Trends and Demographic Patterns in Non-Medical use of Prescription Opioids, 2002-2011

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Increases in Unintentional Drug Poisoning


Okie, NEJM (2010)
Number of Deaths From Poisoning, * Drug Poisoning, † and Drug Poisoning Involving Opioid Analgesics § — United States, 1999–2010

* Poisoning deaths include those resulting from drugs, and those associated with solid or liquid biologics, gases or vapors, or other substances. Poisoning deaths are from all manners, including unintentional, suicide, homicide, and undetermined intent.

† Drug poisoning deaths include unintentional or intentional poisoning deaths resulting from overdoses of a drug, being given the wrong drug, taking the drug in error, or taking a drug inadvertently.

§ Among deaths with drug poisoning as the underlying cause, the International Classification of Diseases, 10th Revision codes T40.2–T40.4 were used to indicate whether opioid analgesics were involved.
Rise of opioids among drug overdose deaths

Deaths from Intentional Drug Overdoses in the United States According to Major Type of Drug, 1999–2007

- Opioid analgesics
- Cocaine
- Heroin

Okie, NEJM (2010)
Mortality increases are racially patterned.

Drug Poisoning Deaths, 1999-2010

Shaded areas indicate 95% confidence intervals.
...and patterned by age
As well as by geography

Drug overdose death rates by state, 2008

CDC (2011)
Potential Drivers of Increases in Prescription Opioid Overdoses

- **Prescriber behavior**
  - changes in pain management philosophy and practice; changes in quantity, dosage, and type of opioids prescribed; prescribing practices; and prescriber error, training (or lack thereof), and competence.

- **Environmental/Systemic factors**
  - introduction of new pharmaceuticals and new formulations; pharmaceutical marketing; drug-related legislation, regulation, and guidelines; media coverage; and insurance industry practices.

- **User behavior**
  - sociodemographics; mental and physical comorbidities, including substance abuse and addiction; patient noncompliance and error; doctor shopping; polypharmacy/polytoxicity; and drug diversion.
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Who is Dying?

- Selected studies of opioid overdose decedents show that a majority of cases had no documented prescription for opioids.
  - 63% of all unintentional drug poisoning decedents in West Virginia
  - 67% of methadone-related decedents in Vermont
  - 67% of methadone-related deaths in western Virginia

- Suggestive of diverted opioids playing an important role in overdoses.

Hall 2008, Madden 2011, Weimer 2011
Why consider non-medical use?

- Almost all prescription drugs involved in overdoses come from prescriptions.
- Prescription drugs are frequently diverted to people using them without prescriptions.
- Diversion is considered to play a key role in the opioid overdose increase.

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CDC, (2011)
Basic descriptive epidemiology of non-medical use of opioids.

Our basic aims were:

- Assess whether non-medical use of prescription opioids has changed over the past decade.
- Estimate any demographic differences among users.
- Investigate differential trends by demographic groups.

Potential implications for drug diversion as a component of the increase in prescription opioid overdose mortality.
Data and Definitions

- 2002-2011 National Survey of Drug Use and Health (NSDUH) surveys:
  - Nationally representative cross-sectional survey of drug use.
  - Ages 12 and over (oversampling of adolescents).
  - Multistage area probability sample for each of the 50 states and the District of Columbia.
  - Average weighted response rates were 90% (screening) and 76% (interview).
- 559,311 observations for the period 2002-2011.
- Survey design and weights incorporated.
Methods: Defining Non-Medical Use

Non-medical use of prescription drugs:

*These questions are about the use of pain relievers. We are not interested in your use of “over-the-counter” pain relievers such as aspirin, Tylenol, or Advil that can be bought in drug stores or grocery stores without a doctor’s prescription. . . . we are interested in your use of any form of prescription pain relievers that were not prescribed for you or that you took only for the experience or feeling they caused.*

▶ Potential problems:

▶ Reporting bias (obviously).
▶ Vague wording.
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Methods: Outcome Definitions

Our main outcomes of interest:

- Past-year use of any prescription opioid pain reliever for non-medical purposes.
- Past-year use of OxyContin for non-medical purposes.
- Source of last use (prescription or not).
- Days of use in past year.
Demographic Groups of Interest

- Gender (Male, Female)
- Age group (12-15, 16-25, 26-49, 50+)
- Race/ethnicity (NHW, NHB, AI/AN, NH Other, Hispanic)
- Family income (<$20K, $20-50K, $50-75K, >$75K)
- Education [ages 30 and over] (<12y, 12y, 13-15y, 16+y)
- Population (CBSA >1 million, CBSA<1 million, non-CBSA)
- Health insurance status (insured, not insured)
Methods: Analysis

- Descriptive unadjusted trends.
- Logistic regression models:
  - Tests for interaction between demographic group and time.
  - Multivariate-adjusted models and marginal probabilities.
- Negative binomial models:
  - Days of use in the past year.
Trends in Overall Use
Crude past-year opioid use trends

Shaded areas indicate 95% confidence intervals.
Relative Increases in OxyContin Use

OxyContin as a fraction of Any Opioid

Shaded areas indicate 95% confidence intervals.
Absolute number of OxyContin users has doubled.

Shaded areas indicate 95% confidence intervals.
Average number of days of use has increased

Shaded areas indicate 95% confidence intervals.
Trends Among Demographic Groups
Crude past-year opioid use trends by age

P-value for ageXyear interaction < 0.001. Shaded areas indicate 95% confidence intervals.
Crude past-year opioid use trends by gender

P-value for gender \times year interaction=0.09. Shaded areas indicate 95% confidence intervals.
Crude past-year opioid use trends by income

P-value for incomeXyear interaction=0.07. Shaded areas indicate 95% confidence intervals.
Crude past-year opioid use trends by race

P-value for raceXyear interaction < 0.001. Shaded areas indicate 95% confidence intervals.
Crude past-year opioid use trends by education (ages 30+)

P-value for educationXyear interaction=0.89. Shaded areas indicate 95% confidence intervals.
Crude past-year opioid use trends by pop size

P-value for sizeXyear interaction = 0.45. Shaded areas indicate 95% confidence intervals.
Crude past-year opioid use trends by health insurance

P-value for insuranceXyear interaction = 0.72. Shaded areas indicate 95% confidence intervals.
OxyContin Use
Crude past-year Oxycontin use trends by race

P-value for raceXyear interaction=0.003. Shaded areas indicate 95% confidence intervals.
Crude past-year Oxycontin use trends by insurance

P-value for insurance×year interaction = 0.004. Shaded areas indicate 95% confidence intervals.
## Adjusted Marginal Estimates: Past-Year Use (Panel 1)

<table>
<thead>
<tr>
<th></th>
<th>Any Opioid</th>
<th>Oxycontin</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pct.</td>
<td>95%CI</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>4.3</td>
<td>(4.2,4.4)</td>
</tr>
<tr>
<td>Male</td>
<td>5.3</td>
<td>(5.2,5.5)</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12-15y</td>
<td>5.4</td>
<td>(5.2,5.6)</td>
</tr>
<tr>
<td>16-25y</td>
<td>11.1</td>
<td>(10.9,11.3)</td>
</tr>
<tr>
<td>26-49y</td>
<td>5.2</td>
<td>(5.0,5.3)</td>
</tr>
<tr>
<td>50+y</td>
<td>1.4</td>
<td>(1.2,1.5)</td>
</tr>
<tr>
<td><strong>Race/Ethnicity</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NH White</td>
<td>5.7</td>
<td>(5.6,5.9)</td>
</tr>
<tr>
<td>NH Black</td>
<td>3.1</td>
<td>(3.0,3.3)</td>
</tr>
<tr>
<td>AI/AN</td>
<td>6.9</td>
<td>(5.8,7.9)</td>
</tr>
<tr>
<td>NH Other</td>
<td>3.1</td>
<td>(2.8,3.5)</td>
</tr>
<tr>
<td>Hispanic</td>
<td>3.5</td>
<td>(3.3,3.7)</td>
</tr>
<tr>
<td><strong>N</strong></td>
<td>559311</td>
<td>450002</td>
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</table>
Adjusted Marginal Estimates: Past-Year Use (Panel 2)

<table>
<thead>
<tr>
<th>Household Income</th>
<th>Any Opioid</th>
<th>Oxycontin</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pct.</td>
<td>95%CI</td>
</tr>
<tr>
<td>&lt;20K</td>
<td>5.9</td>
<td>(5.7,6.1)</td>
</tr>
<tr>
<td>20-50K</td>
<td>5.1</td>
<td>(5.0,5.3)</td>
</tr>
<tr>
<td>50-75K</td>
<td>4.5</td>
<td>(4.4,4.7)</td>
</tr>
<tr>
<td>&gt;75K</td>
<td>3.9</td>
<td>(3.7,4.1)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Insurance Status</th>
<th>Any Opioid</th>
<th>Oxycontin</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pct.</td>
<td>95%CI</td>
</tr>
<tr>
<td>Not insured</td>
<td>6.2</td>
<td>(6.0,6.5)</td>
</tr>
<tr>
<td>Insured</td>
<td>4.5</td>
<td>(4.4,4.6)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Population Size</th>
<th>Any Opioid</th>
<th>Oxycontin</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pct.</td>
<td>95%CI</td>
</tr>
<tr>
<td>CBSA≥1 mil.</td>
<td>5.0</td>
<td>(4.8,5.1)</td>
</tr>
<tr>
<td>CBSA&lt;1 mil.</td>
<td>4.9</td>
<td>(4.8,5.0)</td>
</tr>
<tr>
<td>Not a CBSA</td>
<td>4.0</td>
<td>(3.8,4.2)</td>
</tr>
</tbody>
</table>

| N                | 559311     | 450002    |


Other findings

- Roughly 80% of users reported not having a prescription for their last non-medical use of a prescription opioid.
  - No strong demographic differences.
  - No evidence of differential trends by demographic group.

- No strong evidence of differential trends in days of use by demographic group.
1. Self-reported non-medical use of opioid analgesics show little evidence of increases between 2002-2011.
   - Some differential trends by demographic subgroups
   - Highest reported use by
     - 18-25 year olds
     - Non-Hispanic Whites, AI/AN
     - Low income
     - Uninsured

2. The fraction of non-medical opioid use due to Oxycontin does appear to be increasing.
   - Faster increases among:
     - Uninsured
     - American Indian/Alaska Natives (but imprecise)
Summary of Results

- No important changes in non-medical use of prescription opioids from 2002-2011.
- May suggest that diversion is not playing a strong role in the opioid overdose increase.

However:

- Some demographic similarities with overdose trends.
- Days of use appear to be increasing.
- Changes to the types of opioids used for non-medical reasons:
  - Higher dosages/potency.
  - Methadone (notoriously difficult to titrate).
- Poly-pharmacy.
Final Thoughts

- Demographic patterning of non-medical use largely consistent with opioid overdose mortality (except age).
- Little evidence for increases in non-medical use of prescription opioids.
- Some evidence for increases in use of OxyContin.
- Differential trends are intriguing but in some cases imprecise.
- More work needed to identify characteristics of deaths and where opioids were obtained.
Thank You!

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