Wisconsin CODES
Crash Outcomes Data Evaluation System

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What Is CODES?

• Combines vehicle crash data with health outcomes data to provide more and better information than is available in crash data alone.

• Utilizes Probabilistic Linkage to match together records from multiple data sources which apply to the same person/event.

• Does not require personal identifiers such as name, address, SSN to match records.
What is the Goal of CODES

- To provide information on the health outcomes associated with motor vehicle crashes.

- To evaluate the impact of a variety of factors on health outcomes associated with motor vehicle crashes:
  - Driver Behavior – Speeding, Alcohol Use
  - Safety Equipment – Seat Belts, Helmets, Child Safety Seats
  - Vehicle Factors – Model, Weight, Year
  - Crash Configuration – Manner of Collision, Object Struck, Speed Limit, Urban/Rural
What is the Goal of CODES

• To provide information on the crashes and health outcomes associated with crashes over time, by demographic groups, for communities, counties and Wisconsin as a whole.
CODES – A Brief History

• 1990: Trudy Karlson attempts to link crash and hospital data together utilizing exact linkage techniques.
• 1992: NHTSA issues RFP for states to develop linked data using probabilistic linkage. Wisconsin becomes one of first 7 CODES states.
• 1996: Wisconsin becomes one of 5 states to win a demonstration grant to evaluate serious lower leg injuries.
• 1997: Wisconsin CODES becomes one of 4-5 states to win contract to become part of a CODES Peer to Peer Group.
CODES – A Brief History

• 1999: Wisconsin CODES wins demonstration grant to evaluate the impact of raising speed limits from 55 to 65mph on selected state highways.

• 2000: Wisconsin CODES wins grant to become part of CODES Data Network.
**What is Probabilistic Linkage?**

**Exact Linkage**

<table>
<thead>
<tr>
<th></th>
<th>Data 1</th>
<th>Data 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Bigelow</td>
<td>Bigelow</td>
</tr>
<tr>
<td>DOB</td>
<td>040453</td>
<td>040453</td>
</tr>
<tr>
<td>Date of “Event”</td>
<td>011301</td>
<td>011301</td>
</tr>
<tr>
<td>Sex</td>
<td>Male</td>
<td>Male</td>
</tr>
</tbody>
</table>

**RECORDS MATCHED!!!**
What is Probabilistic Linkage

• But what if the name was Biglo vs Bigelow?
• Or the Date of Birth was off by one year?
• Or one set of data had no names?

NO MATCH!!
General Problem

- Linking records between two data sets when one or both do not have person level identifiers.
- Linking records when there is incorrect or missing data for person level identifiers.
- However, some information, such as sex, age/birthdate, county, etc. is available.
- Problem is common to a wide range of research: Outcomes, epidemiologic, quality assurance, financial.
Probabilistic Record Linkage

- Links records between 2 data sets through the calculation of linkage likelihood or probability weights, adjusting for incomplete and missing data.
- Likelihood/probability weights are estimated given all observed agreements and disagreements on all data elements used for linking records together.
- Probabilistic Linkage incorporates variable levels of discriminatory power and reliability within specific linkage elements.
- Software we use is called CODES2000.
What Activities Does CODES Do?

**LINK DATA**

- Are currently linking hospital and death certificate data to crash data.
- Will link Emergency Department and EMS data when that data becomes available.
- Will consider linking Trauma Registry Data when that becomes available.
Provide Special Information and Reports To WisDOT

• Deer related crashes
• Crash related charges by payer group
• Seat belt use and effectiveness
• Traffic Safety Reporter Magazine
• Motorcycle Crashes in Wisconsin
  – Presentation to training seminars in Madison and Wausau
What Activities Does CODES Do?

MAKE PRESENTATIONS:

- Transportation Research Board
- Safe Communities/Kids Groups
- Educational Seminars put on by BOTS/DOT
- Public Health Association Conferences
- Association for Health Services Research
- International Traffic Records Forum
- Gerontological Society Meetings
- International Injury Conferences
What Activities Does CODES Do?

What Presentations

- Injury Related Hospitalizations in Wisconsin, 1994-1999
- Motorcycle Crashes in Wisconsin, 1994-1998
- Using Probabilistic Linkage to Merge Multiple Data Sources for Monitoring Population Health
- Serious Lower Extremity Injuries in Motor Vehicle Crashes 1990-1994
- The Impact of Driver Age on Crash Rates and Outcomes, Wisconsin, 1991-1995
- Injuries and Costs from Motor Vehicle Crashes into Fixed Objects
- Crash and Behavioral Characteristics, and Health Outcomes, Associated with Vehicular Crashes by Tourists in Wisconsin, 1992-1996
What Activities Does CODES Do?

DEVELOP/PRODUCE REPORTS

- Community Crash Reports
- Crash Level and Injury Outcome Management Reports
- Safe Kids Coalition Reports
- Hospital E-Code Reports (Safe Communities Reports)
- Motorcycle: Crash Level and Injury Outcome Management Reports
- Wisconsin Crash/Outcomes FACTSHEETS
Disseminate Information

• Maintain state level reports, presentations and FACTSHEETS on our website.
• Update the website with new information.
• Provide Community Crash, Safe Kids and Safe Communities Reports directly to regional and county organizations.