Background

- Increase in prescription opioid use since 1990s

- Opioids are powerful painkillers
  - Action on central nervous system $\rightarrow$ analgesia
  - Action on respiratory center $\rightarrow$ decrease respiration

- Increase in prescription opioid-related drug overdose and death
Opioid Sales, Treatment Admissions and Opioid-Related Overdose Death Rates — United States, 1999–2010

- Opioid Sales KG/10,000
- Opioid Deaths/100,000
- Opioid Treatment Admissions/10,000

National Vital Statistics System, DEA’s Automation of Reports and Consolidated Orders System, SAMHSA’s TEDS
Rates of Opioid-Related Overdose Death in Tennessee and United States, 1999–2010

Source: Tennessee Department of Health – Vital Statistics, NCHS Data Brief,
Opioid Use Definitions

- **Misuse**
  - Taking opioids in greater amount / frequency than prescribed

- **Abuse**
  - Opioid drug use with resulting harm to health or social functioning

- **Non medical use**
  - Opioid use without a prescription or for the feeling it causes

- **Diversion**
  - Selling, trading or giving away opioids to others
Impact of Opioid Use — United States, 2010

1 OD death
10 Admissions for opioid abuse
26 ED visits for abuse
108 Report abuse or dependence
733 Report non medical use of opioids

Source: Treatment Exposure Data, DAWN data, National Survey on Drug Use and Health Data
Tennessee Controlled Substances Monitoring Program (TNCSMP)

- Established 2006
- Monitor prescribing of controlled substances—drugs illegal to use except with prescription
- Drug Enforcement Agency (DEA) Schedule II–V
- Provider participation was voluntary
Tennessee Prescription Safety Act

- Established 2012
- Purpose is to identify and target patients at risk of abuse
- Requires provider and pharmacy participation in TNCSMP
- Education of medical community important in implementation
Study Objectives

1. Describe epidemiology of prescription opioid use

2. Describe patterns of high-risk opioid use

3. Assess risk of unintentional opioid-related overdose death
Descriptive Analysis, 2007–2011

- Tennessee Controlled Substances Monitoring Program data

- **Inclusion criteria**
  - Dispensed 2007–2011
  - Tennessee residents
  - Tennessee providers
Overview of TNCSMP Data — TN, 2007–2011

37.1 million Opioid prescriptions

5.2 million Patients

20,489 Providers

2419 Pharmacies

2011 TN Population 6.4 million
Rates of Male and Female Patients Prescribed Opioids per 100 Population by Year, 2007–2011

Rate per 100 population

- Red line: Female Rate
- Blue line: Male Rate

Year:
- 2007
- 2008
- 2009
- 2010
- 2011
Opioid Prescription Rates by County—TN, 2008

- Prescription Rate per 100 Population
  - <100
  - 105 - 121
  - 122 - 140
  - >=141
Opioid Prescription Rates by County—TN, 2009
Opioid Prescription Rates by County—TN, 2011

Prescription Rate per 100 Population
- <105
- 105 - 121
- 122 - 140
- => 141
Number of Opioid Prescriptions by Type of Opioid — TN, 2007–2011

- **Hydrocodone**
- **Oxycodone**
- **Morphine**
- **Buprenorphine**
- **Codeine**
- **Fentanyl**
- **Oxymorphone**
- **Methadone**
- **Hydromorphone**
- **Propoxyphene**

**Number of Prescriptions in Millions**

- **2007**
- **2008**
- **2009**
- **2010**
- **2011**
Study Objectives

1. Describe epidemiology of prescription opioid use

2. Describe patterns of high-risk opioid use

3. Assess risk of unintentional opioid analgesic-related overdose death
Definitions of High Risk Factors

- **High-risk number of providers**
  - ≥4 providers in a year

- **High-risk number of pharmacies**
  - ≥4 pharmacies in a year

- **High dosage**
  - >100 morphine milligram equivalents (MME) per day average for year
Number of Patients by Number of Providers 2007–2011
Patients with a High-Risk Number of Providers

![Bar chart showing the number of patients with a high-risk number of providers across different years (2007, 2008, 2009, 2010, 2011) and provider numbers (4, 5, 6, 7, 8, 9, 10 or more). The chart indicates a significant increase in the number of patients as the number of providers increases, with the highest concentration in the 4 provider category.](image-url)
Number of Patients by Number of Pharmacies 2007–2011
Patients with a High-Risk Number of Pharmacies

Number of Patients

Number of Pharmacies

- 2007
- 2008
- 2009
- 2010
- 2011

10 or more
Number of Patients with High-Risk Dosage

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>30,000</td>
</tr>
<tr>
<td>2008</td>
<td>35,000</td>
</tr>
<tr>
<td>2009</td>
<td>40,000</td>
</tr>
<tr>
<td>2010</td>
<td>45,000</td>
</tr>
<tr>
<td>2011</td>
<td>50,000</td>
</tr>
</tbody>
</table>
Study Objectives

1. Describe epidemiology of prescription opioid use
2. Describe patterns of high-risk opioid use
3. Assess risk of unintentional opioid-related overdose death
Matched Case Control Study

- **Case**
  - Unintentional opioid-related overdose death
  - Aged >10 years, with Rx within 1 year of death
  - Tennessee vital records death certificate data, 2009–2010

- **Control**
  - 20 live patients per case
  - Matching sex, age, 1 year exposure periods
  - ≥ 1 Rx in TNCSMP during study period
Demographics of Decedents in TNCSMP 2009–2010

(N=592)

<table>
<thead>
<tr>
<th>Age, years</th>
<th>Median</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>43</td>
<td>18–92</td>
</tr>
</tbody>
</table>

| Males, no. (%) | 330 (56) |
| Race, no. (%)  |          |
| White          | 576 (97) |
| Black          | 14 (2.7) |
## Risk of Unintentional Opioid-related Overdose Death by Patient Risk Factors

<table>
<thead>
<tr>
<th>Risk factor</th>
<th>Cases N=592</th>
<th>Controls N=11,840</th>
<th>AORs</th>
<th>95% Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥ 4 Providers</td>
<td>227 (38)</td>
<td>513 (4)</td>
<td>6.5</td>
<td>5.1–8.4</td>
</tr>
<tr>
<td>≥ 4 Pharmacies</td>
<td>145 (24)</td>
<td>196 (2)</td>
<td>6.0</td>
<td>4.4–8.3</td>
</tr>
<tr>
<td>High dosage use</td>
<td>140 (24)</td>
<td>172 (1)</td>
<td>11.2</td>
<td>8.3–15.1</td>
</tr>
</tbody>
</table>
Association of Number of Providers or Pharmacies with Risk of Opioid-Related Overdose Death
Association of Opioid Dosage with Risk of Opioid-Related Overdose Death

Odds Ratio vs. Mean Daily Dosage in Morphine Milligram Equivalents
# Study Summary

<table>
<thead>
<tr>
<th>Risk factor</th>
<th>% of All Patients</th>
<th>% of Decedents</th>
</tr>
</thead>
<tbody>
<tr>
<td>High-risk number of providers</td>
<td>8.3</td>
<td>38</td>
</tr>
<tr>
<td>High-risk number of pharmacies</td>
<td>2.7</td>
<td>24</td>
</tr>
<tr>
<td>High-risk dosage</td>
<td>1.9</td>
<td>24</td>
</tr>
</tbody>
</table>
Discussion

- Opioid use statewide problem in TN

- Female rate > male rate

- Opioid related overdose deaths associated with high risk prescribing patterns

- Diversion a real concern

- Increased monitoring in Tennessee may lead to increased activity in bordering states
Limitations

- Not all prescriptions are captured
  - Active duty military and VA facilities
  - Hospital and out of state dispensing

- Matching on sex and age, unable to evaluate these variables

- Dispensing patterns proxy for use, unable to evaluate forms of use
Conclusions

- Prescription opioid misuse major public health problem
- High risk use increasing and associated with increased risk of death
- TNCSMP invaluable tool in describing problem of prescription misuse
Recommendations

- Analyze TNCSMP data regularly
  - Evaluate trends
  - Monitor for aberrant activity

- Monitor provider and pharmacy compliance with Safety Act of 2012

- Educate key stakeholders about opioid misuse and abuse; providers, pharmacists, patients
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Thank You

Questions?