# Assessment of Barriers and Knowledge Deficits to Capnography Monitoring in the PACU at Atrium Health Lexington Medical Center

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## INTRODUCTION

**Background:** Respiratory depression in the postoperative period can be associated with major complications, notably somnolence and hypercarbia. More significantly, postoperative respiratory insufficiency can be tied to brain damage and death (Ayad et al., 2019). In the Post Anesthesia Care Unit (PACU), the standard monitoring protocol employed by nurses comprises respiratory assessments and pulse oximetry monitoring. Notably, capnography is not included in these national standards. Based on our literature review, end-tidal capnography (EtCO2) monitoring is a vital early indicator of inadequate ventilation.

**Purpose:** Patients in PACUs are at an increased risk of respiratory compromise due to lasting anesthetic effects and opioid administration (Weingarten & Sprung, 2022). Nurses' awareness of the value of ETCO2 monitoring in detecting respiratory depression is limited, with some believing that pulse oximetry is superior (Clark et al., 2018). PACU nurses are key stakeholders in the knowledge and implementation of EtCO2.

**Aims/Objectives:** The evidence-based project is aimed at eventual implementation of EtCO2 monitoring at Lexington Medical Center (LMC) PACU. To achieve the aim, the objectives of this phase of the project are:

1. Assess the knowledge, attitude, and perceived barriers of implementing EtCO2 by LMC PACU staff (nurses, anesthesiologists, nurse anesthetists).
2. Develop an educational resource addressing the identified barriers.
3. Assess the knowledge and attitude of the LMC PACU staff after implementation of the educational resource.

**Table 1.**

*Identified purpose of EtCO2 by participants, f (%).*

| | |
|---|---|
| Measures blood oxygen saturation | 0 |
| Measures ventilation by tracking CO2 levels | 16 (89%) |
| Measures heart rate | 0 |
| Detects hypercarbia and respiratory depression early | 9 (50%) |

*Notes:* The survey question allowed for multiple answers to be selected. CO2 = carbon dioxide; EtCO2 = end-tidal carbon dioxide

## METHODS

**Project Site:** The project took place at Lexington Medical Center, a community hospital in North Carolina.

**Data Collection/Analysis:** A RedCap survey was sent out via email to prevent potential bias. The survey was sent out prior to providing any educational information to measure the staff's willingness to change and their knowledge of EtCO2.

**Ethical Considerations:** The Wake Forest Baptist Health Internal Review Board (IRB) consent was obtained prior to initiating the project.

## RESULTS:

The project participants were anesthesia providers and PACU RNs at Lexington Medical Center (n = 18). We obtained a 50% response rate for the survey completion.

The majority of the respondents were CRNAs (55%) with more than 10 years experience (33%). Most of the participants claimed they have had experience with EtCO2 monitoring (83.3%), while 16.7% have no experience with this monitoring modality. While anesthesia providers identified capnography and pulse oximetry as a valuable monitoring for respiratory status, only 5% of the PACU RN selected capnography as important monitor for assessing respiratory status as seen in Figure 1.

The participants identified their knowledge and the barriers to implementation of capnography in the LMC PACU. Table 1 displays that the majority of the participants correctly identified one of the purposes of capnography as checking the level of carbon dioxide (CO2) from the expired air of the patient (89%); however, only 50% identified it as an important assessment for respiratory depression. Moreover, only 61% of the participants knew that the LMC PACU has a GE CO2 Module and compatible nasal cannula. The participants identified barriers to implantation such. As discomfort in using capnography in PACU (38%), disruption of the workflow (56%), and overall resistance to its use (44%). However, 61% of them agree on the need for training to increase the likelihood of using capnography.

## CONCLUSIONS:

The first phase of our project was successful at identifying staff knowledge and certain barriers to implementation.

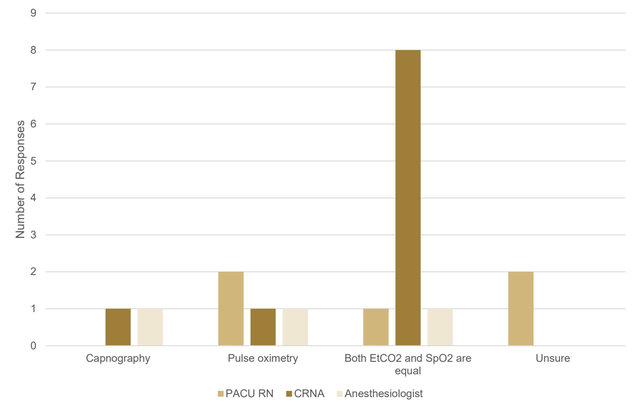
**Implication to Practice:** Our project revealed that most of the providers were not aware that EtCO2 is superior to pulse oximetry alone at detecting respiratory depression. The utilization of capnography promotes patient safety and better outcomes. It is a useful tool to assess early respiratory depression (Chung et al., 2020; Hutchinson & Rodriguez, 2008; Lam et al., 2017; McNeil & Hardy, 2022; Wilks & Foran, 2021).

**Implication to Education:** The results of this project show the importance of education in overcoming barriers to implementing capnography monitoring. It shows that there are a few staff at LMC PSCU that have not used capnography in their practice and would benefit from further education to improve their knowledge deficit.

## SAMPLE CHARTS AND GRAPHS

**Figure 1.**

*Identification of the most important respiratory monitoring modality by professional role.*




*Notes*: PACU = Post-anesthesia care unit; RN = registered nurse; CRNA = Certified Registered Nurse Anesthetist; EtCO2 = end-tidal carbon dioxide; SpO2 = pulse oximetry

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