Children in Air Bag Crashes

SAE Government-Industry Meeting
Washington, DC
2003

John Kindelberger
National Center for Statistics and Analysis
National Highway Traffic Safety Administration
U.S. Department of Transportation

Topics

- Collecting Data on Air Bag Fatalities
- Crisis and Response
- Where are the Children?
- Conclusions
The Special Crash Investigations (SCI) program is a component of the National Center for Statistics and Analysis (NCSA) in the National Highway Traffic Safety Administration (NHTSA).

SCI researchers perform special, intensive investigations of crashes selected for high interest.

Airbag-related fatal and serious injury cases are of particularly high interest.

Collecting Data on Air Bag Crashes

- Cases of interest located through:
  - Fatality Analysis Reporting System (FARS)
  - National Automotive Sampling System (NASS)
  - Other DOT and NHTSA research components, regional offices, and hotlines
  - Police and fire/rescue personnel
  - Auto manufacturers

SCI files are believed to contain a near-census of airbag-related fatalities in crashes of minor to moderate severity (delta-V < 25 mph).
Air bags were introduced to save lives – and NHTSA estimates 10,271 lives saved by air bags as of January 1, 2002.

BUT

In some crashes of minor to moderate severity, a deploying air bag has been an injury source.

Of special concern have been fatal passenger air bag (PAB) injuries to infants and children under 12:

- 1993: 1 - the first child PAB fatality
- 1994: 5
- 1995: 8
- 1996: 25
- 1997: 31
Crisis And Response

Fleet size was also growing...
Number of passenger air bag-equipped cars/light trucks in fleet grew from:

600,000 in 1992 to 40,000,000 in 1997
(Source: R.L. Polk registration data)

Crisis And Response

Responses to the crisis:

- Public education
  - 1996: Safety campaigns launched by NHTSA and its partners – manufacturers, insurance companies, and other organizations
  - A primary message:
    Children 12 and under are safer in the back
Crisis And Response

Responses to the crisis:

- Rulemaking
  - March 1997: NHTSA rule allows manufacturers to reduce force at which air bags deploy
    ➔ “Redesigned Air Bags”
  - More accurately called “Sled-Certified Air Bags”
    - Optional sled test vs. previously required barrier test
  - Vehicles certified to new standard enter fleet throughout 1998 model year
  - May 2000: Final Rule, Advanced Air Bags

Crisis And Response

Were the measures effective?

To answer, compare counts across years:

- Align fatality counts into Sept-Aug production years
- Divide by “Million Registered Vehicle Years” (MRVY):
  Estimated number of (driver/pass.) airbag-equipped vehicles on road during production year (in millions)
  -adjusted for attrition and gradual release
### Children Fatally Injured by a Passenger Air Bag Normalized by Million Registered Vehicle Years

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>92-93</td>
<td>1</td>
<td>1.294</td>
<td>.773</td>
<td>97-98</td>
<td>34</td>
<td>48.303</td>
<td>.704</td>
</tr>
<tr>
<td>93-94</td>
<td>2</td>
<td>4.893</td>
<td>.409</td>
<td>98-99</td>
<td>19</td>
<td>63.018</td>
<td>.302</td>
</tr>
<tr>
<td>94-95</td>
<td>7</td>
<td>12.797</td>
<td>.547</td>
<td>99-00</td>
<td>16</td>
<td>78.718</td>
<td>.203</td>
</tr>
<tr>
<td>95-96</td>
<td>19</td>
<td>22.801</td>
<td>.833</td>
<td>00-01</td>
<td>8</td>
<td>94.140</td>
<td>.085</td>
</tr>
<tr>
<td>96-97</td>
<td>28</td>
<td>34.562</td>
<td>.810</td>
<td>01-02</td>
<td>5</td>
<td>108.701</td>
<td>.046</td>
</tr>
</tbody>
</table>

Source: NCSA, NHTSA
Is the observed reduction an effect of public education or sled-certified air bags?

To assess, control for air bag type - compare since 1997:

### Separating the Effects

<table>
<thead>
<tr>
<th>12-Month Period (Sept-Aug)</th>
<th>Child PAB Fatals</th>
<th>MRVY</th>
<th>Fatalss/MRVY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-Redesigned</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>97-98</td>
<td>33</td>
<td>42.006</td>
<td>0.786</td>
</tr>
<tr>
<td>98-99</td>
<td>15</td>
<td>42.429</td>
<td>0.354</td>
</tr>
<tr>
<td>99-00</td>
<td>14</td>
<td>41.689</td>
<td>0.336</td>
</tr>
<tr>
<td>00-01</td>
<td>7</td>
<td>40.685</td>
<td>0.172</td>
</tr>
<tr>
<td>01-02</td>
<td>4</td>
<td>39.395</td>
<td>0.102</td>
</tr>
</tbody>
</table>

### Separating the Effects

<table>
<thead>
<tr>
<th>12-Month Period (Sept-Aug)</th>
<th>Child PAB Fatals</th>
<th>MRVY</th>
<th>Fatalss/MRVY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Redesigned</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>97-98</td>
<td>1</td>
<td>6.297</td>
<td>0.159</td>
</tr>
<tr>
<td>98-99</td>
<td>4</td>
<td>20.588</td>
<td>0.194</td>
</tr>
<tr>
<td>99-00</td>
<td>2</td>
<td>37.029</td>
<td>0.054</td>
</tr>
<tr>
<td>00-01</td>
<td>1</td>
<td>53.455</td>
<td>0.019</td>
</tr>
<tr>
<td>01-02</td>
<td>1</td>
<td>69.306</td>
<td>0.014</td>
</tr>
</tbody>
</table>
Separating the Effects

Children Fatally Injured by a PAB: Barrier-Certified vs. Sled-Certified
Normalized by MRVY

- Public education effect – across years
- Redesign effect - within years
- Graph suggests both effects are positive.

Source: NCSA, NHTSA
Reductions in air bag fatalities suggest “back seat” message has been heeded – but can’t tell us to what extent

Can other data sources help?

The NHTSA State Data System holds data on all police-reported crashes from 18 participating states
Can be useful for tracking seating patterns
  • To look at changes over time, can control for
    • child age group
    • Number of adults and children in vehicle

Examples follow:
California, Florida, Kansas
Children Age 0-3
Percent Vehicles with a Child in Front Seat
Among Vehicles With 1 Adult and 1 or 2 Children
In 1996-2000 Police-Reported Crashes

Source: NCSA State Data System, NHTSA

Children Age 4-7
Percent Vehicles with a Child in Front Seat
Among Vehicles With 1 Adult and 1 or 2 Children
In 1996-2000 Police-Reported Crashes

Source: NCSA State Data System, NHTSA
Children Age 8-12
Percent Vehicles with a Child in Front Seat
Among Vehicles With 1 Adult and 1 or 2 Children
In 1996-2000 Police-Reported Crashes

Source: NCSA State Data System, NHTSA

Concerns for the Future

NHTSA on watch for possible rise in rates –

- as used first-generation air bag vehicles are bought by drivers who previously owned cars without air bags -

– and thus may not have given attention to air bag safety messages
Conclusions

- Child air bag-related fatalities as a rate per air bag-equipped vehicle have dropped every year since 1996
- Sled-certified air bags have had a lower rate of child fatal injury than barrier-certified air bags in each year since they were introduced
- Child air bag fatality reduction for both barrier- and sled-certified air bags in the years since 1996 suggests positive effect of public education efforts
- Crash data from selected states show drivers are moving infants and toddlers to the back, but room for improvement remains
- State crash data show older children are still commonly in front seats

NHTSA SCI Web Site


- Summary tables and quarterly charts
- Full case studies for all published cases
- Query interface