection and treatment of ventilatory events, thus improving patient safety

Design and Pilot Practice Change
- Discussed with anesthesiologists, obtained their support/collaboration
- Determined desired outcomes (see specific aims)
- Developed data collection tools
- Obtained additional capnography supplies
- Educated/trained PACU Nurses
- Collected baseline data
- Determined procedures for evaluation of process and outcomes

Is change appropriate?
- At risk patients are identified the previous day from the surgery schedule; capnography masks sent to OR for identified patients; patient arrived in PACU with a capnography mask on.
- PACU nurses connected patients to capnography monitor, started monitoring EtCO2, and collected data
- PACU nurses were able to identify at risk patients who were not previously identified and monitored their EtCO2

Integrate and Sustain Practice Change

Disseminate Results
- Disseminated internally (within hospital)

Results

Specific Aims #1 & 2: Increase nurses awareness and confidence measured using a 5-point Likert scale (1=not aware and 5=highly aware) (Figures 1 & 2, respectively)

Specific Aim #3: Increase number of EtCO2 monitored patients by at least 50% compared to 2019.

Specific Aim #4: Document number of ventilatory events detected by capnography, and treated, before any changes in SpO2

Implications for Practice

Capnography is a non-invasive tool that increases safety of patients in the immediate post anesthesia phase.

With training, PACU nurses are capable to read and interpret capnography values

2019-2020 PeriAnesthesia Nursing Standards and Practice Recommendations support the use of capnography in high risk PACU patients