Subsyndromal Delirium and Pain Following Joint Replacement Surgery

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Conflict of Interest Slide

I hereby certify that, to the best of my knowledge, no aspect of my current personal or professional situation might reasonably be expected to affect significantly my views on the subject on which I am presenting.
A Dissertation Research Study:

“Subsyndromal Delirium And Pain In Older Adults Following Major Orthopedic Surgery”

(Denny, 2014)

Objectives

• Define subsyndromal delirium

• Describe the identification of delirium symptoms in older adults

• Discuss the role of pain management in prevention of delirium symptoms in older adults following joint replacement surgery
Define Subsyndromal Delirium
Delirium

- Global brain dysfunction
  (Inouye, 2006; Fong, Tulebaev & Inouye, 2009)

- Presence of 3 or 4 core symptoms on Confusion Assessment Method (CAM)
  (Inouye et al., 1990)
Subsyndromal Delirium (SSD)

• Subclinical delirium symptoms that do not precede or follow delirium

• Presence of 1 or 2 core symptoms according to the CAM delirium diagnostic detection tool, without meeting full criteria for a diagnosis of delirium

(Cole, McCusker, Dendukuri, & Hans, 2003)

• Develops quickly over a few hours or days

(Blazer & Vart Nieuwenhuizen, 2012)
Delirium Continuum

Subsyndromal Delirium

0 1 2 3 4

Number of Delirium Symptoms
Why Should Nurses be Concerned about SSD?

Delirium Symptoms are under-recognized (Ryan et al., 2013)

Delirium Symptoms are very common

• Up to 68 percent of older adults develop SSD following major orthopaedic surgery (Liptzin, Laki, Garb, Fingeroth, & Krushell, 2005)
Why Should Nurses be Concerned about SSD? (Cont.)

**High risk for adverse outcomes** (Vaurio, Sands, Wang, Mullen, & Leung, 2006)

- Increased falls
- Long-term care admits
- Increased length of stay

(Cole et al., 2003):

**Costly**

- Distressing
  
  (Bélanger & Ducharme, 2011; Partridge, Martin, Harari, & Dhesi, 2012)

- $152 Billion annually

  (Leslie, Marcantonio, Zhang, Leo-Summers, & Inouye, 2008)
Describe the identification of delirium symptoms in older adults
Four Core Symptoms of the Confusion Assessment Method (CAM)

1. Acute Onset Or Fluctuating Course
2. Inattention
3. Disorganized Thinking
4. Altered LOC

(Inouye et al., 1990)

Core Symptom of Delirium #1 (CAM)

Acute onset or fluctuating course

• “Is there any evidence of an acute change in mental status?”

• “Does the abnormal behavior fluctuate during the day?”

(Inouye, 2003).
Core Symptom of Delirium #2 (CAM)

Inattention

• “Did the patient have difficulty focusing attention (easily distracted, trouble tracking what is said in a conversation)?”

(Inouye, 2003)
Core Symptom of Delirium #3 (CAM)

Disorganized thinking

- “Was the patient’s thinking disorganized or incoherent?”

(Inouye, 2003)

Core Symptom of Delirium #4 (CAM)

Altered level of consciousness

- **Alert** = Normal
- **Lethargic** = Drowsy, easily aroused
- **Hyperalert** = Vigilant
- **Difficult to arouse** = Stupor
- **Unable to arouse** = Coma

(Inouye, 2003)
Pain and Subsyndromal Delirium
Pain and Subsyndromal Delirium

- Postoperative pain is an independent risk factor for delirium \(\text{(Morrison et al., 2003)}\)

- Inconsistent results about risk factors for subsyndromal delirium from research studies with long-term care residents \(\text{(Cole et al., 2003; Cole et al., 2011; Cole et al., 2012)}\)

- The relationship between pain and subsyndromal delirium had not been examined
Opioid Intake and Delirium

- Delirious patients receive up to 34 percent of opioid analgesics following hip fracture than those without delirium (Adunsky, Levy, Mzrahi, & Arad, 2002)

Methodology Used To Examine Subsyndromal Delirium And Postoperative Pain
Purpose and Study Design

Purpose

- To determine the relationship between the delirium symptoms and pain in older adults following elective orthopedic surgery.

Predictive Correlational Design
Specific Aims

1. Determine the frequency of delirium symptoms and the frequency distributions of preoperative risk factors, pain and 24 hour opioid intake of patients age 65 years and older following major elective orthopedic surgery.

2. To determine the relationship between delirium symptoms and the preoperative risk factors in older adults undergoing elective orthopedic surgery.
Specific Aims (Cont.)

3. To determine the relationship between delirium symptoms and pain intensity ratings in older adults following major elective orthopedic surgery.

4. To determine the relationship between delirium symptoms and 24 hour opioid intakes, in older adults following major elective orthopedic surgery.
Study Variables

1. Pain intensity (Morrison et al., 2003; DeCrane, Stark, Johnston, Lim, Hicks, & Ding, 2014)
2. Opioid intake (DeCrane et al., 2011)
Preoperative Variables

- **Advanced age/Comorbidity** (Cole, Ciampi, Belzile, & Dubuc-Sarrasin, 2012)

- **Cognitive impairment** (Bjoro, 2008)

- **Recent fall history** (Fong et al., 2009)

- **Prolonged preoperative fasting time** (Levkoff et al., 1996; Radtke et al., 2010)
Sample Characteristics

- 62 older adults were invited to participate, 53 consented
- Average age was 73 years ($M = 73.7, SD 6.2$)
- Setting: Critical Access Hospital (25 beds) in Northwest United States
62 Older Adults ≥ 65 years: Scheduled for Joint Replacement Surgery During Study Period

Participants Enrolled in Study (n = 53)

- Refused to participate (n = 9)
- Surgery Cancelled (n = 2)
- Withdrew from Study (n = 2)
- Completed Study (n = 51)

Inclusion/Exclusion

Enrollment of 53 participants
Two participants withdrew after POD 1
Refusal rate = 14.5%
Multifactorial Model for Delirium

Data Collection: Pain Intensity

Pain Intensity Ratings

- Iowa Pain Thermometer (Herr, Spratt, Garand, & Li, 2007)
- Preferred by older adults (Li, Herr, & Chen, 2007)
- Concurrent validity with NRS and VDS (.78 - .86) (Taylor, Harris, Epps & Herr, 2005)

24 Hour Opioid Intake (in morphine sulfate-equivalent doses (IV), in mg)

Used with permission, Keela Herr, PhD, RN, AGSF, FAAN, College of Nursing, The University of Iowa, Iowa City, IA, USA
<table>
<thead>
<tr>
<th>Variables</th>
<th>Methods</th>
<th>Time of Data Collection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delirium Assessment</td>
<td>Confusion Assessment Method</td>
<td>Preoperatively and once on postoperative 1, 2, and 3.</td>
</tr>
<tr>
<td>Pain Intensity Rating</td>
<td>Complete pain assessments utilizing the Iowa Pain Thermometer</td>
<td>Preoperatively and every 4 hours postoperatively x 3 days.</td>
</tr>
<tr>
<td>24 Hour Opioid Intake</td>
<td>Calculated for each 24 hour period for 3 following surgery in MS equivalent doses (in mg)</td>
<td>Medication administration records for postoperative period for 3 days extracted following study participation.</td>
</tr>
<tr>
<td>Comorbidity Score</td>
<td>Age-Adjusted Charleston Comorbidity Index score</td>
<td>Demographic form supplemented by information from the medical record following completion of the study.</td>
</tr>
<tr>
<td>Cognitive Status</td>
<td>Mini-Cog score (0-3)</td>
<td>Preoperatively at the time of enrollment</td>
</tr>
<tr>
<td>Fall History</td>
<td>Number of fall in 6 months prior to surgery</td>
<td>Demographic form supplemented by information from the medical record following completion of the study.</td>
</tr>
</tbody>
</table>
Data Collection

DAY 1
- Pain assessments q4h
- Delirium assessments daily (CAM)

DAY 2
- Pain assessment q4h
- Delirium assessments daily (CAM)

DAY 3
- Pain assessments q4h
- Delirium assessments daily (CAM)

Data were analyzed using descriptive statistics, correlational analyses, and hierarchical (linear) multiple regressions.
Findings
Frequency of Delirium Symptoms

Overall Incidence of Delirium Symptoms

[CATEGORY NAME] 68%

[CATEGORY NAME] 32%

(%, N = 53)
Frequency of Delirium Symptoms (cont.)

Delirium Symptoms
Postop Day 1
- No Delirium
- SSD1
- SSD2
- Delirium

Delirium Symptoms
Postop Day 1
- No Delirium
- SSD1
- SSD2
- Delirium

Delirium Symptoms
Postop Day 2
- No Delirium
- SSD1
- SSD2
- Delirium

Delirium Symptoms
Postop Day 3
- No Delirium
- SSD1
- SSD2
- Delirium
Pain Intensity Ratings

Mean Pain Intensity Ratings

- 0 - 24 hrs: 3.8
- 24 - 48 hrs: 3.6
- 48 - 72 hrs: 4.3
24 Hour Opioid Intake (in mg)

Mean 24-Hr Opioid Intake (in mg)

- 0 - 24 hours: 25.9
- 24 - 48 hours: 26.1
- 48 - 72 hours: 22.3
## Correlation of Preoperative Risk Factors and Delirium Symptoms: Postoperative Day 2

<table>
<thead>
<tr>
<th>Variable</th>
<th>Pearson’s r</th>
<th>N</th>
<th>p</th>
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<tbody>
<tr>
<td>Comorbidity burden</td>
<td>.12</td>
<td>53</td>
<td>.20</td>
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<tr>
<td>Cognitive status</td>
<td>-.13</td>
<td>53</td>
<td>.14</td>
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<tr>
<td>Recent fall history</td>
<td>.37**</td>
<td>53</td>
<td>.007</td>
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<tr>
<td>Preoperative fasting time</td>
<td>.24</td>
<td>53</td>
<td>.09</td>
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* p ≤ .05 level, ** p ≤ .01 level
## Preoperative Risk Factors and Delirium Symptoms: Postoperative Day 3

<table>
<thead>
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<th>Variable</th>
<th>Pearson’s $r$</th>
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</thead>
<tbody>
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<td>Cognitive status</td>
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<td>.33</td>
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<tr>
<td>Recent fall history</td>
<td>.33**</td>
<td>53</td>
<td>.01</td>
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<tr>
<td>Preoperative fasting time</td>
<td>.31*</td>
<td>53</td>
<td>.03</td>
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## Pain and Delirium Symptoms

<table>
<thead>
<tr>
<th>Time of Delirium Assessment</th>
<th>Pain</th>
<th>Pearson’s r</th>
<th>N</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Postoperative Day 1</td>
<td>0 – 24 hr</td>
<td>-.26</td>
<td>53</td>
<td>.06</td>
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<tr>
<td>Postoperative Day 2</td>
<td>24 – 48 hr</td>
<td>.22</td>
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<td>.10</td>
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<tr>
<td>Postoperative Day 3</td>
<td>48 – 72 hr</td>
<td>.05</td>
<td>53</td>
<td>.73</td>
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</tbody>
</table>

*p ≤ .05 level, **p ≤ .01 level
# Pain and Opioid Intake

<table>
<thead>
<tr>
<th>Time of Delirium Assessment</th>
<th>Opioid Intake</th>
<th>Pearson’s r</th>
<th>N</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAM score POD-1</td>
<td>0 - 24 hr</td>
<td>-.17</td>
<td>53</td>
<td>.20</td>
</tr>
<tr>
<td>CAM score POD-2</td>
<td>24 – 48 hr</td>
<td>.24</td>
<td>53</td>
<td>.08</td>
</tr>
<tr>
<td>CAM score POD-3</td>
<td>48 - 72 hr</td>
<td>.12</td>
<td>53</td>
<td>.39</td>
</tr>
</tbody>
</table>

*p ≤ .05 level, **p ≤ .01 level
When Preoperative Risk Factors were Accounted for in Multiple Regression Analysis

✓ **Pain** from 24 to 48 hours after surgery was related to a significant ($p \leq 0.05$) increase in delirium symptoms on POD 2

✓ **Pain** from 0 to 24 hours was related to a significant ($p \leq 0.05$) increase in SSD on POD 2
Delirium Symptoms and Opioid Intake

24-hour Opioid Intake was not significantly (p > .05) related to delirium symptoms or SSD after accounting for preoperative risk factors and pain.
Conclusions

• Older adults with higher levels of pain during the first 24 hours after surgery were more likely to have subsyndromal delirium on the second day after surgery.

• Older adults with higher levels of pain from 24 to 48 hours after surgery were more likely to have delirium symptoms on the second day after surgery.

• Opioid medications intake after surgery in older adults did not significantly contribute to delirium symptoms.
  • Analgesic trials should be considered.
Pain management and the prevention of delirium symptoms in older adults following joint replacement surgery
Subsyndromal Delirium Prevention and Detection

Role of Pain Management:

√ Medicate older adults per physician orders
√ Attempt self-report

➢ Avoid suggestive questions
  ☐ Not, “Is your pain okay?”
  ☐ Instead: “How would you rate your pain when you try to move your (affected extremity)?”
  ☐ Do not rely on nonpharmacological interventions alone in the immediate postoperative period.

√ Follow up any reports of unusual behavior with a delirium assessment

√ Aggressively manage pain in older adults following joint replacement surgery, through the 2nd postoperative day
Future Research

• Tools to assist with early identification of subsyndromal delirium

• Patient and family experiences of subsyndromal delirium
Acknowledgments

• Dr. Glenda Lindseth
  • Primary Mentor and Adviser
  • Professor at the College of Nursing at the University of North Dakota

• Research Site Nurses: Dee, Kathy, and Sue (Nurse Champions)

• Volunteers who participated in this study
Questions?

References


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