Continuous Monitoring of Patients on Opioids: Capnography Initiative at BJC Healthcare

Friday
October 14, 2016
AAMI Foundation

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

- National Coalition for Infusion Therapy Safety
- National Coalition to Promote Continuous Monitoring of Patients on Opioids
  - Compendium: Opioid Safety & Patient Monitoring
- National Coalition for Alarm Management Safety
  - Compendium: AAMI Foundation Management of Clinical Alarm

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Polling Questions
Speaker Introduction

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Continuous Monitoring of Patients on Opioids: Initiatives at BJC Healthcare

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Why Do We Give Opioids?

• Medications used to treat moderate to severe pain
  – Derived from the poppy plant

• Actions:
  – Pain relief—raise pain threshold
    • Considered the gold standard
    • Euphoria which can lead to abuse

• How?
  • Bind to Mu (µ) receptors in brain
  • Mu (µ) receptors are not only in the brain
    – Also in smooth muscle
      • **Respiratory depression**
        – overdose can lead to death
      • Sedation (CNS) / Hypotension
      • Nausea/Vomiting
      • Constipation (treatment for diarrhea)
    – 2016 warning to avoid prescribing with other sedatives

More Opioids = More Risk

• National Perspective
  – Opioids involved in almost One-Half of all deaths from Medication Errors¹
  – One-Third hospital codes due to respiratory depression²
  – 20,000 post-op patients receive naloxone annually³
  – US Healthcare costs associated with post-op respiratory failure total $2 Billion⁴

• Inpatient: A 2013 national study found that opioids were used in more than half of hospital admissions of non-surgical patients, ranging from 33% to 64%.⁵

Case Study: Inpatient Oversedation Risk

- Do you know the oversedation rate at your hospital?
- We developed a robust method of identifying:
  - Valid
  - Comprehensive
  - Reproducible

2015 Percent of ADEs at BJC

- Oversedation (n=223): 34%
- Hypoglycemia: 52%
- All Other: 14%

Opioids n= 199  Benzo n= 24

>4 patients per week being emergently reversed!
BJC’s Improvement Process

- We designed an ADE measurement process that was:
  - Semi-automated
  - Comprehensive
  - Reproducible

- Formed system task force and identified key stakeholders.
  - Reported event rates widely
  - Compared hospitals and even nursing units

What gets measured gets managed!
Stakeholder Acceptance
Case Building
Project Prioritization
Oversedation Events - Rolling 12 Months:
April 2015-March 2016

Example of Monthly Reports Comparing Hospitals

BJC baseline (2011) rate 0.36
BJC rolling-12 month rate 0.35
BJC’s Improvement Process

- Discovered system, regional, and national best practices
- Recommended a standard sedation scale and capnography
## Initial projects identified for action by OS Task Force

### Start Now

- Develop prescribing limits and/or make sure order sets comply with ISMP guidelines
- Institute near real-time audit and feedback on events (all or F-I) using a standardized protocol
- Enter all events in Safety Event Monitoring System and send event forms to appropriate MD
- Complete TJC Sentinel Event Alert Survey and comply

### Pilot Projects

- Capnography
  - 18% of our ADEs are on PCA
- Nurse Education
- All PCAs on Smart Pumps
- Develop Clinical Decision Support (CDS) for high-risk patients
BJC’s Improvement Process

- Developed a Narcotic Event Analysis Tool (NEAT)
- Collected Causative Factors
Narcotic Event Analysis Tool (NEAT) Causative Factor Choices

Select all causative factors associated with the event (when harm is found)

- Concurrent administration of more than one opioid
- Concurrent administration of opioid and benzodiazepine
- Concurrent administration of opioid and another sedative (Please add contributing drug below)
- Surgery/procedure
- Patient or visitor misuse (e.g. PCA by proxy, patient own med)
- Administration error
- Renal impairment
- Hepatic Impairment
- Opioid naive
- Dosing not appropriate (other)
- Lapse in monitoring of patient status
- History of respiratory disease (obstructive or central sleep apnea, severe COPD)
- Obesity (BMI >=30)
- Concurrent use of PCA plus another opioid
- No causative factor discovered during investigation
I don't understand the question
Giarracco, David, 5/31/2016

Will clarify. These are the causative factors that we select
Paul Milligan, 6/3/2016
BJC System Causative Factors
Percentages
October 2015-March 2016

BJC Oversedation Causative Factors
- Percent of BJC system causative factors
- Count of BJC system causative factors

Concomitant Non-opioid Sedating: 56
Dosing not appropriate for patient’s history: 32
Patient/Family Misuse: 6
Monitoring Error: 6
Newly discovered renal impairment: 3
Wrong drug, dose, route, patient, or time: 2
Other: 1

BJC - THE WORLD'S BEST MEDICINE. MADE BETTER.
Review monitoring errors. They may have been low, but we were making little progress on prescribing......

Paul Milligan, 6/26/2016
BJC’s Improvement Process

- Identify Events and Prioritize
- Raising Institutional Awareness
- Implement Foundational Best Practices and Just Do It’s
- Event Investigation and Collect Causative Factors
- Share Strategies and Implement Informed Interventions on Target Floors and Patients

Our Taskforce investigated and piloted 3 different vendors, choosing Medtronic Capnostream 20™ for implementation.

- Targeted Hospitals
- Began implementation of capnography on Highest Risk patients
Capnography Growing at an Accelerated Rate

- 1999 - 2007: 8 statements in 8 years
- 2008 - 2010: 8 statements in 3 years
- 2011 - 2015: 51 statements from Mar 2011 – Mar 2016 (10 per year)
- 2016 onwards: 16 statements in 12 years (~1 per year)

Recommendations
Identifying The Highest Risk Population

• Leadership was reluctant to start with all patients on opioids
• At least 7 other local hospitals are utilizing capnography at the bedside only on patients receiving a PCA.

Since less than 20% of our oversedation events at BJC occur to patients on a PCA, the group conducted a test of several hypothesis based on risks found in the literature to identify a patient group that would identify a larger percentage of our patients.
We Are Evidence Based!

- We tested several hypothesis to identify our patients at highest risk.
And The Winner Was……..

- **Oxygen and Opioids!**
  - 54% of patients had a concurrent order for parenteral narcotic and actively receiving supplemental oxygen prior to the oversedation event. (vs. 18% on PCA)

From the Core Policy*

*Continuous End Tidal Carbon Dioxide (Capnography, EtCO2) monitoring is required (unless otherwise determined by provider) for early detection of over sedation in adult hospitalized patients actively receiving supplemental oxygen along with an active order for a parenteral (IV/PCA, Epidural and IM) opioid.*

*Minimum Requirements: Can Be Broadened But Not Made More Restrictive*
Bedside Capnography Implementation Process

- Approved Core Policy
- Rollout at Best-Practice Hospital
- Readiness Checklist Developed
- Formed Implementation Teams at Each Hospital
- Systematic Rollout
Lessons Learned From Rollout: People

- Have leadership role on the implementation team
- Engage all stakeholders as early as possible
- Prescriber, nursing, and patient acceptance has been very high
- Vendor support has been strong, though repeat education needed in some areas
- Nurse manager introduction of vendor educators will help engagement of staff
- Hospital embraced leadership role and have been tracking issues which will be shared
Lessons Learned From Rollout: Policy

- Application of policy in ICU settings may not be of benefit
- Hospitals are modifying policy to allow nurses to begin capnography at their own discretion
- Capnography usage quickly spread to other areas of the hospitals - ER, PACU, etc.
- One large community hospital monitors all patients on a parenteral opioid (independent of oxygen) and several have added all patients on basal rate PCAs
- Modification of Alarm settings have big impact on nurse and patient satisfaction without compromising safety - policy modified
Progress, So Far….

• Rollout complete at 11 of 12 hospitals
  – Academic hospital testing alarm management technology to rollout simultaneously
• Nationwide recall of device interrupted rollout. (Battery issue discovered at one of our hospitals)
• Currently assessing adoption by all nursing units for all high-risk patients
• Piloting a wireless alarm management program
• Anticipating answers to key questions……………..
Working On Answers To the Following Questions

• Is our high-risk population a good start?
  – If not, re-evaluate.
  – If yes, look for expansion.

• Have we implemented properly?
  – If not, retrain.
  – If yes, continue to work on alarm management.

• Does Capnography work?
  – If not, Hmmm.
  – If yes, Double Down!

• Currently: “There is a statistically significant difference in the proportion of oversedation events between high-risk patients on and off capnography.”
Conclusion & Suggestions

Using a systematic approach to identifying patients at highest risk can provide a stepwise approach for implementation of capnography across a health-system. Once the technology is on-site, it has expanded to other patient care areas and patient populations.

How To Take Action:
- Get attention
  - Measure your events!
- Build your case
  - Literature and National Recommendations
- Identify highest risk patients
- Implement
Future/Ongoing Initiatives
Mark Your Calendars!

October 28, 2016; 12pm to 1pm EST

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Cathy Sullivan, MSN, RN, FNP, CCRN
Associate Director Sourcing
Mount Sinai Beth Israel, NYC

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