Postoperative pain management: Analgesics, algorithms and patient activation

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Deakin University/Epworth HealthCare

Victorian Perioperative Nurses Group 60th State Conference, 2017
Research Team and Funding

• PhD candidates
  – Dr Jo McDonnall
  – Sue Hunter
• Clinicians/Directors
  – Professor Richard Desteiger (Chair of Surgery)
  – Kate Steen (Director, Clinical Services)
  – Caz McLoughlin (Pain service)
• Academics
  – Associate Professor Ana Hutchinson
  – Professor Trish Livingston
  – Damien Khaw

• Australian Research Council Industry Linkage grant scheme
• Epworth Research Institute grant – project and strategic
• Philanthropic grant
Research Program

• Management Algorithms for Postoperative Pain (MAPP)

• Patient Activation (MyStay)
The problem of pain management in perioperative care

- c. 80% of patients who undergo surgery experience acute postoperative pain
- 75% of those experience moderate, severe or extreme pain
- Less than 50% of patients who undergo surgery report adequate pain relief
- Preoperative, intraoperative, and postoperative interventions and management strategies are available for reducing and managing postoperative pain.
Aim

Develop a post-operative, pharmacological pain management algorithm based on best available evidence to effectively manage pain in the post operative orthopaedic environment.
Prevalence Survey Methods

Design

• Prospective, observational
• Surveys -2010, 2011/12 and 2015/16
• 5 surveys, 1 day per week over 5 weeks consecutive weeks, Tuesday – Saturday.
• Census sample
Prevalence Survey Methods

Specific aims

• Quality of care related to pain management
• Variability of available pain medications
• Quality of decision-making related to analgesic administration.
Prevalence Survey Methods

Participants and Setting
• Consecutive patients after THR or TKR
• Private and public sectors

Procedure
• Brief 5 – 10 minute interview about the:
  – Experience of pain
  – Impact of pain on functional ability
  – Satisfaction with pain management

• Audit of medical record and medication chart
  – Analgesic type and dose prescribed (available over 24hr)
  – Analgesic type and amount administered
Prevalence Survey Instruments

• Pharmacological Pain Treatment Survey

• American Pain Society Patient Outcomes Questionnaire (APS-POQ)
  – pain intensity at rest, worst (dynamic) and average pain for the last 24 hours (0-10 scale);
  – the extent that pain interferes with a patients’ affect and activity (0-10 scale).
  – Participation in pain management
  – Satisfaction
Best Practice Recommendations

Multimodal analgesia, or the use of a variety of analgesic medications and techniques combined with nonpharmacological interventions

- Eg. local anaesthetic-based regional (peripheral and neuraxial) analgesic techniques in combination with systemic opioids
- Incorporate around the clock non-opioid analgesics and non-pharmacologic therapies into multimodal analgesia regimens
- Oral over intravenous (i.v.) administration of opioids for postoperative analgesia in patients who can use the oral route
- Consider giving a preoperative dose of oral celecoxib in adult patients without contraindications
- Consider use of gabapentin or pregabalin as a component of multimodal analgesia
- Consider i.v. ketamine as a component of multimodal analgesia in adults for major surgery
Analysis of trends in pain intensity, analgesic prescribing and administration

2010 - 2016
### Demographic characteristics

<table>
<thead>
<tr>
<th></th>
<th>2010 (n = 130)</th>
<th>2011 - 2012 (n = 408)</th>
<th>2015 - 2016 (n = 206)</th>
<th>Total (n = 744)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age (yrs)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Mean</td>
<td>68.4</td>
<td>66.6</td>
<td>65.7</td>
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<tr>
<td>SD</td>
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<td>10.7</td>
<td>11.2</td>
<td>10.8</td>
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<td><strong>BMI</strong></td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>Mean</td>
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<tr>
<td>SD</td>
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<td>6.8</td>
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<tr>
<td><strong>Female</strong></td>
<td>58.5%</td>
<td>54.9%</td>
<td>51.5%</td>
<td>54.6%</td>
<td>ns</td>
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<tr>
<td><strong>Surgery</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>ns</td>
</tr>
<tr>
<td>THA</td>
<td>52.3%</td>
<td>49.5%</td>
<td>44.2%</td>
<td>48.5%</td>
<td></td>
</tr>
<tr>
<td>TKA</td>
<td>47.7%</td>
<td>50.5%</td>
<td>55.8%</td>
<td>51.5%</td>
<td></td>
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<tr>
<td><strong>Language – English</strong></td>
<td>88.8%</td>
<td>88.5%</td>
<td>93.2%</td>
<td>89.9%</td>
<td>ns</td>
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</table>
## History of chronic pain conditions

<table>
<thead>
<tr>
<th>Chronic pain condition</th>
<th>2010 (n = 130)</th>
<th>2011/2012 (n = 408)</th>
<th>2015/2016 (n = 206)</th>
<th>Total (n = 744)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Osteoarthritis</td>
<td>73.3%</td>
<td>97.1%</td>
<td>99.5%</td>
<td>94%</td>
</tr>
<tr>
<td>Rheumatoid arthritis</td>
<td>6%</td>
<td>7.4%</td>
<td>2.4%</td>
<td>5.8%</td>
</tr>
<tr>
<td>Chronic back pain</td>
<td>8.6%</td>
<td>20.6%</td>
<td>17.5%</td>
<td>17.8%</td>
</tr>
</tbody>
</table>
Postoperative interview day

Survey year

Postoperative day

2010
2011 - 2012
2015 - 2016
Rest pain

* Significantly lower rest pain in 2015-16 compared to 2010 and 2011-12 ($p < .001$)
Dynamic pain

* Significantly lower dynamic pain in 2011-12 compared to 2010 ($p = .003$) and 2015-16 ($p < .001$)

Surgery
- THA
- TKA

Error bars: 95%CI
Activity and sleep interference

*Activity interference decreasing since 2010 (2011/12, \( p < .001 \); 2015/16, \( p = .002 \))

*Sleep interference decreasing since 2010 (2011/12, \( p < .001 \); 2015/16, \( p = .001 \))
Participation and satisfaction

- Greater perceived ability to participate in 2015-2016 ($p < .001$)

- Patients more satisfied with pain mg in 2015-2016, compared to 2010 ($p < .001$, OR = 4.3, 95%CI = 2.1 – 8.6)
Postoperative analgesic prescribing

2010 - 2016
RECOMMENDATIONS FOR POSTOPERATIVE PAIN MANAGEMENT

PAIN MANAGEMENT QUALITY ASSURANCE IN JOINT REPLACEMENT SURGERY

• Patient participation in pain management
• Multi-modal analgesic management incorporating a fixed regime and protocol for pain prophylaxis and breakthrough pain
• To achieve quality standards of pain intensity ratings <4/10 at rest and with activity
• Side effects (nausea and constipation) prevented/controlled

Multi-Modal Analgesic Prescribing

**Paracetamol**
   - Panadol 6/24
   - IV if patient nil oral/nauseated

**NSAID (unless contraindicated)**
   - Celebrex BD

**Opioid**
   - PCA OR Targin BD OR Oxycontin BD
   - Established STOP criteria
     • Sedation score/vital signs
     • Not routinely included in discharge medications
     • Progress to weak opioid (tramadol)

**Anti-emetic(s)**
   - Granisetron

**Laxative(s)**
   - Lactulose daily
   - Fixed schedule immediately post operative.
   - Review every 24 hours.

**Gabapentanoid**
   - Pregabalin

**KEY GOALS**

- Analgesics prescribed on a fixed schedule
- Multi-modal prescribing that is opioid sparing
- Prevention/control of common analgesic side effects
- Reduction in variation between prescribers
Quality of postoperative analgesic prescribing

• How many patients received a multi-modal analgesic prescription for postoperative pain?

**Background**
Paracetamol
+ NSAID
+ SR opioid

**Rescue**
Strong opioid or Tramadol
Quality of postoperative analgesic prescribing

• Significantly greater odds of MM prescriptions relative to 2010:

<table>
<thead>
<tr>
<th>Survey year</th>
<th>p</th>
<th>OR</th>
<th>95%CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011 – 2012</td>
<td>.001</td>
<td>2.9</td>
<td>1.6 – 5.4</td>
</tr>
<tr>
<td>2015 – 2016</td>
<td>&lt; .001</td>
<td>17.2</td>
<td>9 – 32.7</td>
</tr>
</tbody>
</table>
Did MM prescribing provide background and breakthrough pain management?

• Background pain
  – Prescriptions for fixed multimodal analgesics

• Breakthrough pain
  – Prescriptions for PRN rescue analgesics
Were background multi-modal analgesics ordered as fixed rate?

![Bar chart showing the proportion of patients with MM prescription ordered as fixed rate for THA and TKA from 2010 to 2015-2016.](chart.png)

- **2010**
  - THA: 42.9%
  - TKA: 16.7%

- **2011 – 2012**
  - THA: 19.2%
  - TKA: 21.2%

- **2015 – 2016**
  - THA: 89.1%
  - TKA: 76.4%
Intensity of analgesic side-effects

• Despite increases in anti-emetic/laxative prescribing, incidence of adverse effects high

Nausea

Drowsiness

Dizziness

Survey year

Survey year

Survey year

Intensity (0 - 10)

Intensity (0 - 10)

Intensity (0 - 10)
Prescribing for analgesic side-effects and adjuvants

![Graph showing proportion of patients with additional prescription for adverse effects over time and across different categories]
Prevalence of constipation

<table>
<thead>
<tr>
<th></th>
<th>2011/12</th>
<th>2015/16</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Constipation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$n$</td>
<td>200</td>
<td>46</td>
</tr>
<tr>
<td>$%$</td>
<td>56.2%</td>
<td>26.4%</td>
</tr>
<tr>
<td><strong>Laxative prescription</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$n$</td>
<td>Data not collected</td>
<td>98</td>
</tr>
<tr>
<td>$%$</td>
<td>Data not collected</td>
<td>45.6%</td>
</tr>
</tbody>
</table>

- Significantly greater odds of constipation in 2011/12 survey
  - ($p < .001$, OR = 3.6, 95%CI = 2.4 – 5.3)
Unnecessary variation within analgesic class

- **NSAIDs**
  - (n = 7)
  - Celecoxib
  - Voltaren
  - Ketorolac
  - Ibuprofen
  - Naproxen
  - Meloxicam
  - Indocin

- **Strong opioids (IR)**
  - (n = 7)
  - Morphine
  - Pethidine
  - Fentanyl
  - Oxycodone
  - Kapanol
  - MSContin
  - Methadone

- **Strong opioids (SR)**
  - (n = 5)
  - Oxycontin
  - Targin
  - Palexia
  - Durogesic
  - Norsepan
Unnecessary variation within analgesic class

<table>
<thead>
<tr>
<th>Analgesic class</th>
<th>2010</th>
<th>2011 -2012</th>
<th>2015 - 2016</th>
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</thead>
<tbody>
<tr>
<td>NSAIDs</td>
<td>6</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Weak opioids</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Strong opioids (IR)</td>
<td>4</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Strong opioids (SR)</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>PCA opioids</td>
<td></td>
<td>3</td>
<td>3</td>
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</tbody>
</table>

Number of different analgesic medications prescribed
Postoperative analgesic administration

2010 - 2016
How many patients were administered more than 1 background analgesic?

<table>
<thead>
<tr>
<th>Year</th>
<th>THA</th>
<th>TKA</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>7.4%</td>
<td>12.9%</td>
</tr>
<tr>
<td>2011–2012</td>
<td>18.8%</td>
<td>6.3%</td>
</tr>
<tr>
<td>2015–2016</td>
<td>51.6%</td>
<td>51.3%</td>
</tr>
</tbody>
</table>

(THA: Total Hip Arthroplasty, TKA: Total Knee Arthroplasty)
How many patients received analgesics for breakthrough pain

<table>
<thead>
<tr>
<th>Year</th>
<th>THA Proportion</th>
<th>TKA Proportion</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>46.3%</td>
<td>64.5%</td>
</tr>
<tr>
<td>2011-2012</td>
<td>59.9%</td>
<td>68.4%</td>
</tr>
<tr>
<td>2015-2016</td>
<td>57.1%</td>
<td>61.7%</td>
</tr>
</tbody>
</table>
Ratio of available analgesics administered
RECOMMENDATIONS FOR POSTOPERATIVE PAIN MANAGEMENT

PAIN MANAGEMENT QUALITY ASSURANCE IN JOINT REPLACEMENT SURGERY

- Patient participation in pain management
- Multi-modal analgesic management incorporating a fixed regime and protocol for pain prophylaxis and breakthrough pain
- To achieve quality standards of pain intensity ratings <4/10 at rest and with activity
- Side effects (nausea and constipation) prevented/controlled

Management of Breakthrough Pain

KEY GOALS

- Pre-emptive pain management (e.g. pre shower, physio)
- Prescribed as required (PRN)
- Reduction in variation between prescribers
- Administration in the postoperative setting guided by an algorithm

Pain >4/10 at rest or movement
Patient uncomfortable
Pre-emptive pain treatment

TREATMENT
Opioid
Oxycodone
Endone

Review of causation and plan of treatment to prevent recurrence
Patient Activation – MyStay Project

2015
MyStay

• Tested a multimedia intervention for managing patient experience after total knee replacement surgery

• PhD student – Jo McDonnall
Background

- Patients have an important shared role in determining the outcomes of their health care
- “Partnering with consumers” - National Quality and Safety Health Service Standard
- Patient engagement in care is considered essential to safe and high quality healthcare
- Systematic search of the literature – Acute Care
  - 7 studies using multi-media
  - Limited design
  - Outcome measured - satisfaction
Aims

- To test the effectiveness of a
  - Bedside, nurse-led, multimedia intervention
  - designed to increase the capability and opportunity
  - for patients to participate in achieving their goals of care in the immediate postoperative period after TKR surgery.
Design

- A cluster randomised, crossover trial
- Nurse-facilitated intervention
- Simultaneous process evaluation
- Implemented across 3 acute care orthopaedic wards at Epworth HealthCare (Richmond)
- 241 patients TKR
MyStay Design

Consecutive patients
Pre-Admission screening
N= 240

Eligible patients:
• Primary: TKR
• ≥18 years

Ineligible patients:
• Previous TKR surgery
• Unable to provide consent

Pre-admission questionnaire:
• Preference for participation PAM & CPS
• Demographic characteristics
• Previous hospital experience

Day 0 - patients admitted to ward 1 or 2 after TKR surgery

Ward 1
N= 50-120
Control - A
n= 24-30
Intervention - B
n= 24-30
Control - A
n= 24-30
Intervention - B
n= 24-30
Control - A
n= 24-30
Intervention - B
n= 24-30

Ward 2
N= 50-120
Control - A
n= 24-30
Intervention - B
n= 24-30
Control - A
n= 24-30
Intervention - B
n= 24-30
Control - A
n= 24-30
Intervention - B
n= 24-30

Ward 3
N= 30-40
Control - A
n= 5-10
Intervention - B
n= 5-10
Control - A
n= 5-10
Intervention - B
n= 5-10
Control - A
n= 5-10
Intervention - B
n= 5-10

Day 3 Patient survey and interview (N=240):
• Pain intensity (NRS)
• Interference of pain on activities of daily living (APSQ)

Primary outcome:
• Worst pain intensity on Day 3 (0-10 NRS)

Secondary outcomes:
• Length of stay (Days)
• Interference of pain on activities of daily living (APSQ)
• Overall satisfaction
• Function of knee at 4 week post op (OKS)
• Postoperative complications - DVT
• Readmission to hospital within 28 days

After discharge (4 weeks) questionnaire (N=240):
• Satisfaction
• Function of knee at 4 week post op (OKS)

Constraint: Events Evaluation
Intervention Cluster: iPad multimedia daily (Day 1-9)
Control: Clusters: Usual Care

Washout period = 2 weeks between intervention & control groups
Primary and secondary outcomes

**Primary Outcome:**
- The patients’ reported worst pain intensity score on Day 3 after surgery.

**Secondary Outcomes:**
- Length of hospital stay (days)
- Interference of pain on activities of daily living (APSOQ-R) on Day 3
- Function and pain following TKR surgery (Oxford Knee Score) 4 weeks after discharge from acute care
- Patient overall satisfaction (NET promotor score) 4 weeks after discharge from acute care
- Postoperative complications – Deep Vein Thrombosis (within 28 days)
- Readmissions to hospital (within 28 days)
MyStay TKR
Animation Knee Bending
Animation Knee Bending
# Baseline characteristics of participants (N=241)

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>All Participants (N=241)</th>
<th>Control Group (n=137)</th>
<th>Intervention Group (n=104)</th>
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<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
</tr>
<tr>
<td>Age (years)</td>
<td>66.5</td>
<td>9.20</td>
<td>67.4</td>
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<tr>
<td>Male</td>
<td>n</td>
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<tr>
<td>Female</td>
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<td>55.2</td>
<td>69</td>
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<tr>
<td>Living arrangements</td>
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<tr>
<td>Living communally</td>
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<td>81.7</td>
<td>109</td>
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<td>Living alone</td>
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<td>Marital Status</td>
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<tr>
<td>Partnered</td>
<td>190</td>
<td>78.8</td>
<td>106</td>
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<tr>
<td>Not partnered</td>
<td>28</td>
<td>11.6</td>
<td>18</td>
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<tr>
<td>Widowed</td>
<td>23</td>
<td>9.5</td>
<td>13</td>
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<tr>
<td>Language spoken at Home</td>
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<tr>
<td>English</td>
<td>232</td>
<td>96.3</td>
<td>130</td>
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</tbody>
</table>
Outcomes

Pain Intensity Day 3

Control: 6.29
Intervention: 5.29

Length of Stay (days)

Control: 6
Intervention: 5.5
Outcomes

Satisfaction with Care

<table>
<thead>
<tr>
<th></th>
<th>Intervention (n=91)</th>
<th>Control (n=118)</th>
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</thead>
<tbody>
<tr>
<td>Net Promoter</td>
<td>78%</td>
<td>57%</td>
</tr>
<tr>
<td>Detractors</td>
<td>3.3%</td>
<td>10.2%</td>
</tr>
<tr>
<td>Passive-Neutral</td>
<td>15.4%</td>
<td>22.9%</td>
</tr>
<tr>
<td>Promoters</td>
<td>81.3%</td>
<td>66.9%</td>
</tr>
</tbody>
</table>

Mean Satisfaction Score

- Intervention: 9.26
- Control: 8.57
Were patients more activated?

**Level of Activation**

<table>
<thead>
<tr>
<th>Level</th>
<th>Intervention (n=102)</th>
<th>Control (n=133)</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>17%</td>
<td>20%</td>
</tr>
<tr>
<td>2</td>
<td>20%</td>
<td>28%</td>
</tr>
<tr>
<td>3</td>
<td>25%</td>
<td>19%</td>
</tr>
<tr>
<td>4</td>
<td>46%</td>
<td>27%</td>
</tr>
</tbody>
</table>

**PRN Opioids**

- Intervention: 16.07 mg over 24 hours
- Control: 10.81 mg over 24 hours
Summary

• The intervention was effective in reducing:
  – Pain intensity
  – Interference of pain on movement in bed
  – Length of stay in acute care

• The intervention was effective in increasing:
  – Satisfaction with care received overall
  – Likelihood of promoting Epworth to others

• There was no effect on:
  – Function and pain 4 weeks after discharge from hospital
  – Postoperative DVT
  – Readmission within 28 days
Conclusions

• We need
  – flexible standardisation of pain management
  – Strong clinical governance

• Engagement can lead to better outcomes for patients and health services

• Engaging patients in the postoperative context requires evidence based processes to increase patient capability (knowledge) and opportunity (negotiated care)
Thank you