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Differences in state drug testing and reporting by driver type in U.S. fatal traffic crashes

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ABSTRACT

Introduction: Driving under the influence of drugs, including marijuana, has become more prevalent in recent years despite local, state, and federal efforts to prevent such increases. The Fatality Analysis Reporting System (FARS) is the primary source of drugged driving data for fatal crashes in the United States but lacks the completeness required to calculate unbiased estimates of drug use among drivers involved in fatal crashes.

Methods: This article uses the 2013 FARS dataset to present differences in state drug testing rates by driver type, driver fault type, and state-level factors; discusses limitations related to analysis and interpretation of drugged driving data; and offers suggestions for improvements that may enable appropriate use of FARS drug testing data in the future.

Results: Results showed that state drug testing rates were highest among drivers who died at the scene of the crash (median = 70.8%) and drivers who died and were at fault in the crash (median = 64.4%). The lowest testing rates were seen among surviving drivers who were not transported to a hospital (median = 14.0%) and surviving drivers who were not at fault in the crash (median = 10.0%). Drug testing rates differed by state blood alcohol content (BAC) testing rate across all driver types and driver fault types, and in general, states that tested a higher percentage of drivers for BAC had higher drug testing rates.

Discussion: Testing rates might be increased through standardization and mandatory testing policies. FARS data users should continue to be cautious about the limitations of using currently available data to quantify drugged driving. More efforts are needed to improve drug testing and reporting practices, and more research is warranted to establish drug concentration levels at which driving skills become impaired.

1. Introduction

In recent years in the United States, government officials have become increasingly concerned about the issue of drugged driving. It has been characterized as a serious and growing threat to public safety (Compton and Berning, 2015). In response to this concern in 2010, the Office of National Drug Control Policy (ONDCP) announced a 5-year goal of reducing drugged driving in the United States by 10% (ONDCP, 2010). Results from the 2013–2014 National Roadside Survey (NRS) indicate that drugged driving has risen since 2007 (Berning et al., 2015). This increase may have stemmed, in part, from changes in state policies on medical and recreational marijuana use. During the time between the 2007 and 2013–2014 surveys, seven states legalized medical marijuana, and two states legalized recreational marijuana. It is not possible, however, to compare or track state-by-state changes over time with NRS data.

Along with the NRS, the Fatality Analysis Reporting System (FARS) has been frequently used in attempts to quantify the extent and nature of drugged driving. The FARS dataset was developed in 1975 by the National Highway Traffic Safety Administration (NHTSA) and contains data derived from an annual census of fatal motor vehicle traffic crashes in the United States (Meier, 1985). Although the majority of FARS data are assumed to be relatively complete, certain variables, including alcohol and drug test results, are admittedly incomplete. In 2013, blood alcohol concentration (BAC) results were known for 71% of drivers who were killed and for only 28% of drivers who survived fatal crashes (U.S. DOT, 2013).

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NHTSA uses multiple imputation to replace each missing BAC with 10 imputed values to allow further analysis to estimate alcohol involvement in fatal crashes where BAC tests were not conducted or reported. In 2013, drug test results were available for even fewer drivers, 57% for killed drivers, and 17% for surviving drivers. FARS only records up to three drugs for each driver and does not include any information on the amount of each drug detected. When four or more drugs are present, the first three drugs are reported based on FARS drug hierarchy (i.e., narcotics over depressants over stimulants over hallucinogens over cannabinoid over phencyclidine [PCP] over anabolic steroid over inhalant) (U.S. DOT, 2014). Unlike for BAC, no imputation for missing drug data is available in FARS, making data analysis and interpretation challenging.

In contrast to BAC, the missingness mechanism of drug data in FARS is nonignorable (i.e., missing not-at-random), which violates the general assumption of multiple imputation techniques (i.e., missing at random) and limits the feasibility of conducting valid imputation. The missing not-at-random means that the probability of missing drug data depends on drug tests per se in addition to various factors unknown or not observed in FARS. The 2009 NHTSA report to Congress indicated a considerable variation existed among laboratories in terms of equipment, procedures, and training of personnel conducting the tests (Compton et al., 2009). The scope and sensitivity of drug testing were highly variable across laboratories (Farrell et al., 2007; Logan et al., 2013). Berning and Smither(2014, p. 1) also brought several limitations of FARS drug data to the data users' attention—"no consistent policy or set of procedures between, or sometimes even within, States"; "[c]onsiderable variation exist[ing] regarding who is tested; which drug is tested for; type of test, cut-off levels, and equipment; and which biological specimen (blood, urine, or oral fluid) is used"; and "unequal reporting to FARS from labs across jurisdictions." Additional limitations of the FARS dataset are the use of free-text fields to record drugs detected, resulting in misspellings and redundant drug names; the use of generic and product names for the drugs detected; and the fact that the FARS analysts often rely on word-of-mouth reporting of the drug findings and do not have access to printed copies of the toxicology reports.

To overcome insufficient drug data in FARS, researchers generally chose select subsamples for their analysis, such as drivers who died within 1 h of a crash in a limited number of states that performed toxicological testing on more than 80% of their fatally injured drivers (Brady and Li, 2013, 2014; Keyes et al., 2015; Romano et al., 2014; Romano and Pollini, 2013) or drivers with known blood test results for drugs (Gates et al., 2013; Maxwell et al., 2010; Pollini et al., 2015; Reguly et al., 2014). These studies may have suffered from selection bias when using the trends observed in the selected states to represent national trends or when the risk factors of interest are associated with not only drugged driving but also the chance of being selected for drug testing. For example, states that have medical marijuana laws and higher rates of marijuana use have higher drug testing rates (Masten and Guenzburger, 2014), potentially artificially inflating drugged driving rates from analyses limited to states with high testing rates. Medical examiners/coroners (ME/C) and law enforcement officials may be more likely to request drug testing for drivers who appear more impaired or have characteristics known to be associated with drugged driving (e.g., male, younger) (SAMHSA, 2005), thus inflating associations by excluding many nonimpaired drivers from analyses.

Current limitations of the FARS drug data prevent the calculation or imputation of unbiased, reliable, and valid estimates of drug use among all drivers involved in fatal crashes in all 50 states and the District of Columbia (Berning and Smither, 2014; Compton and Berning, 2015). A better understanding of current drug testing practices across states could shed light on possible directions for improvements that may enable appropriate use of FARS drug testing data in the future. To this end, in this paper, we (1) present differences in state drug testing rates by driver type and various state-level factors; (2) discuss other limitations related to analysis and interpretation of drugged driving data; and (3) offer suggestions for improvements.

2. Methods

We obtained driver vital status, hospital transport information, fault criteria, and drug and BAC testing results from the 2013 FARS dataset for all 50 states and the District of Columbia. A total of 44,574 people were identified as being a driver of a motor vehicle in-transport that was involved in a fatal crash in 2013. Due to missing information about vital status and/or transport to a hospital, 278 (0.6%) drivers were excluded, leaving 44,296 for analysis. For the purposes of this analysis, drug and BAC testing rates reflect the proportion of drivers who had a valid test result reported in FARS (i.e., if a driver was tested but the results were not reported to FARS, the driver was not categorized as having been successfully tested).

We divided drivers involved in fatal crashes into the following four categories based on scenarios that dictate who is involved in the processes of obtaining and testing blood samples and reporting results to FARS (Casanova et al., 2012):

Type 1: Drivers who died at the scene of the crash or prior to the crash ($n = 12{,}129$)

Type 2: Drivers who died en route to or at a hospital ($n = 8678$)

Type 3: Drivers who were transported to a hospital and survived ($n = 9379$)

Type 4: Drivers who were not transported to a hospital and survived ($n = 14{,}110$)

For Type 1 drivers, the ME/C is responsible for deciding whether to draw blood and have it sent to a laboratory for drug testing (often in addition to BAC testing). For Type 4 drivers, law enforcement officers are responsible for deciding whether to have a blood sample drawn and sent to a laboratory for testing. For Types 2 and 3, the responsibilities and processes can vary and are a complex mix between those of Types 1 and 4. For example, responsibility for testing remains with law enforcement as long as the driver is alive, but it shifts to the ME/C if and when the driver dies. Most hospitals routinely draw a blood sample from seriously injured patients for medical purposes but can only release test results or a portion of the blood sample with specific authorization, such as a warrant from law enforcement, a subpoena or authorized request from the ME/C, or the driver's consent (if the driver is willing and able). Responsibility for reporting drug test results to FARS often lies with the law enforcement officers or ME/Cs who requested the tests. In some states, centralized state laboratories may report the results directly to FARS.

Additionally, we examined drivers by fault status (i.e., at fault in the crash or not at fault in the crash). Drivers were classified as "at fault" if they were involved in a single-vehicle crash or if they had one or more of the violations or related factors used to determine fault in a previous NHTSA report (see Appendix Table A.1 for details) (Stutts et al., 2009). Drivers were divided into the following four driver fault types based on vital status and fault status:

Type A: Drivers who died and were at fault in the crash ($n = 16{,}801$)

Type B: Drivers who died and were not at fault in the crash ($n = 4006$)

Type C: Drivers who survived and were at fault in the crash ($n = 12{,}618$)

Type D: Drivers who survived and were not at fault in the crash ($n = 10{,}871$)