Overview

1. Prescription Opioid Abuse and Poisoning
2. Prescription Drug Monitoring Programs (PDMPs)
3. Evaluation of PDMPs on Adolescent and Young Adult Poisoning Deaths (Dissertation)
4. Evaluation of PDMPs on Opioid Mortalities, Hospital Inpatient Admissions, and Emergency Department visits (CDC FOA Proposal)
Public Health Issue

• Nonmedical Use of Prescription Drugs is a current and growing problem in the United States
  – Prescription Opioid Analgesics
• Poisoning Deaths attributed to Opioids
• Prescription Opioid Diversion
• Adolescent and Young Adults
Motor vehicle traffic, poisoning, and drug poisoning death rates of all intents, U.S., 1980-2009

Source: NCHS Data Brief, December, 2011, updated with 2009 mortality data. Some overdose deaths were not included in the total for 2009 because of delayed reporting of the final cause of death. The reported 2009 numbers are underestimates.
Overdose deaths of all intents by major drug type, U.S., 1999-2009

Source: NCHS Data Brief, December, 2011, updated with 2009 mortality data. Some overdose deaths were not included in the total for 2009 because of delayed reporting of the final cause of death. The reported 2009 numbers are underestimates.
Amount of prescription painkillers sold by state per 10,000 people (2010)

Kilograms of prescription painkillers per 10,000 people

- 3.7 - 5.9
- 6.0 - 7.2
- 7.3 - 8.4
- 8.5 - 12.6

SOURCE: Automation of Reports and Consolidated Orders System (ARCOS) of the Drug Enforcement Administration (DEA), 2010
Rates of prescription painkiller sales, deaths and substance abuse treatment (1999-2010)

Who is at risk?

- Doctor shoppers and those with a propensity to abuse
- Low-income people
- People in rural areas (Southwest and Appalachian region)
- People on Medicaid prescribed painkillers at twice the rate of non-Medicaid patients and are at six times the risk of overdose
- Adolescents and adults ages 35-54 years
- Caucasian and American Indian

Source: http://www.cdc.gov/homeandrecreational safety/rxbrief/
Lifetime prevalence and incidence of prescription opioid misuse among youth ages 12-17

Fig. 1. Historical trends in lifetime prevalence (left scale) and incidence (right scale) of prescription opioid misuse among youth. 1965–2002.

Source: Sung H, Richter L, Vaughan R, Johnson PB, Thom B.
Sources of Prescription Drugs for Non-Medical Use

- Illicit Sources/Drug Theft
- Doctor Shopping
- Sharing
- Internet Pharmacies

SAMHSA: 2010 NSDUH; GAO
Prevention of Poisoning Deaths Associated with Prescription Drugs

• Legislation
  – Controlled Substances Act

• Federal and State Agencies
  – Research, Enforcement, Regulation,
Prescription Drug Monitoring Programs (PDMPs)

- Function to collect, analyze, and report information on prescribing and utilization of prescription drugs within a state
- Main goal of PDMPs is to reduce prescription drug diversion and abuse
- Some PDMPs also fulfill educational and law enforcement roles
- Reactive vs. Proactive PDMPs
PDMPs Data Collected

- Drug Information
- Patient Information
- Prescriber Information
- Dispensing Pharmacy Information
PMP System Overview

- Dispensers: Data Submitted
- Pharmacists: Reports Sent
- Prescribers: Reports Sent
- Law Enforcement & Professional Licensing Agencies: Reports Sent

*Other groups may also receive reports other than those listed*
## State PDMP Profiles: Example

<table>
<thead>
<tr>
<th></th>
<th>Michigan</th>
<th>Kentucky</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Year program established</strong></td>
<td>1988</td>
<td>1999</td>
</tr>
<tr>
<td><strong>Overseeing agency</strong></td>
<td>Bureau of Health Professions</td>
<td>Public Health</td>
</tr>
<tr>
<td><strong>Schedules Monitored</strong></td>
<td>II-V</td>
<td>II-V</td>
</tr>
<tr>
<td><strong>Data Collection</strong></td>
<td>Once a month</td>
<td>4 x month</td>
</tr>
<tr>
<td><strong># prescriptions collected</strong></td>
<td>15 million</td>
<td>8.2 million</td>
</tr>
<tr>
<td><strong>Operating Costs</strong></td>
<td>$400k/implementation</td>
<td>$1.4 million/implementation</td>
</tr>
<tr>
<td></td>
<td>$60k/annual</td>
<td>#350k/annual</td>
</tr>
</tbody>
</table>

*Source: Testimony before the Subcommittee on oversight and investigations. Statement of H. Westley Clark. 2007.*
Prior PDMP Research

- Indication that PDMP implementation is associated with a decrease in the prescribing of Schedule II drugs (Sigler 1984; Angarola; Curtis 2000)
- PDMPs may be associated with decreased drug abuse (Reisman 2009)
- One international study indicates that PDMP implementation is associated with a decrease in doctor shopping (Pradel 2007)
- PDMPs may reduce the per capita supply of prescription drugs (Simeone 2007)
- PDMPs not associated with decreased mortality rates (Paulozzi 2011)
PDMP Research: Next Steps

• Outcomes associated with mortality differentiated by manner of death
• Outcomes associated with Hospital Inpatient and Emergency Department (ED) visits
• Study Population by Age Cohorts most at risk
  – Adolescents
  – Young Adults
  – Adults 35-54 years
• Proactive vs. Reactive PDMPs
• Dynamic nature of PDMPs and evaluations with current number of PDMPs
The Impact of Prescription Drug Monitoring Programs on Adolescent and Young Adult Poisoning Deaths

Michael Kim, MPH
Doctoral Dissertation
Study Population

- Individuals ages 10-24 years old living in the United States from 1999-2008
Outcome Variable(s)

- Prescription Opioid Related Poisoning Deaths
- International Classification of Disease, 10th Revision (ICD-10)
Indicator for Policy Variable(s)

- PDMPs are a dynamic state policy
- Multiple Sources
- Enactment, Data Collection, Proactive/Reactive Status
## Prescription Drug Monitoring Programs: Year of Enactment, Data Collection, and Proactive Status, 1999-2008 (Sample of 50 states)

<table>
<thead>
<tr>
<th>State</th>
<th>Enactment</th>
<th>Data Collection</th>
<th>Proactive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alabama</td>
<td>2004</td>
<td>2006</td>
<td>No</td>
</tr>
<tr>
<td>Alaska</td>
<td>2008</td>
<td>2011</td>
<td>No</td>
</tr>
<tr>
<td>Arizona</td>
<td>2007</td>
<td>2008</td>
<td>No</td>
</tr>
<tr>
<td>California</td>
<td>1939</td>
<td>1997</td>
<td>Yes</td>
</tr>
<tr>
<td>Colorado</td>
<td>2005</td>
<td>2007</td>
<td>No</td>
</tr>
<tr>
<td>Florida</td>
<td>2009</td>
<td>2010</td>
<td>No</td>
</tr>
<tr>
<td>Hawaii</td>
<td>1943</td>
<td>1992</td>
<td>Yes</td>
</tr>
</tbody>
</table>
## Potential Covariates and Confounders for Analysis

<table>
<thead>
<tr>
<th>Demographics</th>
<th>SES</th>
<th>Other state policies/indicators</th>
<th>Health Services</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>Median Income</td>
<td>Poison Control Centers</td>
<td>Insurance Status</td>
</tr>
<tr>
<td>Gender</td>
<td>Poverty Level</td>
<td>Drug Courts</td>
<td>Hospital Density</td>
</tr>
<tr>
<td>Race</td>
<td>Housing Density</td>
<td>Firearm Policies</td>
<td>Physician Density</td>
</tr>
<tr>
<td>Population</td>
<td>Education</td>
<td>Retail Drug Summaries</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Unemployment</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Study Design

• Observational Study
• State as unit of analysis
• Panel dataset 1999-2008
  – 51 areas (including DC) totaling 510 state-years of observation
CDC FOA (RFA-CE-12-007) Submission

- The Evaluation of Prescription Drug Monitoring Programs (PDMP) on Prescription Opioid Related Poisonings and a Case Study of the Implementation Maryland’s PDMP
Project Team

• Renan Castillo, PhD
  – Assistant Professor HPM
• Michael Kim, MPH
  – Doctoral Candidate HPM
• Andrea Gielen, ScD
  – Professor HBS
  – Director CIRP
• G. Caleb Alexander, MD, MS
  – Associate Professor Epidemiology
• Susan Baker, MPH, ScD (honorary)
  – Professor HPM
• Stephen Teret, JD, MPH
  – Professor HPM
  – Director Center for Law and Public’s Health
• Shannon Frattaroli, PhD, MPH
  – Assistant Professor HPM
Specific Aims 1 and 2: Analytic Plan

• Similar to dissertation
• Unit of Analysis: State and HSA
Specific Aim 3: Translation for Injury Policy and Maryland Case Study

- Deliverable 1: Translating injury prevention scholarship to solving the problem of Opioid Poisoning

- Deliverable 2: Case study of the implementation of Maryland’s new PDMP scheduled to launch Spring, 2013
  - Collaborate with Maryland’s DHMH on Senate Bill 883 to examine implementation of PDMP
## States Participating in SIDS: 1999-2008

<table>
<thead>
<tr>
<th>Year</th>
<th>States</th>
<th>Year</th>
<th>States</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999</td>
<td>AZ, CA, CO, FL, HI, IA, MD, MA, MI, NJ, NY, OR, SC, UT, WA, WI</td>
<td>2004-2005</td>
<td>No changes</td>
</tr>
<tr>
<td>2000</td>
<td>Added: KY, NC, WV</td>
<td>2006</td>
<td>Added: ME</td>
</tr>
<tr>
<td>2001</td>
<td>Added: NE, VT</td>
<td>2007-2008</td>
<td>No Changes</td>
</tr>
<tr>
<td>2002</td>
<td>Added: NV, RI Dropped: CA</td>
<td>2008</td>
<td>No Changes</td>
</tr>
<tr>
<td>2003</td>
<td>Added: CA</td>
<td>2009</td>
<td>Added: NM</td>
</tr>
</tbody>
</table>

*Source: AHRQ HCUP Database*
## States Participating in SEDD: 1999-2008

<table>
<thead>
<tr>
<th>Year</th>
<th>States</th>
<th>Year</th>
<th>States</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999</td>
<td>MD, ME</td>
<td>2005</td>
<td>Added: AZ, CA, FL</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2000</td>
<td>Added: SC, UT</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2001</td>
<td>No Change</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2002</td>
<td>Added: MA, VT</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2003</td>
<td>Added: HI, NE</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2004</td>
<td>Added: IA, NJ, WI</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Dropped: ME</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2005</td>
<td>Added: ME</td>
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<td></td>
<td></td>
<td>2006</td>
<td>Added: NC, RI</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2007</td>
<td>Added: NC, RI</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2008</td>
<td>Added: KY</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2009</td>
<td>No changes</td>
</tr>
</tbody>
</table>

*Source: AHRQ HCUP Database*
National Distribution of Hospital Service Areas

Map B. Hospital Service Areas According to the Number of Acute Care Hospitals

Thirty-nine percent of the population of the United States lived in areas with one hospital (buff); 15% lived in areas with two hospitals (light orange); 8.4% lived in areas with three hospitals (bright orange); and 37% of the population lived in areas with four or more hospitals within the hospital service area (red).

Source: Dartmouth Atlas
Strengths: Dissertation and CDC FOA

- Addressing public health problem of non-medical prescription drug use
- First known study to evaluate PDMPs
  - on adolescent, young adult, and adult poisoning deaths
  - on hospital admissions and ED visits
  - Utilize HSA as unit of analysis
  - Utilize extensive policy analysis to characterize PDMPs
- Ability to work in real-time with state of Maryland
Limitations

• Time Period
• Unobserved Factors influencing PDMPs on poisoning deaths
• Use of 50 states and Medical Examiner Coding
Future of Prescription Drug Opioid Poisoning Research Policy

• PDMPs
• Patient review and restriction programs
  – Medicaid
  – Worker’s compensation
• Health care provider accountability
• Laws to prevent prescription drug abuse and diversion
• Better access to substance abuse treatment
• Health insurers and prescription claims review programs
• Health insurers increase coverage for other treatments to reduce pain
Thank You

- Questions?