Advisor Live®

Safe opioid use – Strategies for reducing adverse events and related harm

March 4, 2014

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associate professor, Department of Anesthesiology, Brigham and Women’s Hospital, Harvard Medical School
First National Patient-Controlled Analgesia Survey of Hospital Practices: The Results

Michael Wong, JD
Founder/Executive Director
Physician-Patient Alliance for Health & Safety
Agenda

1. Impetus for the survey
2. Survey methodology & respondents
3. Statistical analysis
4. Result yardstick
5. Major conclusions:
   (i) Inconsistent Consideration of Patient Risk Factors increases patients overall risks
   (ii) Inconsistent double checks puts patients at risk
   (iii) Reducing alarm fatigue may increase use of patient monitoring
   (iv) Continuous electronic monitoring reduces adverse events and hospital expenditures
Impetus for the Survey

More than 13 million patients each year receive PCA in US

0.16 to 5.2% suffer respiratory depression (est.)

Between 20,800 to 676,000 PCA patients will experience opioid-induced respiratory depression

Robert Stoelting, MD
(President, Anesthesia Patient Safety Foundation) presentation,
Patient, Safety Science & Technology Summit (January 2013)
Impetus for the Survey

Amanda Abbiehl
18-year old, admitted for “severe strep throat”
unmonitored use of PCA

Robert Goode
unmonitored use of PCA after hiatal hernia surgery

Louise Batz
unmonitored use of PCA after knee replacement surgery

Leah Coufal
unmonitored epidural anesthesia after surgery for pectus carinatum

Tyler Ireland
unmonitored PCA after surgery for collapsed lung

Justin Micalizzi
unmonitored PCA after surgery to incise and drain a swollen ankle
Survey Methodology & Respondents

Online survey developed & sent out

Survey developed with input from:

- Corey Angst, PhD, MBA (Asst Prof, Dept of Mgmt, Mendoza College of Business, U of Notre Dame)
- Richard Dutton, MD, MBA (Exec Director, Anesthesia Quality Institute)
- Frank Federico, RPh (Exec Director, IHI, and Patient Safety Advisory Group of TJC)
- Matthew Grissinger (Dir, Error Reporting, ISMP)
- Stephen Howell, MSN (Lead Nurse Practitioner, University of Alabama School of Medicine)
- Ken Kelley, PhD, MA (Viola D. Hank Assoc Prof of Mgmt, Mendoza Coll of Business, U of Notre Dame)
- Joe Kiani, MSEE (CEO, Masimo)
- Carter King, MBA (VP, Business Operations, AcelRx)
- Mary Lynn McPherson (Professor, University of MD School of Pharmacy)
- John Tucker, MBA (Chief Commercial Officer, Incline Therapeutics)
- Rodney Tucker, MD, MMM (Assoc Prof, U of AL)
- Greg Spratt, RRT, CPFT (Dir of Clinical Marketing, Covidien)
- Tim Vanderveen, PharmD, MS (VP, Center for Safety and Clinical Excellence, CareFusion)

E mail link provided to:
- hospital pharmacists
- IHI hospital networks
- Premier members
Survey Methodology & Respondents

Profession of Respondents

- 168 Respondents
- 18% Physicians
- 35% Non-Physicians (Nurses, R.T.s)
- 47% Pharmacists

- RN/RT (35%)
- Physicians (18%)
- Pharmacists (47%)
Survey Methodology & Respondent

Results from Hospitals in 40 States

Teaching vs. Non-Teaching

- Teaching: 55%
- Non-Teaching: 45%

Hospital (no. of beds)

- Smallest: 14
- Median: 200
- Largest: 1500
Statistical Analysis

Anuj Mabuyi, PhD
Assistant Professor Department of Mathematics
Northeastern Illinois University

Beverly Gonzalez, ScM
Biostatistician
Johns Hopkins Bloomberg School of Public Health
Result Yardstick

**Anesthesia Patient Safety Foundation**
“Conclusions and Recommendations-Conference on Electronic Monitoring Strategies”

**Association for the Advancement of Medical Instrumentation**

**Institute for Safe Medication Practices**
“Part II - How to Prevent Errors - Safety Issues with Patient-Controlled Analgesia (July 24, 2003)

**The Joint Commission**
“Safe use of opioids in hospitals”
Sentinel Event Alert, Issue 49, August 8, 2012

**National Comprehensive Cancer Network**

**Pennsylvania Patient Safety Authority**
“Making Patient-Controlled Analgesia Safer for Patients”
Vol. 8, No. 3 (September 2011)

**Numerous Peer-Reviewed Research and Studies**
Risk Factors Inconsistently Considered Puts Patients At Risk

Tremendous variation in treatment received by patients across the country:

- About 2 out of 3 hospitals not considering all six major patient risk factors
- More than 60 percent of respondents are considering five or less factors
- Less than 40 percent are considering all six patient risk factors

<table>
<thead>
<tr>
<th>Risk Factor</th>
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<td>Obesity</td>
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<td>40%</td>
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<td>Low body weight</td>
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<td>55%</td>
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<td>Concomitant medications that potentiate sedative effects of opiate PCA</td>
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<td>85%</td>
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<td>Pre-existing conditions (such as asthma, COPD, sleep apnea)</td>
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<td>95%</td>
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<tr>
<td>Advanced Age</td>
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<td>94%</td>
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<tr>
<td>Opioid Naive</td>
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<td>91%</td>
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Six major patient risk factors listed by healthcare organizations like The Joint Commission and ISMP
Risk Factors Inconsistently Considered Puts Patients At Risk: Opioid Naive

Recommendation
The Joint Commission: take “extra precautions with patients who are new to opioids or who are being restarted on opioids”
[Sentinel Event Alert, Issue 49, August 8, 2012]

Practice
Almost 1 out of 5 hospitals are not assessing patients for being opioid naive:
• Pharmacists 4x more likely to consider
• Physicians approximately 70% less likely to consider

<table>
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<th>More Likely</th>
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<th>Nurses, RTs (OR=0.324; 95% CI 0.133-0.787)</th>
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Risk Factors Inconsistently Considered Puts Patients At Risk: Obese Patients

Recommendation
Many studies have shown the increased risk of using anesthesia with obese patients

Practice
Three out of every 10 hospitals do not consider obesity as a patient risk factor

Obesity Considered a Risk Factor Prior to Initiating PCA

- 70% Consider Obesity a Risk Factor
- 30% Do Not Consider Obesity a Risk Factor
Risk Factors Inconsistently Considered Puts Patients At Risk: Advanced Age

**Recommendation**

The Joint Commission cautions against the use of opioids in older patients because of the heightened risk of oversedation and respiratory depression.

*[The Joint Commission, Sentinel Event Alert, Issue 49, August 8, 2012]:*

- 2.8 times higher for individuals aged 61-70
- 5.4 times higher for age 71-80
- 8.7 times higher for those over age 80

**Practice**

About three out of every 20 hospitals do not consider advanced age as a patient risk factor.

---

**Advanced Age Considered a Risk Factor Prior to Initiating PCA**

- **85%** Consider Advanced Age a Risk Factor
- **15%** Do Not Consider Advanced Age a Risk Factor
Double Checks Inconsistently Performed Puts Patients At Risk

Approximately 70% of PCA adverse events are due to errors associated with pump use (e.g., misprogrammed doses and concentrations, installation of the wrong drug or concentration) [Pennsylvania Patient Safety Authority, “Making Patient-Controlled Analgesia Safer for Patients” Vol. 8, No. 3 (September 2011)]

- **Patient’s identification** — Is the correct patient receiving the opioid?
- **Patient allergies** — Is the patient allergic to the medication?
- **Drug selection and concentration** — Is the patient receiving the prescribed medication and dosage?
- **Dose adjustments** — Has any dose adjustment been completed?
- **PCA pump settings** — Has the pump been programmed correctly?
- **Line attachment** — Has the pump been attached correctly to the patient?
Double Checks Inconsistently Performed Puts Patients At Risk

There is great variation on what double-checks are made

Before PCA pump initiation, refilling or programming change, two healthcare providers double-check (please check all that apply)

- Line attachment to patient and tubing insertion into pump
- PCA pump settings
- Any necessary dose adjustments completed
- Drug selection and concentration confirmed as that which has been prescribed
- Patient allergies appear on medication administration record
- Patient's identification
Double Checks Inconsistently Performed Puts Patients At Risk

- Only slightly more than 1 out of every 2 hospitals (51.19%) performed all six double-checks
- 1 out of ten hospitals performed one or less double checks (10.71%)
Reducing Alarm Fatigue Would Increase Use of Patient Monitoring: Concern About Alarm Fatigue

More than 19 in 20 hospitals (95.1%) say they are concerned about alarm fatigue.

How would you rate your concern about potential alarm fatigue about continuous electronic monitoring?

- 5% Not concerned at all
- 34% Concerned but don’t believe it will be an unmanageable problem
- 61% Concerned that it will be a problem that is difficult to manage or is preventing us from implementing
Reducing Alarm Fatigue Would Increase Use of Patient Monitoring

If No Alarm Fatigue, More Hospitals Would Monitor

Almost one in ten hospitals (87.8 percent) believe that a reduction of false alarms would increase the use of patient monitoring devices.

Do you believe that reduction of false alarms would increase the use of patient monitoring devices, like an oximeter or capnograph?

- Yes: 88%
- No: 12%
Reducing Alarm Fatigue Would Increase Use of Patient Monitoring: Tools and Training Hospitals Want

Ease of Assessment: Need for Single Indicator

Seven out of 10 hospitals (70.7%) would like “a single indicator that accurately incorporates key vital signs, such as pulse rate, SpO2, respiratory rate, and etCO2.”

Those concerned alarm fatigue is an unmanageable problem:
more than twice as likely to want a single-indicator assessment tool (OR=2.278; 95% CI 1.073-4.838)
recommendations for ease of assessment for their nursing staff (OR=2.039; 95% CI 0.992-4.190).
Continuous Electronic Monitoring Reduces Adverse Events & Hospital Expenditures

Continuous Electronic Monitoring Reduces Adverse Events, Costs, and Expenses

- Of those hospitals that monitor some or all patients with pulse oximetry or capnography:
  - 65 percent have experienced positive results -- either in terms of a reduction of overall adverse events or costs and expenses
  - 35% say it is “too early to determine or have not determined.”

- Those using smart pumps with integrated end tidal monitoring were almost three times more likely to have had a reduction in adverse events or a return on investment in terms of a reduction in costs and expenses (OR=2.789; 95% CI 1.112-6.996).

Monitor and experienced positive results -- either in terms of a reduction of overall adverse events or have had a return on investment when measured against costs and expenses (including litigation costs)

Monitor, but too early to determine or have not determined
Continuous Electronic Monitoring Reduces Adverse Events & Hospital Expenditures

Continuous Electronic Monitoring Will Become Standard Procedure

Of the hospitals that are not electronically monitoring any of their patients, almost nine out of 10 (86.7 percent) say they are considering the use of monitoring.
Our Experience in Successfully using ETCO2 Monitoring During the Usage of PCA Pain Management

Harold Julius A. Oglesby, RRT. 
Manager, The Center for Pulmonary Health 
Candler Hospital 
Saint Joseph’s/ Candler Health System 
Savannah, Georgia
St. Joseph’s/Candler Health System
Savannah, GA

• 2 hospital system, tertiary care, community, referral centers

• Two of the oldest continuously operating hospitals in the nation

• Largest healthcare system in SE Georgia; 675 beds

• Approximately 25,000 annual discharges
BALANCING EFFECTIVE ANALGESIA WITH SAFETY
What caused a change in PCA delivery at SJCHS?

• We experienced three opioid-related events with *serious* outcomes in the 2 years preceding our embarking on a multiyear process of implementing an advanced IV medication safety system.
PCA Team Developed

• The team recognized that safe use of PCA required both correct pump programming and monitoring of patients’ individual respiratory response to opioids.
1st STEPS in our progression to becoming involved in the monitoring of post-operative patients receiving pain management

- The pharmacy and nursing staffs were attempting to address safety concerns with regards to PCA pain medication delivery. Respiratory Care was called in to address monitoring options early on in the decision making process.
Beta Testing

• Beta testing revealed the difficulty of predicting which patients actually were high-risk. We did note that capnography, not pulse oximetry, provided the first indication of opioid-related respiratory depression. As a result, the decision was made to require a capnography module for each PCA infusion and to use a pulse oximeter module for selected patients receiving PCA analgesics who have preexisting co-morbidities.
Are we sure that this is an area that we want to take on? What about staffing? I don’t know anything about PCA pumps and pain scales?
Why should Respiratory Care be involved in Pain Management?

- RTs have keen clinical assessment skills
- RTs understand EtCO2 and its limitations
- RTs have the ability to use good clinical judgment and to guide the care of patients suffering from Respiratory Depression.
Development of a Functional EtCO2 Tool

• Early on in the evaluation process a problem was identified, in that the staff noticed that the EtCO2 Monitor would alarm indicating High Respiratory Rate. The patient’s resp. rate would be 20 bpm however the device would read 40 bpm.

• The solution was to achieved by working with the manufacture to decreased the EtCO2 threshold, so that only true breaths and not fluctuations in the respiratory pattern would be counted as breaths. This was done and the problem was resolved.
Development of an efficient EtCO2 tool

- Another process development was the creation of a new EtCO2 cannula design.
- In the PACU unit it was noted that the no breath alarm would be sounding, even with the patient seemingly breathing effectively.
- The new cannula was designed to provide increased surface area for CO2 sampling and hence improved accuracy. This action resolve the clinical issues that occurred in the PACU.
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
Changes from Baseline – Action Steps for Nursing Staff

Remember the ABC’s (airway, breathing, circulation)
Assess the patient
Follow your normal protocol, which may include:

- Stimulate patient if necessary
- Ensure open airway
- Check the cannula positioning
- Notify Respiratory Therapy
- Consider decreasing or stopping PCA and starting alternative drug delivery
- Inform M.D.
- Administer reversal agents as prescribed
Typical Monitoring of Patients on PCA

- Intermittent assessments of cognition, vital signs, pulse oximetry and pain scores.
- Dangers of overmedication may not be detected.
PCA Monitoring Trend Data: Opioid Induced Respiratory Depression

**Morphine 1mg/mL**

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ZOOM: 120 60 30 5 1 minutes

>Press UP/DOWN Keys to Move Cursor.

**Morphine 1mg/mL**

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>Press UP/DOWN Keys to Move Cursor.
Change in the Culture of Care for Our PCA Patients
Improved Pain Management

• Clinicians often times use extreme caution during narcotic administration.

• Problem:
  o Under medication to prevent respiratory depression resulting in poor pain control.

• Solution:
  o Add continuous monitoring to provide clinicians with assessment tools that assist in the detection of respiratory depression and allow adequate administration of analgesics.
Findings Using Continuous Etco2 and Spo2 Monitoring With PCA Therapy

Multiple “high risk” situations identified including:

- Narcotic overdose leading to respiratory depression.
- Apnea alarms.
- Undiagnosed sleep apnea.
- Post op pneumonia and Atelectasis.
- Congestive heart failure.
EtCO2

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

Aggregated
50 patients SJC

low BPM versus high EtCO2
in same minute

BPM low Alarm if below
RESULT

- Increased likelihood of better sustained pain control, faster recovery and discharge.

- A better patient experience.

- 8 YEARS of event free usage of PCA therapy
SUMMARY OF OUR EXPERIENCE

• EtCO2 provides earliest alert of decline in respiratory function.

• Undiagnosed Sleep Apnea more prevalent than expected.

• Post op respiratory depression unrelated to PCA detected.

• Pain is more effectively controlled in patients with both high and low opioid tolerance.
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.
THANK YOU
Faculty

Moderator: Gina Pugliese, RN MS
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Thank you for joining us

Find additional resources on Premier Safety Institute® website

Opioids and patient safety:
http://www.premierinc.com/opioids

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