Analysis of Risk Factors Associated with Fatal Motor Vehicle Collisions in Arizona

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Abstract

In 2014, Arizona had 109,554 motor vehicle collisions (MVCs), 708 of which were fatal. The objective of this study was to analyze behavioral patterns in drivers which resulted in fatal MVCs. This was a retrospective chart review of MVCs in 13 Arizona counties from 2007 to 2015. Results showed a high incidence of high-risk behaviors due to substance use and lack of safe driving practices, including 26% of subjects with an ethanol content above the legal limit, 10% with THC in their system at the time of the collision, 9% with amphetamines or cocaine, 8.5% with benzodiazepines, and 5% with opiates. More than 50% had a combination of substances. Other notable characteristics were the lack of seatbelt use in 30% of subjects, and lack of motorcycle helmet use in 66% of motorcycle drivers. More data is needed on distracted driving behaviors, particularly related to cellular phone use, in order to optimally target future legislation and prevention.

Methods

Records from the Office of the Medical Examiner in 13 AZ counties (Apache, Cochise, Coconino, Gila, Graham, Greenlee, La Paz, Navajo, Pima, Pinal, Santa Cruz, Yavapai, and Yuma) were collected for MVCs from Jan. 2007 to Dec. 2015 (n=350). The dates of the records used for each county and the number of subjects per county is shown in Table 1.

Areas of demographic interest included age, sex, blood toxicology results, seatbelt use, and motorcycle helmet use. All aspects of the chart were examined, including whether the report stated other distractors such as cell phone usage associated with the collision.

Table 1 Years of data obtained from each AZ county

<table>
<thead>
<tr>
<th>County</th>
<th>Years of data obtained</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yuma</td>
<td>2012-2015 (n=134)</td>
</tr>
<tr>
<td>Cochise</td>
<td>2007 (n=100)</td>
</tr>
<tr>
<td>Coconino</td>
<td>2013-2014</td>
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<tr>
<td>Graham</td>
<td>2014-2015</td>
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<tr>
<td>Greenlee</td>
<td>2011-2014</td>
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<tr>
<td>La Paz</td>
<td>2014 (n=101)</td>
</tr>
<tr>
<td>Navajo</td>
<td>2015 (n=199)</td>
</tr>
<tr>
<td>Pima</td>
<td>2012-2015</td>
</tr>
<tr>
<td>Pinal</td>
<td>2014-2015</td>
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<tr>
<td>Santa Cruz</td>
<td>2014 (n=199)</td>
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<tr>
<td>Yavapai</td>
<td>2012-2015</td>
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<tr>
<td>Yuma</td>
<td>2011-2015</td>
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</table>

Results (cont.)

Overall, there was a high incidence of high-risk behaviors based on illegal substance use and lack of safe driving practices.

- EtOH above legal limit: 91 subjects (26%)
- THC: 38 subjects (10%)
- Amphetamines/cocaine: 31 subjects (9%)
- Benzodiazepines: 30 subjects (8.5%)
- Opiates: 18 subjects (5%)

More than 50% of subjects had a combination of the aforementioned substances.

Discussion and Conclusions

With the number of MVCs in Arizona rising from 109,554 in 2014 to 116,609 in 2015, as well as an increase in fatalities from 708 in 2014 to 811 in 2015, it is imperative to examine factors associated with these collisions as a preventative effort. Fatal collisions in 13 of 15 Arizona counties were primarily related to MVCs rather than motorcycle collisions or other mechanisms of injury. High-risk behaviors based on the use of illegal substances prior to the fatal injuries, in particular, a combination of ethanol, benzodiazepines, THC, amphetamines, cocaine, and opiates, was prominent.

Although not necessarily predominant in this study population, the lack of seatbelt use is another factor to take into consideration when discussing the fatality rates in MVCs. The lack of helmet use was common in motorcycle fatalities, as the majority of motorcyclists were not wearing a helmet at the time of the collision. Overall, there is a need for ongoing preventative and education measures related to substance use while driving and helmet usage for drivers of motorcycles.

Limitations of this study include the nature of a retrospective chart review and the exclusion of two Arizona counties, including Maricopa County which is the most populous county in Arizona and resulted in 349 fatal MVCs in 2014, thus accounting for almost half of all Arizona MVCs. Unfortunately, this county was excluded from this study due to circumstances pertaining to data collection. Because of the high rate of MVCs in Maricopa County, the rates of intoxication while driving and other distracted driving behaviors are potentially significantly higher than what is reported in this study.

More data is needed, particularly data related to cellular phone use while driving, including texting, dialing, and receiving phone calls, in order to optimally target future legislation and prevention. The addition of data from all counties in Arizona would also be beneficial in future studies.

Acknowledgements

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Introduction

Arizona had 109,554 MVCs, 708 of which were fatal in 2014; this rose to 116,609 collisions and 811 fatalities in 2015.

Prior studies have concluded the following as factors contributing to MVCs:

- Intoxication
- Unrestrained driver
- Driving above the speed limit
- Medical conditions such as epilepsy
- Certain locations
- Lack of vehicle sturdiness

Cellular phone usage is becoming an increasingly common cause of MVCs, whether fatal or non-fatal. A study in Bakersfield, CA with 514 subjects from pre-hospital fatalities, specifically with central nervous system injuries, showed that the majority (53%) had an ethanol content during the time of the collision, while the second most common reason (45%) for the fatal MVC was texting while driving.

Because behavioral patterns in drivers and driving laws have the potential to be altered, an association between these variables and motor vehicle fatalities is worthwhile to analyze for future accident prevention and increasing education.

Fig. 1 Mechanisms of Injury

Fig. 2 Toxicology Results