Ride the Wave

Combining Capnography and Quality Improvement

Janese Nichols, MSN, RN, CEN
Objectives

• Interpret capnography readings and waveforms
• Understand how the use of capnography improves patient quality
• Identify other options for capnography when resources are limited
• Understand how to perform a capnography quality improvement project
Waveform capnography is the method that measures carbon dioxide exhaled from the body.

That measurement occurs at the end of expiration, which provides a numerical reading called end-tidal CO₂ (EtCO₂).

The desired outcome is to get a noninvasive reading of a patient's exhaled CO₂ to assess respiratory, metabolic, and cardiac function.
When is Capnography Used?

- Moderate sedation
- Cardiopulmonary arrest
- Respiratory distress (COPD, Asthma)
- Fluid readiness assessment (passive leg raises)
Understanding the Waveform in Capnography
Normal Waveform

EtCO$_2$ readings are 35-45 mmHg

The arrow is pointed to the end of the tidal wave. This point represents the number that is displayed on the monitor.
Hypoventilation

A EtCO$_2$ reading greater than 45 mmHg

- Possible causes: Narcotic overdose, trauma, etc.

Hyperventilation

A EtCO₂ reading less than 35 mmHg

- Possible causes: Anxiety, pulmonary edema, etc.

Bronchospasms

Bronchial constriction causing a waveform that resembles a sharks fin

- Possible Causes: Asthma, COPD

PEARLS of Capnography

- Evidence has shown that patients experiencing out-of-hospital cardiac arrest, having an etCO\(_2\) value < 10 mm Hg following 20 minutes of CPR, usually do not survive more than 24 hours.

- Researchers in a study of 154 children receiving procedural sedation in a pediatric emergency department reported that the use of capnography resulted in providers performing fewer and more timely interventions for hypoventilation.

Do You Currently Use Capnography Within Your Institution?

- Yes
- No
- No, but would like to start
A Quality Improvement Project

- **THE GOAL**: to implement consistent use of capnography for moderate sedation and resuscitation

- **OVERVIEW OF ORGANIZATION**: 37-bed hospital, 33 bed Med-surg, 4 bed ICU, 14 bed ED, Perioperative services
Step 1: Assess Current Use of Capnography

Identify where capnography is being used within the organization
- Currently used in ED, ICU, and OR

Identify capnography capable equipment
- Bedside monitors in ED and ICU; 2 cables for bedside monitor available
- Lifepak defibrillators on Med/Surg unit, ICU, ED; No adaptors for Lifepak

Inquire about the understanding of capnography and how its used amongst the staff
- Limited understanding of waveform capnography and the difference between CO₂ detector
Step 2: Champion the Cause

Join a committee to understand the role capnography plays
- Reimplemented the code blue committee

Find champions and stakeholders in the process
- Identify a physician champion and others that support the cause
- Identify a respiratory champion
- Identify a nurse champion on each unit
- Include CNO, CMO, and physician chairs for buy in
Step 3: Create a Process

Develop a process that encourages consistent use of capnography

- Stocked the crash cart with capnography Lifepak adaptors throughout the hospital
- Stocked airway cart with capnography adaptor for Lifepak in ED
- Adaptor for bedside monitor stocked in the Pyxis in ED
- Created airway boxes on each crash cart that contains capnography adaptor for Lifepak
Step 4: Spread the Word

Champions within different departments to share the approved process

- Worked with nursing, provider, and respiratory champions to ensure the adaptors were used during a code blue and moderate sedation
Step 5: Potential Roadblocks

Culture and attitude towards change
- Not all staff excited about change

Cost of equipment/supplies
- Cost to purchasing capnography adaptors
- Cost to purchasing additional bedside monitor cables

Identify alternatives
- Option to use defibrillators for monitoring
Step 6: Collect Data

Identify ways to collect data to assess if the process is working

- Utilize Codestat for retrospective review of capnography use
- Real time observation to assess capnography use
Data Findings For Code Blue

1 year retrospective review

Points scored

- Total Codes
- Capnography Used

- April 2017
- July 2017
- October 2017
- January 2018
Data Findings for Moderate Sedation

6 Month retrospective review in ED

Count of ETCO2 used during moderate sedation

- Stated but no reading present: 7.1%
- Yes: 14.3%
- No: 78.6%
Step 7: Provide Feedback

Provide feedback to champions and staff regarding progress of program implementation

- Data summary at monthly code blue committee meetings along with real time feedback if present for resuscitation or sedation
- Leaders to include information during huddles and staff meetings
Step 8: Reassess and Revise

Review outcomes to evaluate process with data collection
- Identified more focused review on importance of capnography use to staff

Determine if the current process in place is working based on data
- Process is working as staff are using capnography, still not consistently.
  New leaders in the department

If current process is working, consider expanding to areas within the organization
- The process was implemented to all areas of the hospital
Keys to Success

- Patience
- Constantly evaluate the plan
- Communication throughout the process
- Stay encouraged and self motivate to see the process through
References