Estimating “Optimal” Durations for Initial Opioid Analgesic Prescription Following Common Surgical Procedures

International Conference on Pharmacoepidemiology & Therapeutic Risk Management (34th ICPE)

August 25, 2018

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On behalf of
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Disclosures

- The authors have no conflicts of interest to disclose
- This work was co-led by FDA partners and supported by FDA through the Department of Health and Human Services (HHS) Contract number HHSF223201400030I
- This presentation reflects the views of the authors and not necessarily those of the U.S. FDA
Excess opioid prescribing after surgery

- Patients report excess opioid analgesics (OAs) after surgery\(^1-3\)
  - Leftover supply affords opportunity for unintended use, misuse, abuse, overdose or diversion
  - Can “refilling” behavior in claims inform appropriate dispensing?

\(\text{Figure. Prevalence of Unused Opioids Prescribed After Surgery}\)

One approach to assessing “refill” behavior

JAMA Surgery | Original Investigation
Defining Optimal Length of Opioid Pain Medication Prescription After Common Surgical Procedures

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Theoretical Relationship

Scully Method

1. Identify post-op opioid initiators
   Follow for subsequent “refill”

2. Fit model for probability of refill
   Include terms for flexible function of days' supply + confounders

3. Plot adjusted relationship
   Nadir of curve used to estimate length of initial prescription associated with lowest refill rate
Another approach

- Identify first days’ supply at which 20% or fewer “refill”
- Absolute cutoff reflects clinical recommendations

At \( \Pr(\text{“Refill”}) \leq 20\% \), assume 80% of patients have pain needs met\(^1\)

Study overview

- **Data source**
  - Sentinel Distributed Database
  - Claims from 17 Data Partners

- **Study period**
  - October 5, 2009 to October 5, 2014

- **Exposure**
  - Index event: Opioid dispensing ≤ 30 days’ supply

- **Outcome**
  - “Refill” – a second dispensing of opioid within 14 days of the end of supply of index dispensing

- **Inclusions**
  - One of 11 surgical procedures in 7 days before index
  - Continuous enrollment for 183 days before and 45 days after index

- **Exclusions**
  - Prior opioid dispensing
  - Prior surgery
  - Prior substance abuse disorder diagnosis
  - Prior cancer
Study design

Evaluate exclusions (183 days)
- OA dispensing
- Other study surgery
- Substance abuse disorder diagnosis
- Cancer diagnosis

Follow-up for second OA fill (“refill”)

Evaluate presence of surgery (7 days)

Oct. 5, 2009

183 days Continuous enrollment 45 days
Surgeries of interest*

- Appendectomy
  - Laparoscopic
  - Nonspecific
- Bunionectomy
- Cesarean section
- Cholecystectomy
  - Open
  - Laparoscopic
- Coronary artery bypass graft
- Hip replacement
- Hysterectomy
  - Non-laparoscopic
  - Laparoscopic
- Tooth extraction
- Not presented
  - Hip fracture treatment
  - Knee arthroplasty
  - Laminectomy/discectomy
  - Spinal fusion

* Selected based on frequency in Healthcare Cost and Utilization Project (HCUP) data
Analytic plan

- Characterize post-surgical OA initiators
  - Demographics
  - Opioid received (active moiety, amount, Drug Enforcement Agency (DEA) schedule, etc.)
  - Presence and time to “refill”

- Fit generalized additive logistic model for probability of “refill”
  - Smooth spline function of days’ supply
  - Adjust for age, sex, year, Charlson-Elixhauser Combined Comorbidity Index, DEA schedule, Data Partner

- Describe adjusted relationship between days’ supply and probability of “refill”
  - Identify “lowest” and “adequate” cutoffs for each surgery
Observed quantities dispensed

- Hip replacement: 28,405
- Coronary artery bypass graft: 19,966
- Bunionectomy: 38,747
- Cholecystectomy (open): 2,513
- Hysterectomy (non-laparoscopic): 11,030
- Hysterectomy (laparoscopic): 12,879
- Cesarean section: 291,566
- Appendectomy (nonspecific): 7,561
- Cholecystectomy (laparoscopic): 131,371
- Appendectomy (laparoscopic): 59,131
- Tooth extraction: 217,598

Days' supply:

- 2
- 4
- 6
- 8
- 10
- 12

Milligram morphine equivalents:

- 250
- 500
- 750

Patients receiving "refill":

- 0%
- 10%
- 20%
- 30%

- 32.1%
- 26.3%
- 24.7%
- 21.6%
- 15.8%
- 14.6%
- 13.5%
- 16.2%
- 9%
- 9.1%
- 9.3%
Modeled results in our study

Predicted probability of "refill"*

Days' supply of index dispensing

High "refill" group

Low "refill" group

*Predictions refer to a hypothetical female reference patient aged 18-64 years, with a combined comorbidity score < 1, initiating a schedule II opioid in 2014 at a large reference Data Partner.
## Our results and comparison

<table>
<thead>
<tr>
<th>Patients</th>
<th>Observed days’ supply</th>
<th>Modeled days’ supply</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Median (IQR)</td>
<td>“Adequate”</td>
</tr>
<tr>
<td><strong>Appendectomy</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Laparoscopic</td>
<td>59,131</td>
<td>4 (2)</td>
</tr>
<tr>
<td>Nonspecific</td>
<td>7,561</td>
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</tr>
<tr>
<td>Bunionectomy</td>
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<td>*</td>
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<td><strong>Hip replacement</strong></td>
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<tr>
<td>217,598</td>
<td>3 (2)</td>
<td>1</td>
</tr>
</tbody>
</table>

"lowest": value with lowest "refill" probability
"adequate": first value with "refill" probability ≤ 20%
*modeled probability of refill always exceeds 20%
Limitations

- No information on actual pain levels of patients
- Strong assumptions about “refilling” behavior
  - How strong is correlation with inadequate pain management?
- Predictions refer to potentially non-representative “reference patient”
- Limited coverage of elderly population
- Potential issues identifying surgery dates
  - Specifically for backdated inpatient procedures, is OA dispensed after > 7 days?
Conclusions

- Prescriptions of <7 days already common for many surgeries
- Substantial between-surgery variation
  - Initial duration dispensed & likelihood of “refilling”
- Replication of Scully et al. in representative population
  - Distribution of initial duration
  - Overall “refill” probability
  - Characteristic “U”-shaped curve
- “Lowest” duration method suggests longer initial prescribing durations than is currently practiced
- “Adequate” duration method suggests often single day is enough for many procedures
Next steps

- Addition of new populations
  - Center for Medicare and Medicaid services
  - Pediatric populations

- Denominator information
  - What % of surgical patients receive an opioid?

- Lowest/adequate cutoffs for number of tablets/capsules, morphine milligram equivalents (MMEs)

- Marginal, population-level predictions

- Importance of predictors of “refill”
  - Is surgery type a more important predictor of “refilling” than days supplied?
  - What about comorbidity, gender, Data Partner, etc.?
Acknowledgements

US Food and Drug Administration

- Co-authors
  - Mallika Mundkur, MD, MPH
  - Tamra Meyer, PhD, MPH
  - Joan Xie, PhD
  - David Graham, MD, MPH
  - Judy Staffa, PhD, RPh

Sentinel Operations Center

- Co-authors
  - Talia Menzin, BS
  - Judy Maro, PhD

- Additional support
  - Tiffany Woodworth, MPH, MBA
  - Darren Toh, ScD
  - Zilu Zhang, MS

Many thanks are due to Data Partners who provided data used in the analysis