Evaluation of an Opioid Risk Assessment Tool

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Collaboration

• This research project is an exciting collaboration between nursing, pharmacy, and anesthesiology.

• A huge thanks to Sean Kane, PharmD, BCPS for initiating and developing the tool from the pharmacy literature review.

• I appreciate the opportunity to be a research fellow and having a knowledgeable, supportive mentor, Janet Stifter, MSN
Introduction

• Nursing encompasses the prevention of illness, the alleviation of suffering, and the protection, promotion, and restoration of health in individuals (Burkhardt & Nathaniel, 2008).

• The American Nurses Association (ANA) *Code of Ethics for Nurses* (2001) is very clear that preventing harm is one of the most important aspects of nursing assessment and care.
Introduction

• More than 51.4 million surgical procedures are performed in hospitals annually (CDC, 2013).
• 80% of the patients experience pain.
• Opioid analgesia remains the primary pharmacological intervention for managing pain in hospitalized surgical patients, but it is not without risk.
Definition

- Change in respiratory status is a leading indicator of adverse patient response to opioid therapy (Maddox et al, 2006).
- Opioid induced respiratory depression is defined as a decrease in baseline ventilatory function with a respiratory rate of 8 to 10 breath per minute, oxygen saturation less than 90%, and end tidal carbon dioxide less than 30mmHg or greater than 50mmHg (Jarzyna, 2011).
- The incidence reported in the literature is highly variable. Opioid induced respiratory depression has been reported as high as 17% (Cashman, 2004) and as low as 0.038% (Ramachandran, 2004).
- Nurses play an important role in assessing, monitoring, and identifying patients at risk for unintended advancing sedation and respiratory depression.
Problem

- Overdyk (2011) stresses the dangers for postoperative patients frequently transferred to a medical-surgical floor unit after surgery.
- Patients vary greatly in their response to opioids.
- Respiratory effects are primarily dose-related but may be unpredictable and highly variable (Adamson et al, 2011).
- Patient status can change quickly.
- Nurse’s intermittent assessments can stimulate an over sedated patient to a higher level of consciousness and stimulate respirations.
- Once that stimulus is removed however the patient may return to an over sedated state.
Problem

• Failure to Rescue and postoperative respiratory failure are the first and third most common patient-related safety events as a result of opioid analgesia, accounting for 113 events per 1000 at risk patient admissions. (Fecho, Jackson, Smith, & Overdyk, 2009).

• Detection of a patient’s declining respiratory status before progression to respiratory depression can help avert transfers to ICU and undesirable outcomes such as anoxic brain injury or death.

• In a report from the Joint Commission, opioid-related events resulting in death or permanent loss of function accounted for 0.25% of all events reviewed between 2004 through 2010; 58% were the result of improper monitoring.
Pulse Oximetry

• In many hospitals, pulse oximetry is used to measure arterial oxygen levels.
• Pulse oximetry however can lead to inaccurate assessment of the patient’s condition.
• Even at a low respiratory rate, a patient’s oxygen saturation (SpO2) is usually maintained especially in patients receiving supplemental oxygen (Ramirez, Pickar, Frens, Cappon, & Cleary, 2009).
• Of concern is that supplemental oxygen does not correct desaturations due to hypoventilation but simply delays the progression of the patient’s respiratory failure.
Capnography

• The Institute for Safe Medication Practices advises that hospital staff should not rely on pulse oximetry alone to detect opiate-induced respiratory depression and indicates that capnography should be used for patients at heightened risk.

• Capnography is a non-invasive respiratory monitoring system which measures the partial pressure of carbon dioxide (CO2) during exhalation (Felhofer, 2013).

• Respiratory status is measured in real-time by continuously monitoring respiratory rate, exhaled carbon dioxide levels, and apneic events or pauses using a nasal cannula device (Hutchison & Rodriquez, 2008).

• This technique can help clinicians detect impending oversedation, hypoventilation, and respiratory depression.

• Averting incidents of Opioid-related respiratory depression can increase patient safety and improve patient outcomes (D’Arcy, 2013).
Figure: Modified Sampling Cannula: \( \text{CO}_2 \) Sampling/O\(_2\) Delivery for Nonintubated Patients

Small pin holes in the nasal sampling cannula deliver pillows of oxygen around nose and mouth.

Uni-junction of sampling ports prevents dilution from nonbreathing source.

Increased surface area of cannula provides greater sampling accuracy in low tidal volume.

\( \text{O}_2 \) and \( \text{CO}_2 \)
Bottom Line

• Pulse oximetry not enough for patients at heightened risk for opioid induced respiratory depression..... Capnography is better!
Literature review

• Despite the frequency of opioid-induced sedation, there is no universally accepted tool for assessment of over-sedation risk for patients receiving opioid analgesia (Jarzyna, et al, 20011).
Synthesis of Literature

- Felhofer (2013) conducted a retrospective chart review of all serious opioid-induced over-sedation events that occurred at the University of Minnesota Medical Center-Fairview.
- Records of 49 adverse events were accessed through Fairview’s adverse event reporting system.
- Felhofer examined the most significant risk factors in predicting an opioid-induced respiratory depression event.
- These findings included:
  1) 90% of the cases the patient was on multiple sedating medications
  2) Three out of four patients studied had an ASA score 3 or greater
  3) Approximately one-third of patients exhibited the risk factors of:
     High opioid dose,
     Patient Controlled Analgesia use,
     Diagnosed lung disease,
     Renal or hepatic dysfunction,
     Dose stacking,
     Age 65 or older,
     Body Mass Index greater than or equal to 35.
     Diagnosed sleep apnea, muscular disorder, and
     Unstable PACU transfer
Synthesis of Literature

- Average patient having a total of 3.75 risk factors.
- Felhofer (2013) developed a scorecard to determine patients at higher risk based on the frequency of multiple risk factors per patient and the quantification of the most critical risk factors,
- When the study population was assessed with the scorecard, 20 patients (50%) met criteria for capnography monitoring.
- Of concern is that only 50% of the patients that had a respiratory event met requirements for capnography.
- In conclusion, Felhofer (2013) determined more research is needed to further guide the determination of the most important risk factors in the prediction of respiratory depression.
Synthesis of Literature

• In 2007, the American Society for Pain Management (ASPM) approved the formation of an expert panel to develop recommendations for assessment and monitoring of hospitalized patients in medical-surgical units who are at risk for respiratory depression from pain management.

• Based on the published literature, the panel reached an agreement regarding four categories relevant to opioid induced respiratory depression. These were:
  1) Individual Patient Risks,
  2) Iatrogenic Risks,
  3) Pharmacology, and
  4) Monitoring.

• After compiling the evidence for research examining risks for opioid-induced respiratory depression, two main categories emerged:
  1) Risk factors for sleep disordered breathing
  2) Risk factors for postoperative pulmonary complications such as atelectasis or pneumonia

• Comprehensive assessments are recommended to identify further risk factors such as:
  1) age greater than 55,
  2) preexisting pulmonary disease,
  3) known or suspected sleep-disordered breathing problems,
  4) anatomic oral or airway abnormalities,
  5) systemic disease including renal or hepatic impairment.
Synthesis of Literature

- Iatrogenic risks are defined as pain environmental factors, and circumstances in the hospital workplace.
- Variables associated with negative outcomes are related to staffing.
- Inexperienced nurses place patients at risk for improper assessments or respiratory status.
- The night shift hours from 2300 and 0700 are attributed to more adverse events occurring due to less frequent and improper monitoring of patient receiving opioid medications.
- Pharmacology is the main contributing factor to postoperative respiratory depression.  
  1) Use of patient controlled analgesia with basal rates  
  2) dose stacking  
  3) concurrent drug therapy with antihistamines and benzodiazepines
- Nurses must be competent in respiratory assessments of patients.
- Nurses can prevent adverse events related to respiratory dysfunction and reduce morbidity and mortality with proper respiratory assessment and early recognition and intervention when patients demonstrate signs of deterioration.
- Research shows that nurses do not perform adequate assessments with a review of documentation noting recorded respiratory rate less than 50% of the time (Hogan, 2006).
Synthesis of Literature

- Hutchison & Rodriguez (2008) conducted a randomized, prospective trial to determine whether opioid-naïve patients at risk for respiratory depression are better monitored with either capnography or pulse oximetry and respiratory rate assessment.
- Patient inclusion criteria were determined from research literature with higher risk noted in:
  1) Patients with body mass index of 30 or more,
  2) History of snoring,
  3) Post Anesthesia Care Unit (PACU) history of respiratory less than 10
  4) Basal dosage of IV opioids.
- In 54 opioid-naïve postoperative orthopedic patients, capnography resulted in greater detection or respiratory depression.
- Of the enrollment criteria, only a respiratory rate of less than 10 breaths per minute while in PACU was the strongest predictive indicator of a subsequent respiratory event on the general care unit.
- This suggests patients who have such an event be strong candidates for capnography monitoring.
Synthesis of Literature

• Kessler, Shah, Gruschkus, & Raju (2013) completed a retrospective cohort study using data of 37,031 patients undergoing surgical procedures to determine
  1) Prevalence of postoperative opioid use in the inpatient setting,
  2) Frequency of and risk factors for opioid-induced depression
  3) Evaluate the impact on clinical and economic outcomes.

• Postsurgical opioid use was ubiquitous, with 99% of patients having received an opioid. 14.6% of patients experienced adverse event such with the most frequently being 4.26% respiratory related.

• Factors associated with increased risk for adverse events
  1) Patients 65 years and older and male were 67% more likely to develop an adverse event
  2) Obesity increases likelihood of an adverse event by 11%.
  3) Receiving opioids during hospitalization before surgery increased risk for an adverse event by 34%

• Kessler, Shah, Gruschkus, & Raju (2013) found that the presence of opioid related adverse events significantly increased the burden on patients and the hospital system
  55% longer length of stay,
  47% higher cost of care, and
  3.4% higher risk of inpatient mortality.
Synthesis of Literature

• Pain management encompasses all spans of life, including the pediatric population with little information is available on the occurrence of ORID in children.
• Niesters, Overdyk, Smith, Aarts, & Dahan, (2013) searched reports on opioid-induced respiratory depression in children 12 years and younger.

Main factors in these case reports are related to pediatric ORID, 1) Renal impairment,
   2) Recurrent hypoxic episode from tonsillitis and obstructive sleep apnea
Research Question

• What is the reliability and validity of an Opioid Risk Assessment Tool amongst PACU Nurses?
# OPRAT Scoring Tool

## Major Risk Factors

<table>
<thead>
<tr>
<th>Age</th>
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<tr>
<td>60 to 70 yrs</td>
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<tr>
<td>71 to 80 yrs</td>
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<td></td>
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<tr>
<td>More than 80 yrs</td>
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<table>
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<tr>
<th>History of heart failure</th>
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<tr>
<td>Surgery within past 24 hours</td>
<td>4</td>
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<tr>
<td>PCA level of 3 or 4</td>
<td>4</td>
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</tbody>
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## Minor Risk Factors

| Obesity (BMI > 30 kg/m²) or obstructive sleep apnea | 2 |
| COPD                                                | 2 |
| Smoking history (>20 pack-years) *                 | 2 |
| Renal impairment (SCr > 1.5 mg/dL or diagnosis of CKD) | 2 |
| Concurrent sedating medications (benzodiazepines, sleep aids, muscle relaxants) ** | 2 |

## Total Points

(if 9 or more, patient requires capnography)

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Tool

- **Opioid Predictive Risk Assessment Tool (OPRAT)**
  - OPRAT is a simple scoring tool to assess oversedation risk in patients receiving opioid therapy. **Those with an OPRAT score of 9 or more should receive capnography to reduce the risk of opioid-related adverse effects.**

- **Who should receive an OPRAT screening score?**
  - Patient-controlled analgesia (PCA) during the first 24 hours of initiation or dose increase
  - Any patient receiving opioids AT OR ABOVE the following doses:
    - Hydromorphone (Dilaudid) 1 mg IV (single dose) or 2 mg IV within 4 hours
    - Hydromorphone (Dilaudid) 8 mg PO (single dose) or 16 mg PO within 4 hours
    - Fentanyl 50 mcg IV (single dose) or 100 mcg within 2 hours
    - Fentanyl patch – initiation or dose increase within previous 48 hours
    - Morphine 30 mg PO (SR or immediate release tablet)
    - Oxycodone 15 mg PO (SR or immediate release tablet)

- **Capnography is REQUIRED if a patient meets any of the following criteria:**
  - OPRAT score of 9 or more (calculate using scoring tool below)
  - Patient-controlled analgesia (PCA) with a basal rate
  - Receiving a continuous opioid infusion
  - Currently receiving opioids with a previous incident of opioid-related respiratory depression due during the current admission

- **Capnography is NOT required, regardless of risk factors or OPRAT score, in intensive care unit or hospice patients.**

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Reliability-Validity testing

Validity testing:
• When developing a new tool, it is important to assess content validity.
• Does the tool measure intended content area? (Fain, 2004). Over-sedation risk factors.
• Literature review
• Panel of experts.

Tool will be presented to anesthesia to assess and evaluate the items on the tool for appropriateness.
Tool was submitted to Specialty Organization ASPAN for comments.
Reliability Testing

Reliability: tool measures same level of opioid analgesia risk each time it’s used.

• Inter-rater reliability and test-retest methods
• This is a pilot study
• Population of 6 RN’s from pre/post/pacu at a community hospital.
• Retrospective study using charts of patients with and without adverse events.
• Patients will be scored using finalized opioid risk assessment tool.
• Each patient will be independently scored by 2 RN’s
• Scores will be compared
Test-Retest

• 2 weeks later….The same group of RN’s will reassess and rescore the patients using the tool to ascertain whether same results obtained.
Next Steps

• IRB approval will be obtained.
• Retrospective Patient charts will be pulled with mixture of opioid risk event/non-event patients.
• Patient confidentiality will be maintained as charts will be decoded.
• RN’s will be invited to participate in the chart review without bias.
Long Term Plan

• Extend reliability testing beyond pilot site.
• Evaluate sensitivity and specificity of tool to help guide capnography use.
Conclusion

- Nurses are their patient’s eyes at times especially with patients receiving opioid medications.
- They look to us as nurses to protect them from harm.
- It is crucial to have assessment tool in place that implements proper monitoring of patients to prevent opioid-induced respiratory depression and its possible deadly consequences.
References

- D'Arcy, Y. (2013). Turning the tides on respiratory depression. Nursing, September, 38-45
References