Alcohol and other drug involvement in fatally injured drivers in the United States

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Abstract

Since 1982, the United States has been tracking the blood alcohol concentrations (BACs) of drivers fatally injured in traffic crashes. Since 1998, some U.S. states have been tracking drugs other than alcohol in fatally injured drivers. Using the U.S. Fatality Analysis Reporting System (FARS), we (a) examined the trends from 1982 to 2011 for BACs in fatally injured drivers and (b) examined the use of other drugs in fatally injured drivers in recent years. In 2010, 71% of driver fatalities were tested for BAC. For other drugs, only states with a known lab result for at least 80% of fatally injured drivers who died at the scene were included in our analyses (nine states). When BAC data are unavailable, it is statistically imputed using crash characteristics to obtain more complete and accurate alcohol data. In 2011, 33% of fatally injured drivers had impairing BACs (≥.05 grams per decilitre [g/dL]); 31% were at or above the illegal BAC limit in the United States (BAC >.08g/dL); and 23% had very high BACs (≥.15g/dL). These percentages are a vast improvement over 1982 when the percentages were, respectively, 52% (≥.05g/dL), 49% (≥.08g/dL), and 35% (≥.15g/dL). Fatally injured drivers in single-vehicle crashes who died at the scene in the nine high-testing states between 2000 and 2010 indicated that 27% tested positive for drugs other than alcohol (recreational, medicine, etc.), with 8% having cannabinoids and 7% having stimulants in their systems at the time of the fatal crash. Reasons for the decline in alcohol-impaired driving between 1982 and 1997 are described. Resuming progress in reducing impaired driving may require lowering the illegal BAC limit for driving and increasing the focus on drugs other than alcohol.

Background

Motor-vehicle crashes are the leading cause of death for Americans age 4 and ages 11 through 27 (Subramanian, 2012). In the United States, alcohol-impaired driving was involved in 31% of fatal crashes in 2010 and resulted in more than 10,000 deaths (National Center for Statistics and Analysis, 2012). Alcohol-related crashes cost the U.S. society an estimated \$129 billion in 2006 (Zaloshnja & Miller, 2009). A national roadside survey (NRS) of nighttime weekend drivers in 2007 indicated that 2% of the drivers on the roads had illegal BACs (Lacey et al., 2009b). Zador, Krawchuk, and Moore (2000) estimated that only 1 of 88 drivers with illegal BACs is arrested for driving while intoxicated (DWI). A national telephone survey of more than 10,000 drivers showed that U.S. drivers admitted to 85.5 million drinking-driving trips in the past 30 days during 2008 (Moulton, Peterson, Haddix, & Drew, 2010). Although impaired driving was reduced in the United States between 1982 and 1997, little has been achieved since that time (Dang, 2008; Fell, Tippetts, & Voas, 2009). In recent years, 1.4 to 1.5 million drivers are arrested annually for DWI (FBI, 2012), which was more arrests than for larceny or theft, assaults, weapons charges, or vandalism, as examples. About the same number of people is arrested each year for drug abuse violations as for DWI.

Aims

The aims of this study were (a) to examine trends from 1982 to 2011 based on the presence of BAC in fatally injured drivers in the United States and (b) to examine the prevalence of other drugs in fatally injured drivers in recent years.

Methods

Alcohol

The FARS is a census of all fatal crashes (defined as a death of a participant within 30 days of the crash event) occurring on U.S. public roadways and reported to the police. FARS analysts are stationed in each of the 50 states, the District of Columbia, and Puerto Rico. They collect data in more than 100 categories from several state data sources (including state crash report records, driver records, death certificates, vehicle registration files, and other sources), which they enter into a local computer database. Alcohol involvement is documented through BAC test results collected by police or coroners. When such data are unavailable, the BACs of drivers, pedestrians, and cyclists are statistically imputed using crash characteristics (such as a police report of driver impairment) to obtain more complete and accurate alcohol data (Subramanian, 2002). This imputation is available in FARS for each year from 1982 through the current year. It provides a BAC value for every driver, pedalcyclist, and pedestrian in the FARS file.

Other drugs

Drug information in FARS has improved in recent years. About 16 states have provided drugtesting results for at least 80% of their fatally injured drivers for the past 10 years. For this part of the study, we used the 2000-2010 FARS. We limited our sample to fatally injured drivers (surviving drivers are rarely tested for drugs) who died at the scene (to avoid confounding our results by the provision of medications to the drivers by caregivers after the crash), and from states with a known lab result for at least 80% of the drivers. We further limited our sample to nine states with a sample of at least 300 drivers in each year (to allow for meaningful trend estimates). To ensure proper identification of crash responsibility, we also excluded drivers who (a) presented a condition signalling them as mentally challenged; (b) were involved in a police chase; (c) were driving buses, snowmobiles, construction or farm equipment; or (d) were parked or in the process of parking a vehicle.

Results

Alcohol

Between 1982 and 1997, the proportion of fatally injured drivers with impairing levels of alcohol (BACs \geq .05 g/dL) decreased from 52 to 34% (a 35% reduction in that proportion) but then levelled off at 33-36% up through 2011 (Figure 1).





The percentage of fatally injured drivers who were intoxicated (BACs \geq .08 g/dL) went from 49% in 1982 to 32% in 1997 (a 35% reduction) and then levelled off at 31-33% up through 2011 (Figure 2).



Fig 2. Proportion of all fatally injured drivers estimated to have been legally intoxicated (BAC≥.08), 1982-2011, [-35%]

The percentage of fatally injured drivers with very high BACs (\geq .15 g/dL) was reduced from 35% in 1982 to 23% in 1997 (a 34% reduction) and then remained at 22-24% through 2011 (Figure 3).





Other drugs

Overall, from 2000 to 2010, 45% of fatally injured drivers tested positive for alcohol (with 40% at BACs \geq .08 g/dL) and 27% for other drugs. The most common drugs present were stimulants (7%) and cannabinols (marijuana) (8%), followed by other drugs (4%), multiple drugs (4%), narcotics (2%), and depressants (2%) (Figure 4). The prevalence of cannabinols among the fatally injured drivers has increased from about 4% in 2000 to 11% in 2010.

Alcohol and other drugs

The association between drug and alcohol use is positive, particularly between marijuana and high BAC drivers. We found that almost 60% of all drivers positive for marijuana had a BAC \geq .08 g/dL, and among those fatally injured drivers positive for stimulants, 42% had BACs \geq .08 g/dL.



Fig 4. Drug prevalence in fatally injured drivers in single-vehicle crashes/driver died at scene FARS 2000-2010, nine states with $\geq 80\%$ testing for drugs

Discussion

The United States enjoyed a remarkable downward trend in crashes related to alcohol-impaired driving between 1982 and 1997, which has since levelled off. That trend coincided with a period during which per capita alcohol consumption declined and the number of young drivers decreased, but those factors alone did not appear to account for the overall reduction. Thus, safety program activity may have been responsible for at least some of the decline. Previous studies have shown that certain laws (e.g., lowering the per se limit to .08; administrative license revocation [ALR]) and enforcement programs (e.g., high-visibility checkpoints) can significantly reduce the number of alcohol-involved drivers in fatal crashes by effect sizes in the 7 to 10% range per intervention (Shults et al., 2001). Further, lowering of the per se BAC limit (e.g., .08 to .05 g/dL), coupled with increased enforcement efforts, might feasibly save as many as 1,700 to 3,400 more lives per year (Transportation Research Board [TRB], 2010).

In the analysis of other drugs, we found the prevalence of alcohol-positive drivers (45%) was significantly higher than for drug-positive drivers (27%). Drug prevalence in our sample also was substantially higher than among the drivers in the 2007 NRS: 11.2% with drugs in the daytime and 14.4% at night (Lacey et al., 2009a). Prior analyses show that alcohol and drugs contribute differently to crash risk and may also indicate that the mechanisms and patterns for which alcohol and drugs contribute to crash risk are different. Recently, Romano and Pollini (2013, in press) supported this conclusion by reporting that drug-impaired driving differs from alcohol-impaired driving, as the hourly patterns of crash-related fatalities involving drugs differed significantly from those involving alcohol. These and related findings by Romano and Voas (2011) that individual drug classes are associated with various traffic violations (e.g., red-light running, speeding) in fatal crashes suggest that criteria for developing effective laws and enforcement strategies to reduce driving under the influence of drugs (DUID) may need to be significantly different than those currently applied to alcohol.

Finally, our trend analysis revealed that the prevalence of marijuana among fatally injured drivers is steadily increasing. Interestingly, this trend for marijuana reverses the one for alcohol, whose prevalence among fatally injured drivers has been stalled for at least 15 years. Despite findings showing the contribution of marijuana and other drugs in drivers killed in crashes is smaller than that of alcohol, the continuous increase in marijuana use among fatally injured drivers calls for continuous monitoring of the relative contribution of drugs and alcohol to fatal crashes. These findings contribute to a growing body of literature suggesting that concerns about DUID should complement, not supplant, the current law enforcement focus on alcohol-impaired driving at night.

Conclusion

The United States has fallen behind several nations in its progress to reduce impaired driving (TRB, 2010). Notably, Australia and Sweden have substantially lower percentages of fatally injured drivers at impairing levels of BAC (Figure 5). Tougher laws (e.g., lowering the BAC from .08 to .05 g/dL) could potentially save thousands of U.S. lives (Fell & Voas, 2009; Wagenaar, Maldonado-Molina, Ma, Tobler, & Komro, 2007). The rationale for lowering the BAC limit to .05 is compelling: (a) the risk of a crash and driving performance decrements are significant at .05; (b) most U.S. drivers do not think one should drive after 2 to 3 drinks (a BAC of .05 for most people); (c) studies from Australia and Europe indicate a reduction in impaired-driving crashes after lowering their limit from .08 to .05 BAC; and (d) most nations have adopted .05 BAC (63 have .05 vs. 21 with .08) and many U.S. and world public health organizations endorse the .05 BAC limit.



Sources: Australia — Department of Infrastructure, Transport, Regional Development and Local Government, 2009. United States — Fatality Anaysis Reporting System. Sweden — Department of Forensic Genetics and Forensic Toxicology, Linköping, Sweden

Fig 5. Percentage of fatally injured drivers with a BAC of .05 or more in Australia, Sweden, and the United States

Our findings may also provide a foundation for exploring targeted drug testing of impaired drivers. For example, a daytime female driver older than 65 who appears impaired but records a BAC<.08 might be tested for narcotics, which is more likely to yield a positive result than cannabinols. Narrowing down the tests required to identify the drug causing driver impairment could be valuable to law enforcement agencies operating on limited budgets. However, our study only justifies targeted testing as an area for further study as our data were limited to fatally injured drivers who died at the scene of single-vehicle crashes in nine states and not the entire U.S. driving population. More research on the key components of the DUID problem is needed before targeted drug testing can become a feasible policy. Of primary importance is characterizing the actual contribution of drugs to impairment and crashes, both alone and combined with alcohol.

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