Evaluation of a Standardized Sedation Assessment in the PACU to Prevent Post-Operative Opioid-Induced Respiratory Depression

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Objectives

- Identify the importance of the Post Anesthesia Care Unit (PACU) nurse’s role in preventing post-operative opioid induced sedation and respiratory depression.
- Differentiate between scales developed for purposeful/procedural sedation and those developed to assess sedation in patients receiving opioids for pain management.
- Describe research strategies to evaluate the effectiveness of the Pasero Opioid Induced Sedation Scale with Interventions (POSS) in the PACU.
- List four outcomes found when evaluating the use of the POSS in the PACU.

Background

PACU nurses are challenged:
- Patient safety
- Patient satisfaction
- Pain management
- Expediting recovery from surgery
- Without increasing risk for opioid related respiratory depression
Advancing Sedation
Hypoxia Apnea
Respiratory Arrest

Opioid Related ADEs

47% of the negative outcomes were attributed to wrong dose medication errors
29% to improper monitoring
11% were due to excessive dosing, medication interactions and adverse effects.

PACU Nurses

Pasani, C. 2013
Guidelines for PACU nurses


Standardized Sedation Assessment

- Detect incremental changes in sedation
- Facilitate nurse decision-making in safely administering opioids
- Identify safe sedation levels for discharge status
- Provide a standardized language to communicate handoff information


Nurses raised concerns about decreasing ADEs associated with opioid administration in the PACU.

Bone and Joint PACU
Providing care for 7,000 patients/year

Main PACU
Providing care for 13,300 patients/year
Pasero Opioid-Induced Sedation Scale (POSS) With Interventions

1. S = Sleep, easy to arouse. Acceptable; no action necessary; may increase opioid dose if needed
2. A = Awake and alert. Acceptable; no action necessary; may increase opioid dose if needed
3. Slightly drowsy, easily aroused. Acceptable; no action necessary; may increase opioid dose if needed
4. Frequently drowsy, arousable, drifts off to sleep during conversation. Acceptable; no action necessary; may increase opioid dose if needed. 

S = Sleep, easy to arouse. Acceptable; no action necessary; may increase opioid dose if needed
1. Awake and alert. Acceptable; no action necessary; may increase opioid dose if needed
2. Slightly drowsy, easily aroused. Acceptable; no action necessary; may increase opioid dose if needed
3. Frequently drowsy, arousable, drifts off to sleep during conversation.
   - Unacceptable; monitor respiratory status and sedation level closely until sedation level is stable at less than 3 and respiratory status is satisfactory; decrease opioid dose 25% to 50% or notify prescriber or anesthesiologist for orders; consider administering a non-sedating, opioid-sparing nonopioid, such as acetaminophen or a NSAID, if not contraindicated.
   - No revisions
   - No revisions
   - No revisions

4. Somnolent, minimal or no response to verbal or physical stimulation. Unacceptable; immediately notify the physician to obtain an order or follow completed pre-printed orders for stopping opioid; consider administering naloxone, monitor respiratory status and sedation level closely until sedation is stable at less than 3 and respiratory status is satisfactory.

Modified by GMC

Pasero Opioid-Induced Sedation Scale (POSS) With Interventions, Pasero, C. (2013)

1. S = Sleep, easy to arouse. Acceptable; no action necessary; may increase opioid dose if needed
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If sedation and respiratory depression occur during administration of transdermal fentanyl, remove the patch; if naloxone is necessary, treatment will be needed for a prolonged period and the typical approach involves a naloxone infusion. Patient must be monitored closely for at least 24 h after discontinuation of the transdermal fentanyl.
Purposes of the quasi-experimental study were:

- **Patient Outcomes**

  To measure the efficacy of the POSS with interventions for sedation assessment & pain management in the PACU.

- **Communication Survey**

  To determine if the implementation of the POSS protocol would increase PACU nurses' confidence with assessing sedation associated with opioid administration and facilitate PACU and post-op clinical and nurse communications regarding safe opioid administration.

**Methodology:**

**Pre-Intervention:** April – June 2011

**Intervention:** September, 2011

POSS Protocol in both PACUs:
- POSS with appropriate interventions every 15 minutes and
- POSS and Pain Rating before and after each opioid
- Staff Education

**Post-Intervention:** April - June 2012

Measure outcomes
Survey nurses

**Intervention: POSS Protocol**

The POSS Protocol included adding the POSS with interventions to the PACU “every 15 minute” assessments and before and after each opioid administration in addition to a pain intensity rating.
When is best time to reassess?
Opioid Dosing Guidelines
Badge Backers

Safe Opioid Dosing

Do You Realize?

Approximate Equianalgesic Doses

Sleep vs Sedation

Is this normal sleep or dangerous sedation?
Sample & Data Collection Strategies

Inclusion criteria included: Non-ventilated PACU patients over the age of 18 who had undergone surgery for either trauma injuries or non-trauma related scheduled joint surgeries (knee, elbow, or shoulder) and received opioid analgesia.

The sample was accrued from Grant Medical Center’s patients who met the criteria during two three-month periods; the first three months prior to implementation with the second three-month period occurring one year later.

Midas+ was searched for medical records of patients with scheduled (non-trauma) orthopedic or trauma surgical procedures for the targeted time periods.

Data were entered by trained data collectors in an Access Data Base placed on a secured shared drive.

Data Collection

In order to evaluate the effect of the POSS, the study examined significant variables in the pre and post data collection periods.

<table>
<thead>
<tr>
<th>Variables of Interest Collected from Medical Records</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length of time in PACU</td>
</tr>
<tr>
<td>Amount of hydrocodone given IV in PACU</td>
</tr>
<tr>
<td>Amount of morphine given IV in PACU</td>
</tr>
<tr>
<td>Amount of oral opioid given in PACU</td>
</tr>
<tr>
<td>All data were entered on a secured shared drive.</td>
</tr>
</tbody>
</table>

Patient Demographics:
- Age
- Gender
- Procedure
- Documented respiratory co-morbidities

Data Collection

Communication survey:

Two anonymous surveys, using 10 point rating scales, were created for PACU and post-operative unit nurses to assess their perceptions of changes associated with the implementation of the PACU POSS protocol.

Items included: level of comfort with communicating with peers, how POSS affected the quality of patient care, and confidence in administering opioids with the POSS.

Data from the surveys were entered into a SPSS data base (Version 17) for analysis.
Analysis

Patient Outcomes

Data from the Access database were converted into Excel and then imported into SPSS. Participants' records and variables were excluded if they had more than 10% missing data.

Opioid medications were converted to equianalgesic doses for analysis using the Ohio Pain Initiative guidelines (www.ohiopaininitiative.org).

Admission and discharge times were changed to military time and analyzed with accommodations made for those patients being discharged after midnight.

Demographic and study variables were examined using descriptive, chi-square, and paired and standard t-test analyses.

Results

Patient Outcomes

<table>
<thead>
<tr>
<th></th>
<th>PRE</th>
<th>POST</th>
<th>Real Sample Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Available Medical Records</td>
<td>Eligible Medical Records</td>
<td>Available Medical Records</td>
<td>Eligible Medical Records</td>
</tr>
<tr>
<td>Scheduled Ortho</td>
<td>235</td>
<td>157</td>
<td>229</td>
</tr>
<tr>
<td>Trauma</td>
<td>465</td>
<td>227</td>
<td>428</td>
</tr>
<tr>
<td>Total</td>
<td>676</td>
<td>384</td>
<td>653</td>
</tr>
<tr>
<td>Final sample</td>
<td>394</td>
<td>448</td>
<td>842</td>
</tr>
</tbody>
</table>
Demographics

Patient Outcomes
Age & Gender

<table>
<thead>
<tr>
<th>AGE</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>48.994 (±16.904)</td>
</tr>
<tr>
<td>Trauma</td>
<td>42.867 (±17.5117)</td>
</tr>
<tr>
<td>Orthopedic</td>
<td>58.453 (±10.317)</td>
</tr>
</tbody>
</table>

GENDER: There were significantly more males (452) in the sample (t=7.964, df=833.954, p<0.001, unequal variances assumed). The gender proportion was stable in both pre and post groups with trauma having almost twice as many males as females and the orthopedic group having slightly less than twice as many females as males.

Demographics: Surgical Procedures

SURGICAL PROCEDURES: Three surgical procedures (scheduled knee, orthopedic and plastic trauma) comprised 89.1% of the sample.

<table>
<thead>
<tr>
<th>Surgical Procedure</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scheduled Orthopedic</td>
<td>304</td>
</tr>
<tr>
<td>Scheduled Knee</td>
<td>4</td>
</tr>
<tr>
<td>Scheduled Shoulder</td>
<td>22</td>
</tr>
<tr>
<td>Trauma</td>
<td>147</td>
</tr>
<tr>
<td>Orthopedic Trauma</td>
<td>99</td>
</tr>
<tr>
<td>Abdominal Trauma</td>
<td>23</td>
</tr>
<tr>
<td>Vascular Trauma</td>
<td>8</td>
</tr>
<tr>
<td>Neuro Trauma</td>
<td>24</td>
</tr>
<tr>
<td>GU/PRO</td>
<td>3</td>
</tr>
<tr>
<td>Cardio-Thoracic Trauma</td>
<td>5</td>
</tr>
</tbody>
</table>

Demographics: Communication Survey

<table>
<thead>
<tr>
<th></th>
<th>Post-op Unit RNs</th>
<th>PACU RNs</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Completed Survey</td>
<td>56</td>
<td>21</td>
<td>67</td>
</tr>
</tbody>
</table>

Mean years of experience

- Post-op Unit RNs: 7.47 years (2.18, 5.08 years)
- PACU RNs: 12.97 years (6.54, 10.12 years)
Research Hypothesis

H1: Adverse events that require the use of naloxone – an opioid reversal agent (antagonist) will decrease after the implementation of the POSS scale.

- Insufficient data to evaluate this hypothesis
- Two cases (one each in the pre and post groups)
- Neither was directly related to POSS protocol implementation

Research Hypotheses

H2: The average length of stay for PACU patients in the same surgical classifications will decrease after the implementation of the POSS process as compared to the same classification of patients assessed with the Aldrete Scale during the baseline time-period.

- The overall sample range of length of time spent in the PACU ranged from 30 minutes to 9.7 hours. There were no significant time differences in LOS in the PACU noted in any of the pre and post groups

Research Hypotheses

H3: PACU and post-operative unit nurses will report an overall higher perception of safe quality patient care related to opioid administration with the use and communication of the POSS protocol for sedation assessment after implementation of the POSS protocol.

<table>
<thead>
<tr>
<th>Nurses</th>
<th>Perceptions of quality of care re: opioid administration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post -Op Unit Nurses</td>
<td>Increased from 6.75 to 7.29 on a 10 point scale</td>
</tr>
<tr>
<td>PACU Nurses</td>
<td>Increased from 7.55 to 8.59 on a 10 point scale</td>
</tr>
</tbody>
</table>

(Paired t = 2.985, df = 44, p = 0.005) (higher scores indicated higher levels of quality)

(Paired t = -2.668, df=21, p=0.014)

(p = 0.014)
**Research Hypothesis**

### H3 (Continued)

<table>
<thead>
<tr>
<th>Nurses’ level of comfort communicating</th>
<th>Results 10 point scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post-surgical unit nurses in communicating with PACU nurses</td>
<td>Significantly increased from 6.80 to 7.55 (Paired t=-3.597, df=43, p&lt;.001).</td>
</tr>
<tr>
<td>PACU nurses communicating with post-surgical unit nurses</td>
<td>Significantly increased from 7.76 to 8.82 (Paired t=-2.257, df=20, p&lt;.035).</td>
</tr>
</tbody>
</table>

**Research Questions**

**Will implementation of the POSS protocol increase surgeon and anesthesia referrals or calls for assistance related to opioid administration by nurses in the PACU?**

- The POSS protocol did not increase calls for assistance from surgical and anesthesia personnel.

<table>
<thead>
<tr>
<th>Pre-intervention</th>
<th>Post-intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physician contacted for sedation concerns</td>
<td>7 times</td>
</tr>
</tbody>
</table>

**Research Questions**

**How will implementation of the POSS protocol affect the amount of opioid medication given in the PACU?**

- There were no significant increases or decreases in opioid administration in the patients from scheduled knee, plastic trauma, or orthopedic trauma groups.
Research Questions

How will implementation of the POSS protocol affect patients’ perceptions of pain while in the PACU?

<table>
<thead>
<tr>
<th></th>
<th>Pre-intervention</th>
<th>Post-intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of pain intensity ratings verbalized</td>
<td>196/364=54.6%</td>
<td>289/422=68.5%</td>
</tr>
<tr>
<td>Mean Pain Intensity Scores</td>
<td>6.724 (+2.897)</td>
<td>6.563 (+2.939)</td>
</tr>
</tbody>
</table>

Research Questions

Was the fidelity of the intervention maintained in the post intervention group?

- Treatment fidelity describes the “faithfulness” or the extent to which the treatment was implemented according to the guidelines.

Treatment Fidelity

Treatment fidelity in our study was demonstrated in three ways:
**Discussion**

Before implementing any new intervention, it is important to understand how the intervention will impact needed resources, patient care and outcomes that may affect LOS in PACU and staffing.

**Discussion**

The POSS protocol addressed the documented need for standardized sedation assessment without:

- Increasing number of calls needed. POSS intervention steps facilitated decision making and directed the nurse to take appropriate action.
- Changing the amount of medications given
- Increasing LOS in the PACU

**Discussion**

Opioids are associated with negative ADEs associated with morbidity and mortality, particularly respiratory depression. Nurses are required to be knowledgeable and confident when administering opioids in the PACU.

- PACU nurses reported the use of the POSS increased their confidence in administering opioids to address pain needs and avoiding over-sedation.
- Both PACU and clinical nurses indicated increased perception of quality of pt care related to safe opioid administration with the use of the POSS
- Scope of study not large enough to capture sufficient ADEs to evaluate impact of POSS in preventing respiratory depression.
Discussion

• PACU and clinical nurses’ comfort with communicating sedation and pain assessment during handoffs increased with use of the POSS.
• Focusing on safe adm of opioids using the POSS did not affect pain intensity ratings at discharge from PACU.
• 68.5% vs 54.6% of pts able to give pain intensity rating at discharge from PACU with use of POSS, pts were awakened, supports lack of over-sedation.

Discussion

Treatment fidelity was a strength of the study:
• This supports the ease of use of the protocol in patient care activities.

Conclusion

Studies, such as this intervention study, strengthen the evidence for the use of the POSS with Interventions protocol in the PACU and support the use of the POSS as an accepted standardized nursing practice for assessing sedation and opioid management in PACU.
Implications for Nursing Education, Practice and Research

• Additional studies are needed to further validate use of POSS in the PACU
• Showing a change in rare events, such as opioid depression requiring naloxone is challenging and requires a sample size greater than 3000 pts to show significant differences.
• Future studies need to account for use of or advances in technological monitoring. Other studies are needed that address technological vs nursing assessment in detecting respiratory depression.
• Commitment to continuing and progressive staff education is required to sustain fidelity and sustain care practice and culture of safety.

Summary

• In summary, the POSS protocol addresses the recommendations for a PACU systematic standardized sedation assessment from The Joint Commission and national organizations without adding additional care burden including:
  – 1) increasing patient length of stay in the PACU,
  – 2) increasing patients’ reports of experienced pain, and
  – 3) increasing calls for assistance or consultation from surgical and anesthesia personnel.
• PACU nurses consistently implemented and documented the POSS protocol interventions appropriately in the care and monitoring of their patients. Both PACU and post-surgical unit nurses reported significant increases in their perceptions of quality of care after implementation of the protocol and PACU nurses reported significant increases in their confidence in safely administering opioids to treat pain in post-operative patients.

Summary

The findings from this study support the use of the POSS as an efficient an accepted standardized nursing practice for assessing sedation and for opioid management in the PACU.
References

References


Conflict of Interest Disclosure

• Authors Conflicts of Interest:
  - Paula Kobelt, MSN, RN-BC - no conflict of interest
  - Karen Burke, BSN, CNSN - no conflict of interest
  - Paula Renker, PhD, RN - no conflict of interest