Using IDOT’s Traffic Crash Report data in Motor Vehicle Injury Surveillance
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Acknowledgements

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This Presentation

• About us
• Tracking motor vehicle (MV) injuries
• Utilizing IDOT Traffic Crash data for MV injury surveillance:
  ✓ Importance of the data
  ✓ Scope of the data
  ✓ Quality of the data
The IL EMSC Program

About us:

• Established in 1994, as part of the National EMSC program (1984)

• Public/private partnership between:
  IL Department of Public Health & Loyola University Medical Center

• Mission: Enhance Healthcare Preparedness for Pediatric Emergencies (Critical Care & Trauma)
The IL EMSC Program

Scope of activities:

• Professional training and awareness campaigns
• Assurance of ED/Hospital preparedness for the pediatric patient through a *Facility Recognition* process
• Data promotion & dissemination initiatives
IL EMSC Statewide
Data Initiatives

Data Systems
- Illinois EMS Data Reporting System

Data Reports
- Illinois Statewide/Regional Annual Data Reports
- IDOT Crash Report Fact Sheets
- Ad Hoc Reports

Applied Research
- Continuous Quality Improvement (CQI) Clinical Indicator studies
- Data Quality Studies
IL EMSC Statewide Data Initiatives

Data Systems
- Illinois EMS Data Reporting System

Data Reports
- Illinois Statewide/Regional Annual Data Reports
- IDOT Crash Report Fact Sheets
- Ad Hoc Reports

Applied Research
- Continuous Quality Improvement (CQI) Clinical Indicator studies
- Data Quality Studies
Why track MV injury data?

• Mortality Facts for Illinois (2006):
  ✓ Unintentional injuries: 5th major cause of death
  ✓ Most frequent unintentional injury death cause:
    MV traffic (31 %)
  ✓ Among those age 1 to 44:
    ✓ Unintentional injuries: 1st major cause of death
    ✓ 41% are MV traffic related
Percentage of MV Injuries among All Other Unintentional Injury Deaths, by Age Group (1-44 y/o), in Illinois, 2006.

<table>
<thead>
<tr>
<th>Age Group</th>
<th>% MV Injuries</th>
<th>% Other Unintentional Injuries</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-4</td>
<td>24.6</td>
<td></td>
</tr>
<tr>
<td>5-9</td>
<td>46.9</td>
<td></td>
</tr>
<tr>
<td>10-14</td>
<td>51.4</td>
<td></td>
</tr>
<tr>
<td>15-24</td>
<td>59.8</td>
<td></td>
</tr>
<tr>
<td>25-34</td>
<td>40.2</td>
<td></td>
</tr>
<tr>
<td>35-44</td>
<td>28.1</td>
<td></td>
</tr>
</tbody>
</table>

Source: Office of Statistics and Programming, National Center for Injury Prevention and Control, Centers for Disease Control and Prevention
Data Source: National Center for Health Statistics (NCHS), National Vital Statistics System
Why track MV injury data?

• Mortality Facts for Illinois (2006):
  ✓ Most frequent cause of premature death before age 65: Unintentional Injuries
  ✓ Premature death due to MV traffic injuries accounts for 40.1% of all years of potential life lost (YPPL) because of an unintentional injury
Why track MV injury data?

- **Trauma Center Admission Facts for Illinois (2006):**
  
  - MV injury is the 2nd most prevalent cause of trauma admission
  
  - But for those age 10 to 44 MV injuries are the main cause of severe trauma, peaking at age 20-24 with 43% of the admissions.
IL EMS Data Reporting System

Purpose:

• To support the creation of an accessible data and surveillance system for medical emergencies and injuries in Illinois.
IL EMS Data Reporting System

Objectives:

• Create an umbrella query system with a comprehensive set of injury/health related data
• Allow easy access to state/local level data
• Provide a user-friendly interface with key data elements and basic statistics
IL EMS Data Reporting System

• Web-based interactive data query system containing 4 statewide injury and health related databases:
  • Mortality data (1994-2006)
  • Hospital Discharge (1994-2007)
  • Crash Report (1994-2007)
  • Trauma Registry (1994-2005)
<table>
<thead>
<tr>
<th>Database</th>
<th>Years of Data Available on the Web</th>
<th>Total Records</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traffic Crash</td>
<td>14 years of data: 1994-2007</td>
<td>5,597,788 crashes, 12,810,208 road user records</td>
</tr>
<tr>
<td>Mortality</td>
<td>13 years of data: 1994-2006</td>
<td>1,365,700 death records</td>
</tr>
<tr>
<td>Hospital Discharge</td>
<td>14 years of data: 1994-2007</td>
<td>22,309,868 discharge records</td>
</tr>
<tr>
<td>Trauma Registry</td>
<td>12 years of data: 1994-2005</td>
<td>509,443 trauma admission records</td>
</tr>
</tbody>
</table>
IL EMS Data Reporting System

Exploring trends in motor vehicle injuries (fatal/non-fatal)...

Sources: Frequencies for fatal and non-fatal injuries extracted from the IL EMS Data Reporting System (http://app.idph.state.il.us/emsrpt/index.htm) IDOT Traffic Crash, Illinois Trauma Registry, and Illinois Mortality data (2000-2005).
Table describing data in previous graph:

<table>
<thead>
<tr>
<th>Year</th>
<th>Traffic Crash</th>
<th>Trauma Registry</th>
<th>Mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Injured MV Occupants</td>
<td>Injured Non-Occupants</td>
<td>MV Injury Admissions</td>
</tr>
<tr>
<td>2000</td>
<td>8591</td>
<td>3101</td>
<td>1400</td>
</tr>
<tr>
<td>2001</td>
<td>7754</td>
<td>2906</td>
<td>1201</td>
</tr>
<tr>
<td>2002</td>
<td>8293</td>
<td>2989</td>
<td>1247</td>
</tr>
<tr>
<td>2003</td>
<td>8415</td>
<td>2737</td>
<td>1289</td>
</tr>
<tr>
<td>2004</td>
<td>7718</td>
<td>2515</td>
<td>1211</td>
</tr>
<tr>
<td>2005</td>
<td>6070</td>
<td>2194</td>
<td>1090</td>
</tr>
</tbody>
</table>


Sources: Frequencies for fatal and non-fatal injuries extracted from the IL EMS Data Reporting System (http://app.idph.state.il.us/emsrpt/index.htm) IDOT Traffic Crash, Illinois Trauma Registry, and Illinois Mortality data (2000-2005).
Traffic Crash data in MV injury surveillance

Importance:

• Report on crashes occurring in public roadway that might have led to a fatal or non-fatal injury.

• Contains comprehensive information regarding vehicle and environmental factors possibly related to the risk and severity of injuries.

• Identify road user by type (i.e., driver, passengers, pedestrians, bicyclist, etc).
Traffic Crash data in MV injury surveillance

Scope of the data:

• Injury information is limited.

• Reporting of fatal or non-fatal injury is based on officers’ observation, rather than medical account.

• Integration of Crash Report with medical data is laborious.
Traffic Crash data in MV injury surveillance

Data Quality Studies by EMSC:

- Routine reviews
- Special studies
Traffic Crash data in MV injury surveillance

- Routine reviews:
  - Flag potential data inconsistencies (i.e., invalid entries)
  - Assess completeness of information (i.e., % missing or unknown data)
Routine Data Quality Reviews

Data Request
- Data Source Agencies:
  - IDPH
  - IDOT
  - IHA

Data Storage
- IL EMSC receives and stores the source data files

Data Processing (Step 1)
- Data quality review:
  - No data problems
  - Questionable data

Data Processing (Step 2)
- Subset of data with key data elements
- Preparation of aggregate data files

Update of Web Application
- Import of web application files to IDPH server
Data Quality Studies

Special studies:

- Systematic study of each data element frequency with focus on:
  - Accuracy
  - Completeness
Data Quality Studies

Accuracy:
• Validity of a measurement
• Reliability of a measurement, that is: The consistency in repeated measurements of the same data element; and,

Completeness:
• Indicates how complete a data element is based on the coding of valid options, versus unknown or missing data.
Data Quality Studies

Measurements:

• Detailed frequency counts and percent

• Comparative analysis of changes in the percent distribution of data element values from pre-CIS data to post-CIS data.

<table>
<thead>
<tr>
<th>Crash Severity</th>
<th>2002 (Count)</th>
<th>2002 (%)</th>
<th>2003 (Count)</th>
<th>2003 (%)</th>
<th>2006 (Count)</th>
<th>2006 (%)</th>
<th>Pre-CIS: Change in % from 2002 to 2003</th>
<th>Post-CIS: Change in % from 2003 to 2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fatal</td>
<td>1,273</td>
<td>0.29</td>
<td>1,308</td>
<td>0.30</td>
<td>1,136</td>
<td>0.28</td>
<td>0.01</td>
<td>-0.02</td>
</tr>
<tr>
<td>Injury</td>
<td>87,458</td>
<td>19.92</td>
<td>88,585</td>
<td>20.26</td>
<td>75,376</td>
<td>18.44</td>
<td>0.34</td>
<td>-1.82</td>
</tr>
<tr>
<td>Prop. Damage</td>
<td>350,259</td>
<td>79.79</td>
<td>347,996</td>
<td>79.44</td>
<td>332,339</td>
<td>81.29</td>
<td>-0.34</td>
<td>1.84</td>
</tr>
</tbody>
</table>

Number of Crashes by Crash Severity by Year

- Count02
- Count03
- Count06


- From 2002 to 2003:
  - Fatal: -0.01
  - Injury: 0.34
  - Prop. Damage: -0.34

- From 2003 to 2006:
  - Fatal: -0.02
  - Injury: -1.82
  - Prop. Damage: 1.84

COMMENTS:
The distribution of crashes per crash severity shows a decrease in the overall number of crashes involving injured road users, which will be reflected in the differences between the percent changes from 2002-2003 to 2003-2006.

(1) Table column detailing all categories or values entered for the data element.
(2) Table columns describing annual counts and percents for data element specific values.
(3) Table columns with percent change between the selected data periods. (Change = absolute % difference between specified years.)
(4) Column chart representing annual counts from table above.
(5) Bar charts representing absolute percent differences for the selected data years, from last 2 columns of the table above.
### Accuracy and Completeness


<table>
<thead>
<tr>
<th>Driver Gender</th>
<th>2002</th>
<th>2003</th>
<th>2006</th>
<th>Pre-CIS: Change in % from to 2003</th>
<th>Post-CIS: Change in % from to 2006</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(Count)</td>
<td>(%)</td>
<td>(Count)</td>
<td>(%)</td>
<td>(Count)</td>
</tr>
<tr>
<td>Missing</td>
<td>100</td>
<td>0.01</td>
<td>186</td>
<td>0.02</td>
<td></td>
</tr>
<tr>
<td>Driverless</td>
<td>279,043</td>
<td>36.21</td>
<td>282,901</td>
<td>36.87</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>413,981</td>
<td>53.73</td>
<td>408,496</td>
<td>53.24</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>77,403</td>
<td>10.05</td>
<td>75,747</td>
<td>9.87</td>
<td></td>
</tr>
<tr>
<td>Unknown</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>14</td>
</tr>
</tbody>
</table>

#### Number of Drivers by Gender by Year

- **Count02**
- **Count03**
- **Count06**


<table>
<thead>
<tr>
<th>Driver Gender</th>
<th>From 2002 to 2003</th>
<th>From 2003 to 2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Missing</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Driverless</td>
<td>0.01</td>
<td>0.00</td>
</tr>
<tr>
<td>Female</td>
<td>0.65</td>
<td>1.44</td>
</tr>
<tr>
<td>Male</td>
<td>-0.49</td>
<td>0.86</td>
</tr>
<tr>
<td>Unknown</td>
<td>-0.17</td>
<td>-2.28</td>
</tr>
</tbody>
</table>
# Accuracy and Completeness


<table>
<thead>
<tr>
<th>Driver Age</th>
<th>2002 (Count)</th>
<th>2002 (%)</th>
<th>2003 (Count)</th>
<th>2003 (%)</th>
<th>2006 (Count)</th>
<th>2006 (%)</th>
<th>Pre-CIS: Change in % from 2002 to 2003</th>
<th>Post-CIS: Change in % from 2003 to 2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-9</td>
<td>870</td>
<td>0.11</td>
<td>525</td>
<td>0.07</td>
<td>1</td>
<td>0</td>
<td>-0.04</td>
<td>-0.03</td>
</tr>
<tr>
<td>10-14</td>
<td>86,925</td>
<td>11.28</td>
<td>85,137</td>
<td>11.10</td>
<td>74,390</td>
<td>10.43</td>
<td>-0.19</td>
<td>-0.67</td>
</tr>
<tr>
<td>15-19</td>
<td>94,850</td>
<td>12.31</td>
<td>90,072</td>
<td>12.52</td>
<td>85,988</td>
<td>12.05</td>
<td>0.21</td>
<td>0.47</td>
</tr>
<tr>
<td>20-24</td>
<td>154,016</td>
<td>19.99</td>
<td>153,125</td>
<td>19.96</td>
<td>139,150</td>
<td>19.51</td>
<td>-0.03</td>
<td>-0.45</td>
</tr>
<tr>
<td>25-34</td>
<td>139,687</td>
<td>18.13</td>
<td>137,762</td>
<td>17.95</td>
<td>124,827</td>
<td>17.50</td>
<td>-0.18</td>
<td>-0.46</td>
</tr>
<tr>
<td>35-44</td>
<td>105,050</td>
<td>13.63</td>
<td>107,175</td>
<td>13.97</td>
<td>106,925</td>
<td>14.99</td>
<td>0.33</td>
<td>1.02</td>
</tr>
<tr>
<td>45-54</td>
<td>57,127</td>
<td>7.41</td>
<td>60,569</td>
<td>7.89</td>
<td>64,313</td>
<td>9.02</td>
<td>0.48</td>
<td>1.12</td>
</tr>
<tr>
<td>55-64</td>
<td>28,787</td>
<td>3.74</td>
<td>29,363</td>
<td>3.83</td>
<td>28,866</td>
<td>4.05</td>
<td>0.09</td>
<td>0.22</td>
</tr>
<tr>
<td>65-74</td>
<td>20,294</td>
<td>2.63</td>
<td>20,868</td>
<td>2.65</td>
<td>19,774</td>
<td>2.77</td>
<td>0.02</td>
<td>0.12</td>
</tr>
<tr>
<td>75-99</td>
<td>82,921</td>
<td>10.76</td>
<td>77,234</td>
<td>10.07</td>
<td>68,888</td>
<td>9.66</td>
<td>-0.70</td>
<td>-0.41</td>
</tr>
<tr>
<td>Unknown</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Number of Drivers by Age by Year

![Bar chart showing the number of drivers by age and year](chart1.png)


![Bar chart showing the difference in percent distribution](chart2.png)
# Accuracy and Completeness


<table>
<thead>
<tr>
<th>Safety Equipment Used</th>
<th>2002 (Count)</th>
<th>2003 (Count)</th>
<th>2006 Pre-CIS: Change in % from 2002 to 2003</th>
<th>2006 Post-CIS: Change in % from 2003 to 2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Missing</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 None present</td>
<td>5,874 0.76</td>
<td>5,891 0.77</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Safety belt used</td>
<td>558,570 72.49</td>
<td>563,022 73.45</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 Safety belt not used</td>
<td>9,986 1.30</td>
<td>8,198 1.07</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 Helmet used</td>
<td>653 0.08</td>
<td>740 0.10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 Helmet not used</td>
<td>1,219 0.16</td>
<td>1,324 0.17</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 Child restraint used</td>
<td>42 0.01</td>
<td>35 0.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7 Child restraint used</td>
<td>27 0.00</td>
<td>18 0.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 Child restraint not used</td>
<td>26 0.00</td>
<td>26 0.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9 Usage unknown</td>
<td>194,130 25.19</td>
<td>187,476 24.43</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Number of Drivers by Safety Equipment Used by Year

![Bar chart showing number of drivers by safety equipment used by year](chart1.png)


![Chart showing difference in percent distribution](chart2.png)
Traffic Crash data in MV injury surveillance

Data quality improvement efforts:

✓ Implementation of the CIS system
✓ CODES Project
✓ Continuous agency adhesion to the MCR system
✓ Illinois Traffic Safety Coordinating Committee efforts
QUESTIONS ?