“Saving Lives In the Medical Surgical Unit”

and

“Establishing a Successful Capnography Monitoring Program For Patients Receiving Opioid Medications”

March 14, 2016
AAMI Foundation

• **Vision:** To drive the safe adoption and use of healthcare technology

• *National Coalition to Promote Continuous Monitoring of Patients on Opioids*
  • *NEW* Opioid Safety & Patient Monitoring

• *National Coalition for Alarm Management Safety*
  • *NEW* AAMI Foundation Alarm Compendium

• Consider making a donation!

• Contact Sarah Lombardi at slombardi@aami.org
Thank You to Our Premier Industry Partners

This Patient Safety Seminar is offered at no charge thanks to funding from our National Coalition to Promote Continuous Monitoring of Patients on. The AAMI Foundation and its co-convening organizations appreciate their generosity. The AAMI Foundation is managing all costs for the series. The seminar does not contain commercial content.

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- Soterawireless

Gold
- EarlySense
- GE Healthcare
LinkedIn Questions

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Please post questions on the AAMI Foundation’s LinkedIn page.

OR

Type a question into the question box on the webinar dashboard.
Polling Questions
Speaker Introductions

• Tina Tucciarone, RN, MSN, CPHRM, Corporate Director of Risk Management, Virtua

• Harold Oglesby, RRT/RCP – Manager of Pulmonary Medicine, St. Josephs/Candler Health System
SAVING LIVES IN THE MEDICAL SURGICAL UNIT

The New Approach To Opioid Monitoring

Tina Tucciarone RN, MSN, CPHRM
Corporate Director of Risk Management
About Virtua

• A non-profit organization, comprehensive healthcare system headquartered in Marlton, New Jersey.

• Virtua consists of three hospitals (1,009 Beds)
  • Virtua Marlton
  • Virtua Memorial
  • Virtua Voorhees

• Ambulatory Care Center, Rehabilitation and Long-Term Care Centers, Home Care, Physical Therapy and Mobile Intensive Care Units throughout Burlington, Camden, Gloucester and surrounding counties.

• Health and Wellness Centers
Objectives

- Understand what technology provides the nurse with the first indication of opioid related respiratory depression.
- Articulate the patients who will be placed on non-invasive capnography monitoring on the medical-surgical units.
- Summarize the measurable data that may indicate opioid-related respiratory depression.
The purpose of this presentation is to describe how a non-profit community hospital system implemented Capnography in a Medical Surgical setting to ensure highest clinical quality is delivered in a safe environment.
Background

- The Joint Commission Sentinel Event Alert #49
  - “Safe Use of Opioids in Hospitals”
- Between 20,000 and 676,000 PCA patients will experience opioid-induced respiratory depression every year.
Preventable Deaths

- Narcotic medications, such as opioids, are often used to control pain but also have a sedating effect. Patients can become overly sedated and suffer respiratory depression or arrest, which can be fatal.

- Litigation claims can cost greater than $1 million
Paradigm Shift: Safer Care

“It’s time for a change in how we monitor patients receiving opioids. We need a complete paradigm shift in how we approach safer care for patients receiving opioids.”

Continuous Patient Monitoring Is the BEST way to PREVENT AND INTERVENE EARLIER and IMPROVE PATIENT SAFETY.
Our Journey

DEFINE

VERIFY

Six Sigma

DMADV

Designing a process from the ground up

MEASURE

DESIGN

ANALYZE
Steps In Our Journey

- Evidence-based gap analysis.
- Selection of a non-invasive capnography monitor.
- Developing a screening monitoring process
- Pilot
CAPNOGRAPHY SCREENING CRITERIA

Risk Criteria for Capnography Monitoring of patients on PCA pump and Parental Opioid Administration of less than or equal to 2 hours: Capnography should be mandatory for patients with at least 2 Moderate risk criteria or one High Risk Criteria

**Moderate risk Criteria:**
1. Age 70 and older.
2. Morbid obesity defined as BMI>40.
3. Patients with severe Cardio- Pulmonary disease (COPD, CHF, Cardiomyopathy, Emphyzema, oxygen Dependent) (ASA III and higher)
4. Concomitant use of CNS depressant medications i.e. Benzodiazepines.

**High Risk Criteria:**
1. Persistent Hypoxemia, defined as SpO2 of <92%
2. Patients with history of respiratory arrest due to narcotics.
3. Patients identified during PACU stay as requiring Capnography monitoring.
4. Patients with known OSA or suspected OSA (Using the STOP-BANG criteria)

**STOP-BANG CRITERIA**

<table>
<thead>
<tr>
<th>Item</th>
<th>YES / NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>S (snore) Have you been told that you snore?</td>
<td></td>
</tr>
<tr>
<td>T (tired) Are you often tired during the day?</td>
<td></td>
</tr>
<tr>
<td>O (obstruction) Do you know if you stop breathing or has anyone witnessed you stop breathing while you are asleep?</td>
<td></td>
</tr>
<tr>
<td>P (pressure) Do you have high blood pressure or on medication to control high blood pressure?</td>
<td></td>
</tr>
<tr>
<td>B (BMI) Is your body mass index greater than 35?</td>
<td></td>
</tr>
<tr>
<td>A (age) Are you 50 years old or older?</td>
<td></td>
</tr>
<tr>
<td>N (neck) Are you a male with a neck circumference greater than 17 inches (43cm), or a female with a neck circumference greater than 16 inches (40cm).</td>
<td></td>
</tr>
<tr>
<td>G (gender) Are you a male?</td>
<td></td>
</tr>
</tbody>
</table>

AAMI FOUNDATION
## Modified Pasero Opioid-induced Sedation Scale

<table>
<thead>
<tr>
<th>Sedation Scale/ Monitoring</th>
<th>Description</th>
<th>Interventions</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Sleep, easy to arouse</td>
<td>Acceptable; no action necessary; may increase opioid dose if needed (as per order)</td>
</tr>
<tr>
<td>1</td>
<td>Alert and awake</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Slightly drowsy, easily arousable</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Frequently drowsy, arousable, drifts off to sleep during conversation</td>
<td>Unacceptable; immediately stop opioid, stimulate patient, encourage deep breathing, administer oxygen, Call RRT if deemed appropriate. Keep PCA Pump off for a minimum of one hour. Monitor respiratory status and sedation level closely until sedation level is stable at less than 3 and respiratory status is satisfactory. After one hour, may restart PCA when the patient is at an acceptable sedation level. NO increase in PCA dose without physician evaluation.</td>
</tr>
<tr>
<td>Or if SpO2&lt;88% and/or IPI &lt;5 and/or EtCO2 &gt;60mmhg or &lt;25mmhg and/or RR&gt;24 or &lt;8, and/or HR &gt;130 or &lt;45</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Somnolent, minimal or no response to verbal or physical stimulation</td>
<td>Unacceptable; immediately stop opioid; stimulate patient, encourage deep breathing, administer oxygen, Give naloxone (narcan); notify Physician STAT &amp; RRT; monitor respiratory status and sedation level closely until sedation level is stable at less than 3 and respiratory status is satisfactory*</td>
</tr>
<tr>
<td>Or if SpO2&lt;85% and/or RR &lt;6 or &gt;28 and/or ETCO2 &gt;65 mmhg or &lt;15mmhg and/or IPI &lt;3 and/or HR &gt;150 or &lt;40</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Case Study

M.Z. is a 72 year old male admitted for total joint replacement. Met 4 “Stop-bang” criteria (snoring, hypertension, age and gender) which qualified him for Capnography monitoring. Patient exhibited multiple episodes of low ETCO2 and apnea, however with no drop in Oxygen saturation below 93% on post-op days #0 and #1. C-PAP ordered post-op day #1. Education on follow-up care for OSA provided.
Lessons Learned

- Education for patient and family
- Physician support
- Bulky equipment
- False alarms
- Noise
- Evaluating Outcomes
Final Thoughts

- Through persistent advocacy, can influence change in practice.
- Technology’s role
- Staff and patient engagement
- Passion for improving the safe delivery of opioids.
Thank you!


Establishing a Successful Program For the Use of Capnography Monitoring During Opioid Drug Administration

By: Harold Oglesby, RRT/RCP
Top of the day to Ya’ll
Why Use Continuous Monitoring?

According to an 2014 article in Becker’s Infection Control & Clinical Quality by M. Wong it was noted that on March 14, 2014, CMS issued guidance necessitating monitoring of all patients receiving opioids when in the hospitals.
The March 14, 2014 CMS guidance clearly states the following:

"Narcotic medications, such as opioids, are often used to control pain but also have a sedating effect. Patients can become overly sedated and suffer respiratory depression or arrest, which can be fatal. Timely assessment and appropriate monitoring is essential in all hospital settings in which opioids are administered, to permit intervention to counteract respiratory depression should it occur."
Wong’s article also notes the following APSF recommendation:

"The conclusions and recommendations of APSF are that intermittent 'spot checks' of oxygenation (pulse oximetry) and ventilation (nursing assessment) are not adequate for reliably recognizing clinically significant evolving drug-induced respiratory depression in the postoperative period.

For the CMS measure to better ensure patient safety, APSF recommends that monitoring be continuous and not intermittent, and that continuous electronic monitoring with both pulse oximetry for oxygenation and capnography for the adequacy of ventilation be considered for all patients."
Does implementing Capnography for monitoring patients receiving opioids make financial sense?
In an article entitled, *Clinical Experience with Capnography Monitoring* for PCA patients by R. Maddox, the following positive financial findings were noted:

In 2006, the Institute of Medicine estimated the cost of managing a serious medication-related event to be $8,750 per preventable ADE. These errors, if not averted, would have resulted in potential expenses to SJ/C of $3,970,296, not including potential litigation costs.

Deducting the cost of averted outcomes/errors from the total purchase costs plus disposables yields a 5-year ROI of more than $2.5 million.
Which patients should we monitor?

In a student project by Katie Felhofer, PharmD. Developing a Respiratory Depression Scorecard for Capnography Monitoring, it was noted that due to the limited availability of capnography equipment they attempted to create a scorecard for patients who should be preferentially selected for capnography over pulse oximetry alone.
Which patients should we monitor?

In the Felhofer 2013 paper it was identified that the most common risk factors were concomitant use of multiple opioids or an opioid and a CNS-active sedative, followed by an ASA score $\geq 3$. 
Does a scorecard really work?

While having a scorecard tends to lead towards monitoring those at greatest risk it may result in missing the unexpected patient who has a lower scorecard rating.
Does a scorecard really work?

What happens when the unexpected patients have poor outcomes? Are you at risk for not using the same level of care for all patients receiving opioid medications?
Does a scorecard really work?

Visit the website www.promisetoamanda.org to learn about young healthy patients who unfortunately died due to adverse outcomes while receiving opioid medications. It’s often the unexpected patients who will result in litigation.
Keys to successful implementation of a capnography monitoring of patients receiving opioid medications

- Don’t wait for a patient death or adverse event to occur. Proactively implement continuous patient monitoring.
Keys to successful implementation of a capnography monitoring of patients receiving opioid medications

- Make sure respiratory therapists are an integral part of the process.
Why should Respiratory Care be involved in Pain Management?

• RTs have keen ability to work collaboratively with nursing and other to assess patients and guide their clinical care.

• RTs understand EtCO2 and it’s limitations which can aid in educating patients, families, as well as other caregivers.
What do the RTs do?

• Q shift monitoring of each patient on PCA therapy.
• RTs assess patient’s history and adjust monitoring to meet patient’s status.
• Reviews trended information (EtCO2, SpO2, Respiratory Rate, & PCA medication rates)
• Provide bedside education regarding EtCO2 monitoring
What do the RT’s Document?
Keys to successful implementation of a capnography monitoring of patients receiving opioid pain management

- When a monitor’s alarm sounds, find out what needs adjustment - the patient’s treatment or the monitor’s default settings.
Keys to successful implementation of a capnography monitoring of patients receiving opioid pain management

- Educate patients and their families on why they are wearing the end tidal CO2 monitor.
Keys to successful implementation of a capnography monitoring of patients receiving opioid pain management

- Use the right interface for the right patients.
Educate the staff!
PCA Monitoring Trend Data: Opioid-Induced Respiratory Depression

<table>
<thead>
<tr>
<th>TIME</th>
<th>TOTAL DOSE (mg)</th>
<th>SPO2 AVG</th>
<th>PULSE AVG</th>
</tr>
</thead>
<tbody>
<tr>
<td>09:00</td>
<td>2.5</td>
<td>95</td>
<td>90</td>
</tr>
<tr>
<td>09:30</td>
<td>3</td>
<td>97</td>
<td>92</td>
</tr>
<tr>
<td>10:00</td>
<td>2.5</td>
<td>97</td>
<td>88</td>
</tr>
<tr>
<td>10:30</td>
<td>4.5</td>
<td>94</td>
<td>80</td>
</tr>
<tr>
<td>11:00</td>
<td>5.5</td>
<td>93</td>
<td>84</td>
</tr>
<tr>
<td>11:30</td>
<td>5.5</td>
<td>88</td>
<td>90</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TIME</th>
<th>TOTAL DOSE (mg)</th>
<th>ETCO2 AVG</th>
<th>RR AVG</th>
</tr>
</thead>
<tbody>
<tr>
<td>09:00</td>
<td>2.5</td>
<td>44</td>
<td>18</td>
</tr>
<tr>
<td>09:30</td>
<td>3</td>
<td>42</td>
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<tr>
<td>10:00</td>
<td>2.5</td>
<td>43</td>
<td>20</td>
</tr>
<tr>
<td>10:30</td>
<td>4.5</td>
<td>50</td>
<td>14</td>
</tr>
<tr>
<td>11:00</td>
<td>5.5</td>
<td>54</td>
<td>9</td>
</tr>
<tr>
<td>11:30</td>
<td>5.5</td>
<td>57</td>
<td>7</td>
</tr>
</tbody>
</table>

>Press UP/DOWN Keys to Move Cursor.
Select alarms that make sense!
So, what alarm defaults do we use?

(1) *High EtCo2 60mmHg*
(2) *Low EtCO2 6 mmHg*
(3) *No Breath Alarm 30 seconds*
(4) *High resp rate 35 bpm*
(5) *Low resp rate 6 bpm*
low BPM versus high EtCO2 in same minute

BPM low  <8  7504  
EtCO2 high >60  71  
Both  9

Aggregated
50 patients SJC

Intensity Graph

BPM minute-minimum (per minute)

E_tCO2 minute-maximum (%)

BPM low Alarm if below

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Change In the Culture of Care for Our PCA Patients
Typical Monitoring of Patients on PCA

- Intermittent assessments of cognition, vital signs, pulse oximetry and pain scores.

- Dangers of overmedication may not be detected.
CONCLUSION

• Changes in respiratory status is a leading indicator of adverse patient response to opioid infusion or other types of clinical deterioration.

• Current respiratory monitoring technology can aid in patient assessments and prevent serious adverse events.

• The use of continuous monitoring using capnography can be cost effective.
THANK YOU
Polling Questions
Thank you for attending!

Slides & Recording Available Here
Complimentary Resources

- Safety Innovations Series
- Alarms Management Patient Safety Seminars
  - Webinar Recordings
  - Webinar Slides
  - Key Points Checklists

NEW Opioid Safety & Patient Monitoring

NEW AAMI Foundation Alarm Compendium
Mark Your Calendars!

• May 20, 2016  12n – 1p EDT

• Continuous Monitoring of Patients On Opioids - Johns Hopkins
  • Sue Carol Verrillo, RN, MSN, CRRN
    Nurse Manager Zayed 11 East, The Johns Hopkins Hospital
  • Bradford D. Winters, Ph.D., M.D., FCCM
    Associate Professor, Anesthesiology and Critical Care Medicine and Surgery The Johns Hopkins Hospital

• To register, please click here.
  https://attendee.gotowebinar.com/register/7329441640951913218
Questions?

• Post a question on AAMI Foundation’s LinkedIn

• Type your question in the “Question” box on your webinar dashboard

• Or you can email your question to: pmiller@aami.org.
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