MOTORCYCLE STUDIES IN MARYLAND

Univ. of Maryland
National Study Center for Trauma
Available Injury Data Sources in Maryland

- MVA Licensing
- Driver Citations
- Police Crash Reports
- Ambulance & EMS Logs
- ED Data
- Hospital Records
- Statewide Trauma Registry
- Vital Statistics
- Autopsy Records
- Toxicology
Motorcyclist fatalities have decreased since 2007 by close to 27%, while total traffic fatalities decreased 21% during that period.

There were 3% fewer injuries and 4% fewer fatalities in 2011 compared to 2010.

Motorcycle crash–related fatalities comprised 14.4% of all traffic fatalities in 2011, down slightly from 14.7% in 2010.
Maryland Trends

- Motorcycle registrations increased by 1.2% from 2009 to 2011
- Motorcycle licensure increased by 12% over the same period
- More than 10,000 people received a Class M endorsement in 2005
Maryland Motorcycle Data

Graph showing the number of motorcycle crashes and involved fatalities from 2002 to 2011.

- Motorcycle-Crashes
  - Line graph showing a steady increase from 2002 to 2011.

- Motorcycle-Involved Fatalities
  - Line graph showing a peak around 2004 and a decrease towards 2011.

Y-axis: Motorcycle Crashes and Involved Fatalities
X-axis: Years from 2002 to 2011
Maryland Motorcycle Data

Motorcycle Operators Involved in Crashes by Age
Top Contributing Circumstances in Motorist–Fault Collisions with MC

- Failure to Give Full Time and Attention
- Failure to Yield Right of Way
- Following Too Close
- Improper Turn
In Maryland in 2008.....

### Table 1 – Motorcycle Crash and Rider Characteristics

<table>
<thead>
<tr>
<th></th>
<th>Total Riders Involved in Crashes</th>
<th>Riders Killed in Crashes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>%</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>1,665</td>
<td>90</td>
</tr>
<tr>
<td>Age</td>
<td></td>
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<tr>
<td>&lt;20</td>
<td>89</td>
<td>4.8</td>
</tr>
<tr>
<td>20-34</td>
<td>686</td>
<td>37.1</td>
</tr>
<tr>
<td>35-49</td>
<td>596</td>
<td>32.2</td>
</tr>
<tr>
<td>50-64</td>
<td>332</td>
<td>18.0</td>
</tr>
<tr>
<td>65+</td>
<td>41</td>
<td>2.2</td>
</tr>
<tr>
<td>Helmet Use</td>
<td></td>
<td></td>
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<tr>
<td>Yes</td>
<td>1,381</td>
<td>74.7</td>
</tr>
<tr>
<td>Unknown</td>
<td>308</td>
<td>16.7</td>
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<td>Total Motorcycle Crashes</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Day of Week</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weekday</td>
<td>1,137</td>
<td>63.1</td>
</tr>
<tr>
<td>Weekend</td>
<td>666</td>
<td>36.9</td>
</tr>
<tr>
<td>Hour of Day</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12am – 8am</td>
<td>203</td>
<td>11.2</td>
</tr>
<tr>
<td>8am – 12pm</td>
<td>212</td>
<td>11.8</td>
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<tr>
<td>12pm – 8pm</td>
<td>1,078</td>
<td>59.8</td>
</tr>
<tr>
<td>8pm – 12am</td>
<td>310</td>
<td>17.2</td>
</tr>
<tr>
<td>Mechanism</td>
<td>Number</td>
<td>Charge ($ in 1,000s)</td>
</tr>
<tr>
<td>--------------</td>
<td>--------</td>
<td>----------------------</td>
</tr>
<tr>
<td>Driver</td>
<td>3,132</td>
<td>60,945</td>
</tr>
<tr>
<td>Passenger</td>
<td>1,125</td>
<td>19,363</td>
</tr>
<tr>
<td>Motorcyclist</td>
<td>835</td>
<td>27,455</td>
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<tr>
<td>Pedal Cyclist</td>
<td>105</td>
<td>2,225</td>
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<tr>
<td>Pedestrian</td>
<td>736</td>
<td>18,171</td>
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<tr>
<td>Unspecified</td>
<td>247</td>
<td>5,110</td>
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<tr>
<td>Total</td>
<td>6,180</td>
<td>133,269</td>
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</table>

Maryland CODES - 2008
In 2010:

- 2,037 motorcycle operators were involved in crashes
  - 1,544 were reported to have a MD license
    - 24% of total were out-of-state operators
  - 1,513 linked to MVA licensure files
    - 896 (59%) had an M endorsement on record
    - However, only 339 (22%) had an M in the class field on the crash report
Motorcycle safety is not just one problem, but several problems:

- Rider Vulnerability
- Rider Inexperience
- Driver Inattention
- Driver Awareness and Attitudes
- Rider Impairment
- Aggressive Riding
Rider Vulnerability

- Represent 2.5% of all registered motor vehicles
- Are involved in 15% of fatal motor vehicle collisions
- Motorcycle operators are 4 times more likely to be injured or die in a crash than other drivers
- 1 in 25 motorcycle crashes result in a fatality
Question:
How well do helmets work to prevent deaths?

- Very well – can't prevent all deaths
- Reduce the chances of a traumatic brain injury
- Some helmets are not certified & will not provide protection (see example of bad helmet)
Estimated effectiveness of helmets

- Reduce chances of death in crash by 40% (Keng, 2005)

- National Highway Traffic Safety Administration: estimates helmets saved 1,316 motorcyclists' lives in 2004
Deaths per 10,000 registered motorcycles before and after helmet law, Maryland
(Auman et al., 2002)
Motorcycle Research Projects

- Injury Patterns – Hospitalized Younger and Older Motorcycle Operators
- Driving Behavior – Motorcycle Training
- Data Collection – Promising Practices
- Characteristics of Motorcycle Operators in MD
  - Crash Statistics
  - Helmet Photographs
  - Motorcyclist Survey (riding behaviors)
  - SF-36 (psychosocial outcomes)
Characteristics of Motorcycle Operators

- 2007–2009 (n=189)
- 94% men
- 76% white

Education
- 21% <12th grade
- 27% High School, GED
- 23% Some College
- 22% College Graduate or higher
Characteristics of Motorcycle Operators

- Motorcycle ridden most often
  - 36% Harley Davidson
  - 18% Suzuki
  - 10% Yamaha
  - 16% Honda
  - 8% Kawasaki

- Motorcycle Type
  - 40% Sport
  - 33% Cruiser
  - 10% Touring

- Ownership
  - 93% owner
  - 37% owned <1 year
Characteristics of Motorcycle Operators

- **Crash Type**
  - 31% impact with object
  - 24% laid the bike down
  - 15% multiple vehicle intx
  - 17% multiple vehicle not at intx

- **Road Type**
  - 26% county road/rural area
  - 29% suburban
  - 22% interstate
  - 14% city street/urban area
Characteristics of Motorcycle Operators

- **Training**
  - 60% motorcycle safety course
    - 48% basic
    - 10% intermediate
    - 8% experienced

- **Licensing**
  - 89% valid motorcycle endorsement

- 77% under the age of 21 when they began riding
Helmet Type

- STC Helmet Photos (n=242)

- Type
  - 55% full face
  - 10% three-quarter
  - 35% half-shell

- Compliant
  - 80% FMVSS compliant
Injured Body Regions (AIS ≥ 1)
All Motorcyclists admitted to RAC Shock Trauma Center (July 2007–June 2009)

Mean Age = 38 yrs
Mean ISS  = 14.9
Head MAIS by helmet type
(hospitalized patients)
Head MAIS by helmet style
(hospitalized patients)
## Head injuries
*(hospitalized patients)*

<table>
<thead>
<tr>
<th></th>
<th>Compliant</th>
<th>Non-compliant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fx Base of skull</td>
<td>6.7% (13/194)</td>
<td>16.3% (8/49)</td>
</tr>
<tr>
<td>Fx Vault of skull</td>
<td>1.0% (2/194)</td>
<td>8.2% (4/49)</td>
</tr>
<tr>
<td>TBI</td>
<td>53.6% (104/194)</td>
<td>77.6% (38/49)</td>
</tr>
</tbody>
</table>
Psychosocial Outcome Data (SF–36)
(hospitalized patients) N=177 (Baseline) / 104 (6 month follow-up)
OCME

- Helmet photos – 45
  - 38 compliant
  - 7 non-compliant
OCME – MAIS Head Injuries

6/7 non-compliant helmets
16/38 compliant helmets
Next steps....

- Reconstruction studies?
  - Biomechanics of injury
  - Effectiveness of safety equipment (all gear)
Next steps....

**Promising Practices**
- Analyze new exposure data (odometer readings = new measure of miles traveled)
- Analyze new baseline data (motorcycle safety training course test scores and reported riding histories)

**Behavioral Surveys**
- Quantify and analyze knowledge, attitudes and behaviors
  - Motorcycle operators/riders
  - Motor vehicle drivers
For more information

Pat Dischinger
Tim Kerns
Cindy Burch
Shiu Ho
Gabe Ryb

Maryland CODES
University of Maryland Baltimore
National Study Center for Trauma/EMS

pdischin@som.umaryland.edu
tkerns@som.umaryland.edu
cburch@som.umaryland.edu