Data Integration and Analysis for Improved Drug Overdose Surveillance in Kentucky

Svetla Slavova, PhD
Terry Bunn, PhD

Bureau of Justice Assistance
Research-Practitioner Partnership & Data-Driven Pilots National Meeting
August 15, 2016
Washington DC
Two major programs support the data integration and analysis of drug use and drug-related health outcome data in Kentucky:

*Data-Driven Multidisciplinary Approaches to Reduce Prescription Drug Abuse in Kentucky*  
_(Funded by BJA; start date Oct 1, 2014)_

And

*Kentucky Drug Overdose Prevention*  
_(Funded by CDC, start date Sept 1, 2015)_
The BJA-funded Data-driven pilot program established a solid background for multi-source data collection, integration, and analysis:

Major activities:
- Established data use agreements between state agencies
- Piloted multi-source data collection, linkage and analysis
- Developed and implemented enhanced analytical capabilities within the state’s PDMP
- Formed a multi-disciplinary, multiagency Action Team to review the data and analysis and guide the program activities
The CDC-funded Drug Overdose Prevention program ensured sustainability and expansion of the results from the Data-driven pilot:

**Major activities:**
- Comprehensive drug overdose fatality surveillance system (integration of data from death certificates, coroner investigations, autopsy reports, post-mortem toxicology testing, and controlled substance prescription history records)
- Enhancement of the PDMP electronic patient reports to enable practitioners to better identify patients at increased risk for overdose
- Utilization of PDMP data for public health surveillance and research
- Integration of PDMP patient reports within Electronic Health Records
The Kentucky Injury Prevention and Research Center (KIPRC), a bona fide agent for the Kentucky Department for Public Health, became a state repository for drug overdose and drug use data and analysis by establishing data sharing agreements with

- Kentucky Office of Vital Statistics (electronic death certificate records)
- Kentucky Office of the Chief Medical Examiner (autopsy reports, post-mortem toxicology results, and coroner reports for drug overdose deaths)
- Kentucky All Schedule Prescription Electronic Reporting (KASPER), Office of the Inspector General (prescription drug monitoring program data)
- Kentucky Office of Health Policy (inpatient hospitalization and emergency department visits administrative billing records)
- Kentucky State Police (police crash reports)

Additional data sources:
- Kentucky Trauma Registry (KIPRC is the single statewide trauma registry repository per 902 KAR 28:040)
- Kentucky Syndromic Surveillance data (KIPRC, as an agent for the Ky Department for Public Health, has access to these records through CDC BioSense)
Linkage of 2013-2014 death certificates for Ky drug overdose decedents and PDMP records to identify prescribing patterns
Linkage of 2013-2014 death certificates for Ky drug overdose decedents and PDMP records to identify prescribing patterns

Percentage of Ky resident deaths with a prescription filled within the last 6 months before the death

Percentage of Ky resident deaths with an active prescription on the day of the death
Were there current prescriptions for the controlled substance drugs showing on the toxicology reports?

Percentage of Ky decedents with a current prescription (as of the day of the death) for the drug showing in the post-mortem toxicology report:

- Alprazolam: 32.4%
- Buprenorphine: 6.3%
- Clonazepam: 40.0%
- Diazepam: 22.2%
- Fentanyl: 14.6%
- Hydrocodone: 41.7%
- Hydrocodone*: 0.8%
- Methadone: 13.2%
- Morphine*: 4.1%
- Oxycodone: 36.2%
- Oxymorphone*: 2.6%
- Tramadol: 37.0%
Death certificates do not always list the specific drugs involved in overdose deaths thus leading to underestimation of the contribution of some drugs to the overdose epidemic.

Kentucky Resident Drug Overdose Deaths

- 2011: 31.6%
- 2012: 29.3%
- 2013: 26.1%
- 2014: 22.9%

Percentage of Ky resident drug overdose deaths not listing any specific drug or drug type contributing to the death

Produced by the Kentucky Injury Prevention and Research Center, June 2015. Data source: Kentucky Office of Vital Statistics Death Certificate Files. Data for all years are provisional and subject to change.
Kentucky Comprehensive Drug Overdose Fatality Surveillance
(data sources: death certificates, coroner investigation reports, medical examiner autopsy reports, toxicology reports, PDMP records)
Linkage of 2013-2014 drug overdose death certificates and toxicology reports to access the completeness and accuracy of the death certificate text related to specific drugs involved in overdose deaths

<table>
<thead>
<tr>
<th>Drug</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alprazolam</td>
<td>48.2%</td>
</tr>
<tr>
<td>Amphetamine</td>
<td>13.3%</td>
</tr>
<tr>
<td>Buprenorphine</td>
<td>30.0%</td>
</tr>
<tr>
<td>Clonazepam</td>
<td>27.3%</td>
</tr>
<tr>
<td>Cocaine</td>
<td>61.6%</td>
</tr>
<tr>
<td>Diazepam</td>
<td>23.8%</td>
</tr>
<tr>
<td>Fentanyl</td>
<td>71.4%</td>
</tr>
<tr>
<td>Gabapentin</td>
<td>27.7%</td>
</tr>
<tr>
<td>Heroin</td>
<td>71.3%</td>
</tr>
<tr>
<td>Hydrocodone</td>
<td>52.1%</td>
</tr>
<tr>
<td>Hydromorphone*</td>
<td>4.1%</td>
</tr>
<tr>
<td>Methadone</td>
<td>57.6%</td>
</tr>
<tr>
<td>Methamphetamine</td>
<td>60.4%</td>
</tr>
<tr>
<td>Morphine*</td>
<td>15.3%</td>
</tr>
<tr>
<td>Oxycodone</td>
<td>49.2%</td>
</tr>
<tr>
<td>Oxymorphone*</td>
<td>14.1%</td>
</tr>
<tr>
<td>Tramadol</td>
<td>47.9%</td>
</tr>
</tbody>
</table>
Linkage between trauma registry data and police crash reports to improve the identification of drugs involved in motor vehicle crashes leading to trauma center treatments in Kentucky

Results:

• “Drug involvement” was listed as a human factor on police reports for 61(3%) of the 1,774 injured drivers treated in Ky trauma facilities in 2013.
• For 20 of these 61 drivers the trauma registry data (TR) listed illegal use of drugs (prescription of illicit) confirmed by a test; for additional 20 cases the TR listed presence of prescription drugs confirmed by test.
• The TR data identified additional 126 drivers with illegal use of drugs confirmed by tests who’s police report didn’t list “drug involvement” as human factor.
• TR listed 503 drivers with presence of prescription drugs confirmed by tests (indicating that the drugs were taken according to a prescription or the trauma registrars didn’t have enough information to classify the prescription drugs showing on the toxicology screen as prescription drugs taken illegally).
• Overall, only 19 of the 145 cases identified as illegal use of drugs by the TR were listed as “drug involvement” on the police report.
Table 5. Number of drug types present in injured motor vehicle drivers diagnosed with nondependent abuse of drugs and treated in the emergency department or hospitalized in Kentucky

<table>
<thead>
<tr>
<th>Number of substances</th>
<th>Emergency department treatment</th>
<th>Inpatient hospitalization</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>71,893</td>
<td>19,680</td>
</tr>
<tr>
<td>1</td>
<td>572</td>
<td>903</td>
</tr>
<tr>
<td>2</td>
<td>51</td>
<td>211</td>
</tr>
<tr>
<td>3+</td>
<td>13</td>
<td>66</td>
</tr>
<tr>
<td>Total number of records with substances present</td>
<td>636</td>
<td>1180</td>
</tr>
<tr>
<td>Multiple substances?</td>
<td>No = 572</td>
<td>Yes = 64</td>
</tr>
<tr>
<td>Cannabis abuse?</td>
<td>No = 512</td>
<td>Yes = 124 (19.5%)</td>
</tr>
<tr>
<td>Hallucinogen abuse?</td>
<td>No = 636</td>
<td>Yes = 0</td>
</tr>
<tr>
<td>Sedative, hypnotic, or anxiolytic abuse?</td>
<td>No = 591</td>
<td>Yes = 45 (7.2%)</td>
</tr>
<tr>
<td>Opioid abuse?</td>
<td>No = 577</td>
<td>Yes = 59 (9.3%)</td>
</tr>
<tr>
<td>Cocaine abuse?</td>
<td>No = 563</td>
<td>Yes = 73 (11.5%)</td>
</tr>
<tr>
<td>Amphetamine abuse?</td>
<td>No = 618</td>
<td>Yes = 18 (2.8%)</td>
</tr>
<tr>
<td>Antidepressant abuse?</td>
<td>No = 633</td>
<td>Yes = &lt;5</td>
</tr>
<tr>
<td>Other, mixed, or unspecified abuse?</td>
<td>No = 243</td>
<td>Yes = 393 (61.8%)</td>
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Improved Recognition of Specific Drugs Contributing to Kentucky Resident Drug Overdose and Injuries is Needed to:

- Identify emerging trends in drug abuse and diversion
- Evaluate the effectiveness of prescription drug overdose prevention laws [e.g., Kentucky House Bill 1 from the 2012 Special Session (KRS §218A.172; KRS §218A.175; KRS §72.026) and subsequent licensing board regulations (201 KAR §8-540, §9-260, §20-057)]
- Inform new interventions, continuing education, law enforcement training, and policy changes
Conclusions:

Kentucky public health officials, regulatory boards, and law enforcement need multiple sources of drug-related data in making informed data-driven decisions to address controlled substance abuse and diversion at state and local levels.

Integrated multi-source drug use and overdose surveillance allows better identification of drug diversion, harmful prescribing practices, informs targeted state and local prescriber education, law enforcement, policy and program evaluation, and surveillance quality improvement.
Svetla Slavova
ssslav2@email.uky.edu