**Supplementary Appendix A: Opioid use, misuse, and abuse in orthopaedics—grand rounds’ slides**

**Opioid Use, Misuse, & Abuse in Orthopaedics**

*Grand Rounds*

*February 8, 2017*

---

**Opioid Use, Misuse, & Abuse in Orthopaedics**

What TYPE of pain tablets do you think a patient should get for the following procedures:

- Total Knee Replacement?
- One level spinal fusion?
- Distal Radius ORIF?
- Hand soft tissue procedure?

---

**Opioid Use, Misuse, & Abuse in Orthopaedics**

What EXPECTATIONS for post-operative pain do you think is reasonable for the following procedures:

- Total Knee Replacement?
- One level spinal fusion?
- Distal Radius ORIF?
- Hand soft tissue procedure?

---

**Opioid Use, Misuse, & Abuse in Orthopaedics**

- The current opioid epidemic
  
  - From 2004 to 2008 oxycodone overdoses increased from 41,700 to 105,200
  
  - Deaths from prescription opioids exceeded cocaine and heroine combined
  
  - Prescription opioids passed marijuana as the most common initial drug of choice among adolescents

---

**Opioid Use, Misuse, & Abuse in Orthopaedics**

How MANY pain tablets do you think a patient should get for the following procedures:

- Total Knee Replacement?
- One level spinal fusion?
- Distal Radius ORIF?
- Hand soft tissue procedure?

---

**Opioid Use, Misuse, & Abuse in Orthopaedics**

*Purdue Pharma*

*Letter to the editor in 1980 NEJM*

- Cited by Purdue Pharma (OxyContin) as “A Paper in the New England Journal of Medicine”

- Provided physicians with a clean slate and contributed to the subsequent boom in opioid prescribing
• 2015 study analyzing prescribing patterns
• Opioid prescribing has decreased as awareness of the opioid epidemic increased

Opioid Use, Misuse, & Abuse in Orthopaedics
• What contributes to this epidemic?
• As residents we receive little training minimal guidance on management of post-operative pain
• Factors that can influence these decisions:
  – Pain is subjective
  – Lack of personal experience taking narcotics
  – Lack of understanding of various narcotic strengths
  – Overnight and weekend home calls from patients in pain
  – Struggle with the fact that we are privileged to have the opportunity to operate on patients and the desire for them to be comfortable post-operatively

Opioid Use, Misuse, & Abuse in Orthopaedics
• What does the AAOS Recommend? (2015 information statement)
  – Set patient expectations
  – Standardize prescription protocols within a practice
  – Develop practice based consensus treatment and duration for both operative and, non-op management of common injuries
  – Strict limits on prescription size
    – If you think a patient may need more you can give it as 2 prescriptions with one future dated
    – Restrict opioid use for non-surgical or pre-surgical patients

Opioid Use, Misuse, & Abuse in Orthopaedics
• Pressure to make patients happy:
  – Push to consider pain as the “5th vital sign”
  – Often included as a part of HCAHPS survey questionnaire
  – “Easy points” on satisfaction surveys may not actually represent what is best for patients

Opioid Use, Misuse, & Abuse in Orthopaedics
• What does the AAOS Recommend? (2015 information statement)
  – Use tools to predictive opioid abuse or misuse
  – Opioid Risk Tool (ORT) for Narcotic Abuse
    – 1 = Yes / 0 = No
      – Opioid
      – Age 16-45
      – History of preadolescent sexual abuse
      – History of depression
      – ADD, OCD, Bipolar, Schizophrenia
      – Personal IDOH abuse
      – Personal illegal drug use
      – Personal prescription drug abuse
      – Family history of IDOH
      – Family history of illegal drug
      – Family history of prescription drug abuse


Opioid Use, Misuse, & Abuse in Orthopaedics
• The current opioid epidemic among orthopaedic surgeons
  – Orthopaedic surgeons are the third highest opioid prescribers
    – 7.7 % of all prescriptions
  – No Dutch hip fracture patients are discharged on opioids
    – 85% in the U.S.
  – 6% of Dutch ankle fractures receive opioid prescriptions
    – 82% in U.S.
  – Based on ED toxicology screening many orthopaedic trauma patients are already using opioids pre-injury.
Opioid Use, Misuse, & Abuse in Orthopaedics

- What does the AAOS Recommend? (2015 information statement)
  - Limit Extended-Release Opioids
  - Intended for long lasting cancer pain
  - Do not allow for titration and decrease of opioids
  - Popular class for misuse and abuse
  - Improved care coordination and opioid use tracking
  - Quality improvement

- Opioid Culture Change

What is the right amount to prescribe?

- Opioid Consumption Following Outpatient Upper Extremity Surgery (Rodgers et al., 2014, Journal of Hand Surgery)
  - 250 patients undergoing elective surgery at an outpatient surgery center with 5 surgeons in Des Moines, Iowa.
  - Phone survey 7-14 days after surgery

<table>
<thead>
<tr>
<th>TABLE 1: Summary Description of Study Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute Pain</td>
</tr>
<tr>
<td>Chronic Pain</td>
</tr>
<tr>
<td>Opioid Use</td>
</tr>
<tr>
<td>Opioid Misuse</td>
</tr>
<tr>
<td>Opioid Abuse</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TABLE 2: Medication Prescribed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medication</td>
</tr>
<tr>
<td>Hydrocodone</td>
</tr>
<tr>
<td>Oxycodone</td>
</tr>
<tr>
<td>Hydrocodone</td>
</tr>
<tr>
<td>Oxycodone</td>
</tr>
<tr>
<td>Hydrocodone</td>
</tr>
</tbody>
</table>

- For bony procedures patients took: 14/11
- For soft tissue procedures patients took: 9/6

Opioid Consumption Following Outpatient Upper Extremity Surgery

- 92% reported adequate pain relief
- 82% (205) no longer taking meds at time of call
- 2% (6) still taking pain medication

- Patients on average consumed 10 opioid pills resulting in 4,639 unused opioid tablets

- For bony procedures patients took: 14/11
- For soft tissue procedures patients took: 9/6

HOW MUCH IS 50 OR 60 MG A DAY FOR COMMONLY PRESCRIBED OPIODS?

- 50 mg hydrocodone (10 tablets of hydrocodone acetaminophen 5/325)
- 60 mg of oxycodone (10 tablets of oxycodone)
- 100 mg of meperidine (10 tablets of meperidine 10 mg)
- 100 mg of meperidine (10 tablets of meperidine 10 mg)
Common doses as morphine milligram equivalents

- 2 Tabs Norco Q6H / 60 MME
- 2 Tabs Norco Q4H / 90 MME
- OxyContin 10 mg BID / 30 MME

Opioid Use, Misuse, & Abuse in Orthopaedics

- What are the recommendations for unused opioid tablets?
  - FDA recommends that patients return them to the pharmacy
  - there is no standard across pharmacies, many won’t accept them
  - DCAM pharmacy now has an unused opioid disposal program
- American pharmacy association recommends crushing or dissolving tablets in water before mix them with kitty litter or placing them in solid substance in sealed plastic bag in the garbage

HOW MUCH IS 50 OR 90 MME/DAY FOR COMMONLY PRESCRIBED OPIOIDS?

<table>
<thead>
<tr>
<th>50 MME/day</th>
<th>90 MME/day</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 mg oxycodone</td>
<td>60 mg oxycodone</td>
</tr>
<tr>
<td>15 mg hydrocodone</td>
<td>20 mg hydrocodone</td>
</tr>
<tr>
<td>12 mg oxymorphone</td>
<td>18 mg oxymorphone</td>
</tr>
<tr>
<td>375 mg acetaminophen</td>
<td>600 mg acetaminophen</td>
</tr>
</tbody>
</table>
Supplementary Appendix B  Morphine milligram equivalent (MME) conversion formula

<table>
<thead>
<tr>
<th>Opioid</th>
<th>Conversion factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Codeine</td>
<td>0.15</td>
</tr>
<tr>
<td>Hydrocodone</td>
<td>1.00</td>
</tr>
<tr>
<td>Hydromorphone</td>
<td>4.00</td>
</tr>
<tr>
<td>Meperidine</td>
<td>0.10</td>
</tr>
<tr>
<td>Methadone</td>
<td>3.00</td>
</tr>
<tr>
<td>Morphine</td>
<td>1.00</td>
</tr>
<tr>
<td>Oxycodone</td>
<td>1.50</td>
</tr>
<tr>
<td>Oxymorphone</td>
<td>3.00</td>
</tr>
<tr>
<td>Tramadol</td>
<td>0.10</td>
</tr>
</tbody>
</table>

For pills: MME conversion factor × strength (MGs per pill) × quantity (number of pills prescribed) = MME.

For solutions: MME conversion factor × strength (MGs per ML) × quantity (number of ML prescribed) = MME.
**Supplementary Appendix C** Number of prescriptions for opioid medications in the year before and after the targeted educational intervention on February 8, 2017

<table>
<thead>
<tr>
<th>Opioid analgesic</th>
<th>Total knee arthroplasty</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Preintervention No. of prescriptions (%)</td>
<td>Postintervention No. of prescriptions (%)</td>
</tr>
<tr>
<td>Tramadol</td>
<td>228 (28)</td>
<td>154 (27)</td>
</tr>
<tr>
<td>Oxycodone SR 20 mg</td>
<td>27 (3)</td>
<td>2 (0.4)</td>
</tr>
<tr>
<td>Oxycodone SR 10 mg</td>
<td>186 (23)</td>
<td>17 (3)</td>
</tr>
<tr>
<td>Oxycodone IR 10 mg</td>
<td>1 (0.1)</td>
<td>–</td>
</tr>
<tr>
<td>Oxycodone IR 5 mg</td>
<td>40 (5)</td>
<td>119 (21)</td>
</tr>
<tr>
<td>Morphine ER 30 mg</td>
<td>2 (0.2)</td>
<td>8 (1.4)</td>
</tr>
<tr>
<td>Morphine ER 15 mg Percocet (10/325)</td>
<td>48 (5.9)</td>
<td>141 (25)</td>
</tr>
<tr>
<td>Percocet (5/325) Norco (10/325)</td>
<td>77 (9.5)</td>
<td>22 (3.9)</td>
</tr>
<tr>
<td>Norco (5/325) Tylenol 3</td>
<td>187 (23)</td>
<td>98 (17.2)</td>
</tr>
<tr>
<td></td>
<td>3 (0.4)</td>
<td>4 (0.7)</td>
</tr>
<tr>
<td>Dilaudid 8 mg</td>
<td>2 (0.2)</td>
<td>–</td>
</tr>
<tr>
<td>Dilaudid 4 mg</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Dilaudid 2 mg</td>
<td>–</td>
<td>1 (0.2)</td>
</tr>
<tr>
<td>Methadone 10 mg</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Methadone 5 mg</td>
<td>–</td>
<td>–</td>
</tr>
</tbody>
</table>