USING INTEGRATED CRASH AND HOSPITAL DATA TO ASSESS OLDER OCCUPANT OUTCOMES

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GOAL

Better understand crash and other factors that contribute to increased risk of crashes and injury severity for older occupants
Impact of Motor Vehicle Crashes

- Motor vehicle crashes in 2017
  - More than 40,000 people killed
  - 4.6 million medically treated injuries
  - $433 billion in economic costs

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Fatal Crash</th>
<th>Population</th>
<th>Licensed Drivers</th>
</tr>
</thead>
<tbody>
<tr>
<td>16 – 24</td>
<td>-16.3%</td>
<td>+0.2%</td>
<td>-1.5%</td>
</tr>
<tr>
<td>25 – 44</td>
<td>+2.6%</td>
<td>+4.6%</td>
<td>+0.5%</td>
</tr>
<tr>
<td>45 – 64</td>
<td>+9.4%</td>
<td>+7.3%</td>
<td>+7.6%</td>
</tr>
<tr>
<td>65 +</td>
<td>+29.1%</td>
<td>+31.2%</td>
<td>+34.3%</td>
</tr>
<tr>
<td>Total</td>
<td>+3.7%</td>
<td>+7.1%</td>
<td>+7.8%</td>
</tr>
</tbody>
</table>
EMS

ED

Analysis Database

Crash

EMS

Inpatient

ED

Inpatient
PROBABILISTIC LINKAGE

- Probabilistic linkage is a method that uses properties of variables common to databases to determine the probability that two records refer to the same person and/or event.
ANALYSIS 1: SERIOUS INJURIES

• Common metric used by state agencies for allocating resources and assessing safety

• Objective
  – Determine the accuracy of crash reported serious injuries compared to hospital reported
  – Identify factors associated with under-identification
DATABASE

- Probabilistically linked Utah motor vehicle crash, emergency department, and hospital discharge data from 2010 – 2016
  - Full name
  - Date of birth
  - Date, time, location of crash
  - Vehicle and person type
Injury severity

Crash File (KABCO)
- K: killed or died within 30 days of the crash
- A: incapacitating injury
- B: non-incapacitating injury
- C: possible injury
- O: no injury
- Typical definition of serious injury: K/A injury

Hospital File (MAIS)
- Assigned following hospital evaluation
- Demonstrated to be predictive of mortality
- MAIS of 3 or higher (MAIS 3+) is considered serious
- Requires ability to combine crash and hospital data
Results

- 931,485 persons in crashes, 2010 - 2016
- 95,532 (10.3%) linked to hospital record
- 5,685 (6%) MAIS 3+ injury
- 2,959 (52%) coded as K or A
KA BC O BY MAIS 3+ INJURIES

Percent Coded as KA

0% 50% 100%

3 - Serious
4 - Severe
5 - Critical
6 - Maximum

MAIS
CRASH REPORTED INJURED BODY REGION

Number of Serious Injuries

Head: MAIS 3+ 900, KA 800
Lower Extremity: MAIS 3+ 800, KA 700
Abdomen: MAIS 3+ 600, KA 500
Spine: MAIS 3+ 400, KA 300
Chest: MAIS 3+ 300, KA 200
Upper Extremity: MAIS 3+ 100, KA 90
Neck: MAIS 3+ 30, KA 20
Face: MAIS 3+ 10, KA 5

Crash Reported Injured Body Region

p < 0.001
AGE GROUP

Percent of Severe Injuries Identified

p < 0.001
SERIOUS INJURIES MORE LIKELY TO BE CODES AS K/A

- Motorcyclists
- Rural crashes
- High speed crashes
- Alcohol/drug related crashes
- Multiple compared to single vehicle crashes
- Head injury compared to other body regions
ANALYSIS 2: CRASH FACTORS

- Determine which crash factors are most common in older person crashes.
- Identify factors
  - that demonstrate increased risk of hospital treatment or death for older persons compared to younger persons
  - with age-specific patterns
- Logistic regression with outcome older occupant.
- Logistic regression with outcome death or linked, stratified by age.
DAYLIGHT AND INTERSECTION CRASHES

The graph shows the log odds ratio for daylight and intersection-related crashes across different age groups. The x-axis represents age groups (0-30, 31-60, 61-70, 71+), and the y-axis represents the log odds ratio. The plot indicates varying trends for daylight and intersection-related crashes across these age groups.
RESTRAINTS USED
SUMMARY

• Crash level
  – Time
  – Lighting condition
  – Intersection related
  – Crash type
• Vehicle level
  – Vehicle age
  – Vehicle damage
  – Speed
  – Driver condition
    • Alcohol, drugs, fatigue

• Person level
  – Age
  – Male
  – Driver
  – Airbag deployed
  – Seatbelt use
Questions?

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