DRUG-IMPAIRED DRIVING

A GUIDE FOR WHAT STATES CAN DO

GHSA
Governors Highway Safety Association®
The States' Voice on Highway Safety

FOUNDATION FOR
ADVANCING ALCOHOL
RESPONSIBILITY

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ABOUT THIS REPORT

This report was prepared by Dr. James Hedlund under contract with the Governors Highway Safety Association (GHSA), the national association of state and territorial highway safety offices that address behavioral highway-safety issues, including drug-impaired driving. An open forum on drugged driving at GHSA's 2014 Annual Meeting noted the need for this type of resource. Funding was provided by the Foundation for Advancing Alcohol Responsibility (Responsibility.org).

The report was guided by an advisory panel of experts from the states, the research community, and several organizations concerned with impaired driving. It provides references to research and position papers, especially papers that summarize the research on drugs and driving that have appeared in the last 20 years. It includes information obtained by GHSA from a survey of state highway safety offices. It does not attempt to be a complete review of the extensive information available on drugs and driving.

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INTRODUCTION

Drug-impaired driving is an increasingly critical issue for states and state highway safety offices. In 2013, the most recent year for which data are available, NHTSA's **Fatality Analysis Reporting System (FARS)** reported that drugs were present in 40% of the fatally-injured drivers with a known test result, almost the same level as alcohol (FARS, 2015). NHTSA's 2013–2014 roadside survey found drugs in 22% of all drivers both on weekend nights and on weekday days (Berning et al., 2015). In particular, marijuana use is increasing. As of August 2015, marijuana may be used for medical purposes in 23 states and the District of Columbia (NCSL, 2015a). Recreational use is allowed in Alaska, Colorado, Oregon, Washington and the District of Columbia and 16 other states have decriminalized possession of small amounts of marijuana (NCSL, 2015b). Congress is considering HR 2598 which would require NHTSA to issue guidance on the best practices to prevent marijuana-impaired driving (http://1.usa.gov/1Cld6yr). Legislatures, law enforcement, and highway safety offices in many states are urged to "do something" about drug-impaired driving, but what to do is far from clear.

Legislatures, law enforcement, and highway safety offices in many states are urged to

"DO SOMETHING"

about drug-impaired driving, but what to do is far from clear.

Drug-impaired driving is more complex than alcohol-impaired driving for many reasons.

- Hundreds of different drugs can impair drivers.
- Some drugs that can impair driving are illegal to use, some are legal to use under certain conditions, and some are freely available over-the-counter.
- For many drugs the relation between a drug's presence in the body, its effect on driving, and its effects on crash risk is complex, not understood well, and varies from driver to driver.
- Data on drug presence in crash-involved drivers are incomplete in most jurisdictions, inconsistent from state to state, and sometimes inconsistent across jurisdictions within states.
- It's more difficult for law enforcement to detect drug impairment at the roadside than alcohol impairment.
- Laws regarding driving while under the influence of drugs (DUID) vary across the states.
- It's more difficult to prosecute and convict a driver for DUID than for alcohol-impaired driving (DUI).

This report summarizes the current state of knowledge on drug-impaired driving, including what little is known about the costs and effectiveness of these actions, and identifies actions states can take to reduce drug-impaired driving.

CHEMISTRY AND EPIDEMIOLOGY

WHAT IS A DRUG AND HOW MANY ARE THERE?

Definition of a drug. For this report, a drug is any substance that can impair driving. There are four broad categories of drugs:

- Illegal drugs: the main families are narcotics, stimulants, depressants (sedatives), and hallucinogens. See the Drug Enforcement Administration (DEA, 2015) for fact sheets on over 20 specific drugs and drug families.
- Legal non-medicinal drugs.
- Prescription medications.
- Over-the-counter medicines that may be used freely without a prescription.

In addition, other substances not usually considered drugs can impair. Examples include volatile solvents such as gasoline, paint thinner, and glue, and gases such as aerosols.

These categories aren't precise. In particular, marijuana is illegal in some states and is on the DEA Schedule I illegal drug list of "drugs with no currently accepted medical use and a high potential for abuse" (DEA, 2015b) but is a prescription medication in other states and is legal for recreational use still in other states.

This report concentrates on illegal drugs and marijuana, with other drugs noted as appropriate. It compares drug prevalence, impairing effects, laws, enforcement, sanctions, and prevention programs with the well-established facts, laws, and programs associated with alcohol-impaired driving.

HOW MANY DRUGS ARE THERE?

HUNDREDS, with more created regularly.

FARS has codes for 430 specific drugs or metabolites, from Acetaminophen + Codeine to Zopiclone.

In 2013, at least one instance of 80 of these drugs was reported by states for fatally-injured drivers, together with other drugs not in the FARS list (FARS, 2015). The DRUID (Driving under the Influence of Drugs, Alcohol and Medicines) project, the extensive 19-nation European study of drugs and driving, lists 22 drugs and alcohol as the most common in European drivers (Schulze, 2012).

A single drug can have different names and can take different chemical forms. For example, marijuana is the substance that's smoked or swallowed while its principal psychoactive component is tetrahydrocannabinol (THC), or more precisely its main isomer Δ^9-THC. FARS has separate codes for marijuana, THC, Δ^9-THC, and Unknown Cannabinoid.

HOW FREQUENTLY ARE DRUGS PRESENT IN DRIVERS?

DRIVERS IN CRASHES

The best data come from fatal crashes because drivers in fatal crashes, especially fatally-injured drivers, are tested for drugs more frequently than drivers in non-fatal crashes. In 2013 nationwide, 62.6% of the fatally-injured drivers were tested for drugs. Of those tested, no drugs were detected in 57.3%, a drug in the FARS list was found in 30.3%, some other drug in 7.7%, and test results were unknown for 4.6%. Over one-third – 34.7% – of the identified drugs were marijuana in some form, followed by amphetamine at 9.7% (FARS, 2015).

Alcohol was present at similar levels. In 2013, 74.3% of the fatally-injured drivers were tested for alcohol. No alcohol was detected in 57.6% of those tested, alcohol at a positive BAC in 38.4%, and test results were unknown for 3.9%.

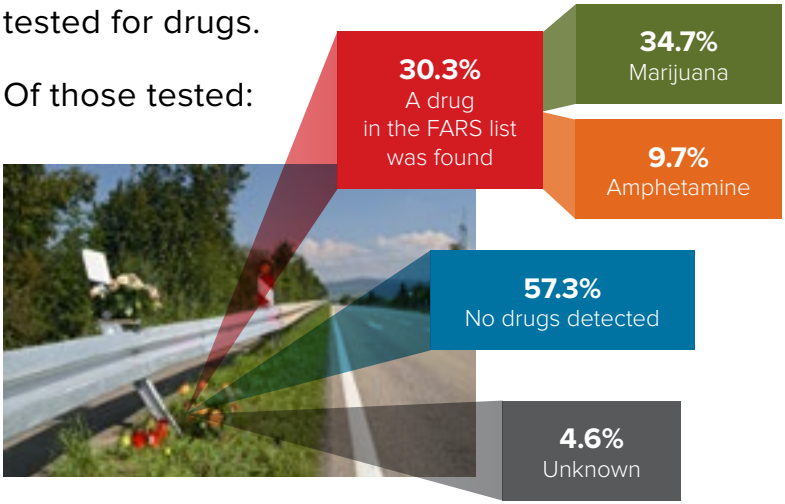
Fatally-injured drivers in Canada had similar drug and alcohol levels. In 2010, 34.2% were positive for drugs and 39.1% for alcohol, with marijuana present in 36.9% of the drug-positive drivers (Beirness, 2014b).

Only 31.2% of surviving drivers were tested for drugs in 2013. They had somewhat lower drug levels: no drugs in 56.0% of those tested, a drug in the FARS list in 23.4%, some other drug in 5.5%, and unknown test results for 15.2%. For surviving drivers, 30.4% of the identified drugs were marijuana.

Alcohol was tested in 31.2% of the surviving drivers in 2013. No alcohol was detected in 67.2%, alcohol at a positive BAC in 24.1%, and test results were unknown for 8.7%.

In 2013 nationwide, **62.6%** of the fatally-injured drivers were tested for drugs.

Of those tested:



While FARS has the best nationwide data on drug presence in drivers involved in crashes, FARS data have several critical limitations. FARS merely collects what the individual states report. States vary considerably in how many and which drivers are tested, what tests are used, and how test results are reported (Berning and Smithers, 2014). While 7 states tested 90% or more of their fatally-injured drivers in 2013, 2 states tested 10% or fewer (FARS, 2015). The FARS marijuana codes do not distinguish clearly between the active impairing component THC and various inactive and non-impairing metabolites (Grondel, 2015). And FARS records only drug presence, not drug concentrations analogous to BAC levels for alcohol. For these and other reasons, FARS drug data should be interpreted with caution.

ROADSIDE SURVEYS:

	Weekday Days	Weekend Nights
Tested positive for some drug or medication	22.4%	22.5%
Illegal drugs, including marijuana	12.1%	15.2%
Medication	10.3%	7.3%
Marijuana	11.7%	12.6%
Alcohol	1.1%	8.3%

DRIVERS ARRESTED FOR DUI

A recent study provides the best available data (Logan et al., 2014). Of 92 drivers arrested for DUI in the Miami area, 41% tested positive for some drug. Fifty-one of these drivers had a BAC of 0.08 or above and 39% of them also tested positive for a drug.

ROADSIDE SURVEYS

In 2013-14, NHTSA conducted a roadside survey of drivers during weekday days and weekend nights (Berning et al., 2015). In each time period, 22% of the drivers tested positive for some drug or medication. Illegal drugs, including marijuana, were somewhat more prevalent on weekend nights (15.2%) than weekday days (12.1%). Medication prevalence was the opposite, with 7.3% on weekend nights and 10.3% on weekday days. Marijuana was by far the most prevalent drug, with 12.6% of drivers testing positive on weekend nights. Alcohol presence was considerably lower: 8.3% of the weekend night drivers had a positive BAC level (.005 BAC or above) with 1.5% at a BAC of 0.08 or above. On weekday days, only 1.1% had a positive BAC and 0.4% a BAC of 0.08 or above.

A 2012 Canadian roadside survey reported lower drug levels: 7.4% positive for any drug, of which 3.3% were positive for marijuana; 6.5% had a positive BAC (Beirness, 2014b). Drug types varied considerably by age, with marijuana the most common drug by far among teenage drivers, depressants and narcotics among the oldest drivers, while marijuana, depressants, stimulants, and narcotics were present in similar levels among middle-aged drivers.

DRUG AND ALCOHOL USE IN THE POPULATION

Table 1 reports drug and alcohol use within the past month from the National Surveys on Drug Use and Health for 2014 (NSDUH, 2015).

TABLE 1. ALCOHOL AND DRUG USE, 2014, FROM SURVEY DATA.

Percent using in the past month	Age 18-25	Age 26 and older
Any illegal drug (including marijuana)	22.0%	8.3%
Marijuana	19.6%	6.6%
Alcohol	59.6%	56.5%

(NSDUH, 2015)

In a 2014 roadside survey in Washington conducted primarily in evening hours,

44% of the drivers reported that they had driven within two hours of using marijuana

in the past year (PIRE, 2014).

CHANGES IN DRIVER DRUG USE

Measured in national data, drug use has increased in recent years. In FARS, drugs were detected in 27.8% of fatally-injured drivers with known test results in 2005, 32.8% in 2009, and 39.9% in 2013 (NHTSA, 2010; FARS, 2015). The proportion of drivers testing positive for prescription drugs has increased (Rudisill et al., 2014; Wilson et al., 2014). In NHTSA's roadside surveys, illegal drugs, including marijuana, increased from 12.4% in 2007 to 15.1% in 2013-14 and medications from 3.9% to 4.9% after adjusting the 2013-14 data to the same set of drugs and cutoff levels used in 2007 (Berning et al., 2015). In particular, marijuana (THC) increased from 8.6% in 2007 to 12.6% in 2013-14. Using current drugs and cutoff levels, the 2013-14 survey detected drugs in 22.4% of drivers on weekday days and 22.5% on weekend nights.

TABLE 2. PERCENT OF DRIVERS WITH DRUGS DETECTED.

Percent of drivers	2005	2007	2009	2013	2013-14
FARS – fatally-injured drivers	27.8%		32.8%	39.9%	
Roadside – 2007 procedures		12.4%			15.1%
Roadside – 2013-14 procedures					22.4%

FARS, drivers with known test results, all drugs: NHTSA, 2010; FARS, 2015
Roadside survey, illegal drugs including marijuana: Berning et al., 2015

EFFECTS OF MARIJUANA LAW CHANGES

Guenzburger and Masten (2013) found that a medical marijuana law was associated with increased marijuana presence in fatally-injured drivers in only 3 of the 14 states that implemented a law before 2010: California, Hawaii, and Washington. On the other hand, Salomonsen-Sautel et al. (2014) found that in Colorado, the proportion of drivers in a fatal motor vehicle crash who were marijuana-positive was 4.5% in the first 6 months of 1994, 5.9% in the first 6 months of 2009, and 10% at the end of 2011. Colorado's medical marijuana law was enacted in 2000 but became fully effective after restrictions on who could cultivate and distribute medical marijuana were greatly reduced in the summer of 2009. Pollini et al. (2015) found that there was no change in THC-positive driving among weekend nighttime drivers after California decriminalized marijuana use in January 2011, but there was a significant increase in crash fatalities involving cannabinoids. They suspect this was due to an increased attention to marijuana in fatal crashes after the law change.

Washington voters approved recreational marijuana use in November 2012. The proportion of suspected impaired driving cases that tested positive for marijuana (THC) averaged 19.1% from 2009-2012, then rose to 24.9% in 2013 (Couper and Peterson, 2014) and to 28.0% in 2014 and 33% in preliminary data from the first four months of 2015 (Couper, 2015)..

CONCLUSIONS ON DRUG PRESENCE IN DRIVERS

Given the uncertainties in defining and measuring drug use, these conclusions are stated fairly generally.

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WHAT DRUGS ARE KNOWN OR SUSPECTED TO IMPAIR DRIVING?

THE DRUGS THAT CAN IMPAIR DRIVING

A large enough dose of most drugs can impair. The purpose of any drug is to affect physical or mental conditions in some way. Even prescription medications can impair driving, which is why many come with warning labels such as, “Do not drive or operate heavy machinery when taking these medicines.”

DRUID reviewed 605 studies of reasonable quality, conducted between 1993 and 2007, of the effects of 33 different drugs on driving-related tasks measured in experimental situations. The results are summarized in a 772 page report (Berghaus et al., 2010). Many of these drugs other than stimulants were found to have impairing effects (Schulze et al., 2012).

THE EFFECT OF MARIJUANA ON DRIVING

In experimental settings, marijuana impairs psychomotor skills and cognitive functions associated with driving, including vigilance, time and distance perception, lane tracking, motor coordination, divided attention tasks, and reaction time (Compton and Berning, 2015; Hartman and Huestis, 2013; Kelly-Baker, 2014). Drivers may attempt to compensate by driving more slowly and increasing their following distance (Hartman and Huestis, 2013).

HOW DO DRUG EFFECTS CHANGE AS THE DOSE INCREASES OR IF DRUGS ARE COMBINED?

DRUG LEVELS AND IMPAIRMENT

The relations between a drug's presence in the body, its concentration, measured in blood, breath, saliva or urine, and its impairing effects are complex and not understood well. A drug may be present at low levels without any impairing effects. Some drugs or metabolites may remain in the body for days or weeks, long after any impairment has disappeared (Berning et al., 2015; GAO, 2015). In particular, marijuana metabolites can be detected in the body for weeks after use (Berning and Smither, 2014). On the other hand, concentrations in the body of some drugs decrease rapidly while impairing effects persist. For marijuana, THC concentrations fall to about 60% of their peak within 15 minutes after the end of smoking and to about 20% of their peak 30 minutes after the end of smoking while impairment lasts for 2 to 4 hours (Kelly-Baker, 2014; Logan, 2014).

In addition, individuals differ in how their bodies absorb and metabolize a drug. In experimental settings, wide ranges of drug concentrations produce similar levels of impairment in different individuals (Berning et al., 2015). NHTSA's observation is generally accepted: "At the current time, specific drug concentration levels cannot be reliably equated with a specific degree of driver impairment" (Berning et al., 2015). GAO (2015) agrees: "identifying a link between impairment and drug concentrations in the body, similar to the 0.08 BAC threshold established for alcohol, is complex and, according to officials from the Society of Forensic Toxicologists, possibly infeasible."

Alcohol is far simpler because it is quickly absorbed into the body and impairment is directly related to BAC.

The only generally accepted conclusion regarding drug levels and impairment is that impairment usually increases as a drug's concentration increases.

COMBINATIONS OF DRUGS

Impairment can increase if drugs are used in combination or together with alcohol. Alcohol and marijuana used together are particularly risky. Ramaekers et al. (2000) showed that the combined use of alcohol and marijuana "dramatically impaired driving performance." Hartman et al. (2015) showed that use of alcohol and marijuana together produces significantly higher blood concentrations of THC than marijuana use alone.

HOW DO DRUGS AFFECT CRASH RISK?

DRUGS AND CRASH RISK

The effects of drugs on driving-related tasks can be studied in experimental settings, where drug doses can be controlled and driver behaviors can be measured accurately. But impairing effects do not necessarily produce increased crash risk, because drivers may compensate by driving more carefully. And experiments typically use relatively low drug doses.

Crash risks can best be estimated with epidemiological studies that use real-world data. These generally use one of two methods. Culpability studies compare the rate at which drug-positive and drug-negative drivers are at fault for crashes. Case-control studies compare the proportions of drug use by drivers in crashes and drivers on the road. Studies using either method must control carefully for other factors that may affect crashes, such as driver age and time of day. See Compton and Berning (2015) for a good overview of the issues involved in studying how drugs affect crash risk.

Elvik (2013) provides a thorough review of studies published between 1976 and 2011 that investigated the effects of illegal drugs on crash risk. The 66 studies reviewed contain 264 estimates of the effects of 33 drugs. He presents estimates for amphetamines, analgesics, anti-asthmatics, anti-depressives, antihistamines, benzodiazepines, cannabis, cocaine, opiates, penicillin and zopiclone (a sleeping pill). He found that most drugs were associated with small or moderate crash risk increases and that the risk generally increased as the drug's concentration increased.

Elvik notes that the quality of the studies varied greatly, that most studies did not control well for other factors that may influence crash risk, and that the higher-quality studies tended to produce smaller crash risk estimates than the lower-quality studies.

Table 3 presents the DRUID summary of the effects of major drug categories on crash risk (Schulze et al., 2012; Griffiths, 2014). The authors note that many of the estimates "must be treated with caution." In the table, a driver with no drugs has a relative risk of 1. The final column shows that, in these studies, all drugs increase crash risk to some extent and amphetamines, multiple drugs, and drugs together with alcohol increase crash risk substantially. These conclusions are in general agreement with Elvik's review.

TABLE 3. CRASH RISK ASSOCIATED WITH DRUG USE IN EUROPEAN STUDIES

Risk level	Relative risk	Drug category
Slightly increased risk	1-3	marijuana
Medium increased risk	2-10	benzodiazepines cocaine opiods
Highly increased risk	5-30	amphetamines multiple drugs
Extremely increased risk	20-200	alcohol together with drugs

Shulze et al., 2012; Griffiths, 2014

Other studies confirm that the combination of alcohol with drugs produces higher risk than either alcohol or drugs alone (Romano et al., 2014).

NHTSA's recent drug and alcohol crash risk study (Compton and Berning, 2015) used a carefully designed case-control methodology. Its analyses controlled for road location, day of week, time of day, and driver age and gender. Its results for the crash risk of alcohol at different BAC levels are quite consistent with the extensive research on alcohol crash risk. Overall, the study found unadjusted increases in crash risk of 21% associated with illegal drugs and 25% associated with marijuana. After adjusting for other factors that affect crash risk, including driver age and gender, the crash risk increases were no longer statistically significant, suggesting that "these other variables ... were highly correlated with drug use and account for much of the increased risk associated with the use of illegal drugs and with THC."

It's useful to compare the crash characteristics of alcohol- and drug-involved drivers. In the United States, drug-involved crashes occurred with relative uniformity throughout the day while alcohol-involved crashes were more common at night (Romano and Pollini, 2013). Canadian fatal crashes involving alcohol typically involve young male drivers, in the early morning hours on weekends; often a single-vehicle run-off-road crash. In contrast, fatal crashes involving drugs include drivers of all ages, both male and female, on all days and all times, usually in a multiple-vehicle crash (Beirness, 2014b). These findings are consistent with NHTSA's roadside survey of drug and alcohol use patterns.

MARIJUANA AND CRASH RISK

Elvik's comprehensive review concluded that marijuana increased crash risk by a non-significant 26%. NHTSA's crash risk study found a 25% increase, much of which was associated with other driver factors. DRUID concluded that marijuana increases crash risk by a factor of 1 to 3 (Schulze et al., 2012).

Two other reviews of marijuana effects are quoted frequently. Asbridge et al. (2012) reviewed nine studies and concluded that "this meta-analysis of studies examining acute cannabis consumption and motor vehicle collisions, with adequate control groups, found a near doubling of risk of a driver being involved in a motor vehicle collision resulting in serious injury or death. The increased risk was most evident for high quality studies, case-control studies, and studies of fatal collisions." Hartman and Huestis (2013) reviewed ten studies and concluded that "the risk of involvement in a motor vehicle accident (MVA) increases approximately 2-fold after cannabis smoking." See Compton and Berning (2015) for discussion of issues in meta-analyses that attempt to summarize studies of drug effects on crash risk.

DRUGS AND CRASH RISK CONCLUSIONS

Given the many issues involved in studying the crash risk of drugs, particularly the need to control for other factors that affect crash risk and to account for the fact that most crash data record only drug presence rather than drug concentrations, the most defensible overall conclusions are:

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WHAT DO DRIVERS THINK ABOUT DRUG EFFECTS ON DRIVING?

DRUGS AND CRASH RISK

Many drivers do not understand how various drugs can increase crash risk.

In surveys and focus groups with regular marijuana users in Colorado and Washington, almost all believed that marijuana doesn't impair their driving, and some believed that marijuana improves their driving (CDOT, 2014; PIRE, 2014; Hartman and Huestis, 2013). Most regular marijuana users surveyed in Colorado and Washington drove "high" on a regular basis. They believed that they can compensate for any effects of marijuana, for instance by driving more slowly or by allowing greater headways. They believed it is safer to drive after using marijuana than after drinking alcohol.

Many young drivers in Australia were not aware that drugs can impair driving. Many believed that drugged driving was safer than alcohol-impaired driving or that drugs improved their driving (Barrie et al., 2011). Young drivers in Canada had similar views: drugged driving is less risky and less easily detected than alcohol-impaired driving; in particular, marijuana use does not impair and may even improve their driving (Holmes et al., 2014).

Many drivers
DO NOT UNDERSTAND
how various drugs can
INCREASE CRASH RISK.

DRUGS AND ARREST RISK

Many marijuana users in Colorado generally were not aware that driving with a marijuana concentration above Colorado's 5 ng *per se* limit is a traffic offense (CDOT, 2014). However, in a roadside survey in Washington, almost two-thirds of drivers said that it was either "likely" or "very likely" that a person could be arrested for impaired driving after using marijuana within two hours of driving (PIRE, 2014). In a nationwide survey, Canadian drivers believed that it is less likely that a driver will be stopped and charged for DUID than DUI (Jonah, 2013). In particular, only about a quarter of drivers thought it was very likely that a driver impaired by cannabis would be stopped and charged, compared to two-thirds for alcohol.

IS MARIJUANA A DRUG?

In focus groups, Canadian youth frequently stated that marijuana is not a drug because it is a natural product, quite distinct from "hard drugs" (Porath-Waller et al., 2013). They also questioned why medical marijuana could be good for you if you're sick but is illegal if you're healthy.

HOW DO DRUGS COMPARE WITH ALCOHOL?

As states consider strategies to reduce drug-impaired driving, it's useful to keep in mind the many ways in which drugs present different and more complex issues than alcohol.

- **Diversity:** hundreds of drugs; alcohol is alcohol.
- **Data on use by drivers and in crashes:** very limited for drugs; abundant for alcohol.
- **Driver use patterns:** all ages and times for drugs; young males on weekend nights far more prevalent for alcohol.
- **Trends:** drug use by drivers is increasing; alcohol consumption is decreasing.
- **Driving skill impairment:** varies by drug type; well-documented for alcohol.
- **Concentration effect on impairment:** varies by drug type, generally no established relation between drug level in the body and impairment; well-established relation between alcohol BAC in blood or breath and impairment.
- **Crash risk:** varies by drug type, with only broad qualitative estimates for some drugs; quite precise estimates of crash risk by BAC level for alcohol.
- **Driver beliefs:** some drugs don't impair driving and there's a low risk of arrest; alcohol impairs.
- **Societal attitudes:** no strong attitudes on drugs and driving; drinking and driving is socially unacceptable for many and the designated driver is a societal norm.

LAWS, ENFORCEMENT, PROSECUTION, ADJUDICATION, AND SANCTION

WHAT ARE THE LAWS REGARDING DRIVING UNDER THE INFLUENCE OF DRUGS?

There are three types of state laws regarding driving under the influence of drugs.

- Driving Under Influence of Drugs (DUID): illegal to drive while impaired by any drug.
- Zero Tolerance: illegal to drive with any amount of specified drugs in the body.
- *Per se:* illegal to drive with amounts of specified drugs in the body exceeding set limits.

See NMS (2014) for key provisions of each state's laws and procedures.

DUID LAWS

DUID is illegal in every state, in the same way that driving while impaired by alcohol (DUI) is illegal (DuPont et al., 2010). DUID has two requirements: the driver must exhibit signs of impairment through behavior observed by a law enforcement officer and the impairment must be linked to a drug.

On the surface, DUID laws are easy to understand and agree with as they directly address driving performance. However, they can be quite complex and difficult to enforce and prosecute. First, a law enforcement officer must observe and identify the driver's impairment. Then the officer must attempt to obtain chemical evidence of a drug, usually through a blood test, and must be able to link drug presence to the observed impairment. If the driver refuses a chemical test, the officer must rely on his or her observations. Both steps are more complicated and take longer than the equivalent steps for alcohol, where the signs and symptoms of alcohol impairment are well-understood, the Standardized Field Sobriety Tests (SFSTs) provide a quick roadside screen, admissible evidence of a driver's BAC level can be obtained quickly and easily with evidentiary breath test equipment that's widely available to law enforcement, and the link between alcohol and impairment is well-understood by prosecutors, judges, and juries.

Many officers are not trained to identify the signs and symptoms of drivers impaired by drugs other than alcohol. Delays in drawing blood for a test may allow drugs to metabolize, so that test results do not accurately measure a driver's drug concentration at the time of arrest. Drug testing is expensive. Some testing laboratories have substantial backlogs, so that test results may not be available when a case comes to trial. Linking a driver's impairment to a drug may be difficult if judges and juries do not understand how some drugs can impair driving.

Many officers are **NOT TRAINED** to identify the signs and symptoms of drivers **IMPAIRED BY DRUGS** other than alcohol.

ZERO TOLERANCE LAWS

Under a zero tolerance law it is illegal to drive with any measurable amount of specified drugs in the body. As of August 2015, 15 states had zero tolerance laws in effect (NCSL, 2015c). These laws differ across the states. In general, they prohibit driving with any amount of any drug or metabolite specified in the state's laws. North Carolina's and South Dakota's laws apply only to drivers under 21. State laws typically allow drivers to use medications for which the driver has a prescription.

Zero tolerance laws also are easy to understand. They send drivers a strong and clear message. They are modeled after the current zero tolerance alcohol laws for drivers under the legal drinking age of 21. "Any amount" of a drug usually means the least amount that can be detected by laboratory equipment to guarantee a valid and reliable result without false positives, in the same way that the alcohol zero tolerance limit typically is set at 0.02 BAC. Most states do not specify zero tolerance drug levels for blood and urine drug testing (DuPont et al., 2012).

Zero tolerance laws are easy to justify for illegal drugs: if it's illegal to possess or use a drug, then it's reasonable to prohibit driving after the drug has been possessed and used. A logical extension would be an "internal possession" law, prohibiting a person from having an illegal drug in his or her bloodstream independent of any driving. Most states do not have internal possession laws (DuPont et al., 2010). Zero tolerance laws also may help DUID prosecution (GAO, 2015; Lacey 2010).

However, zero tolerance laws have their limitations. They are difficult to justify for legal drugs because there is no evidence that the small concentrations that can be detected in the laboratory will produce any impairment in a driver. In the same vein, without a link to driver impairment, zero tolerance laws for illegal drugs may appear to be directed more to controlling drug use than to improving traffic safety. In particular, several states include metabolites of illegal drugs in their zero tolerance laws. Metabolites of some drugs can remain in the body for days or weeks, long after any impairment has ended. Zero tolerance laws do not stand on their own: because an officer cannot request a drug test without some indication of a driver's impairment, zero tolerance laws are linked directly to DUID laws (DuPont et al., 2012, Thomka, 2014), though they may be used for drivers injured in a crash when there is no opportunity to observe impairment.

PER SE LAWS

Under a *per se* law it is illegal to drive with amounts of specified drugs in the body that exceed set limits. As of August 2015, six states had *per se* laws in effect: three states only for THC (marijuana), two states for THC and other drugs, and one state for other drugs but not for THC (NCSL, 2015c; NCSL classifies Colorado's reasonable inference THC law as a *per se* law). Zero tolerance laws are *per se* laws with a limit of zero. *Per se* laws with limits greater than zero are discussed separately because they raise different issues.

Per se laws with a limit greater than zero are modeled after alcohol *per se* laws, set at a BAC of 0.08 in the United States. They are apparently straightforward but conceal some thorny issues. The most fundamental is that setting a positive *per se* limit, such as 5 ng for THC, implies that the limit is related to impairment and that all, or most, drivers have their abilities impaired at concentrations above the limit. The scientific evidence to establish such an impairment threshold for drugs simply does not exist, and may never exist.

"The development of impairment standards for drugs similar to the .08 *per se* standard for alcohol has failed, not for want of trying and not for want of serious research. This is because no standard relationship between blood levels of a drug or drug metabolites and impairment has been established."
(DuPont et al., 2012)

"For more than a quarter century, there has been a search for drug blood concentrations that are the equivalent of the 0.08 g/dL threshold for alcohol-impaired driving in the United States. We suggest that such equivalents are a mirage, and cannot be determined due to variable drug tolerance, lack of consistent relationships between drug blood concentrations and impairment, innumerable drug combinations and multiple other factors."
(Reisfield, 2012)

"Some toxicologists, including representatives from SOFT [the Society of Forensic Toxicologists], stated that a link between the [current] established [*per se*] thresholds and impairment levels cannot be supported scientifically."
(GAO, 2015)

Lacking a well-established link between drug concentrations and impairment, there are two potential justifications for a non-zero *per se* limit. If the drug is illegal, then a limit can be set at a threshold concentration, in essence defining a zero tolerance law, or at a higher limit, though a limit greater than zero appears to condone moderate use of an illegal drug (Logan, 2014; Thomka, 2014). Or a limit can be set for any drug at a concentration that appears high enough to assure that it produces some impairment, perhaps based on what some feel can be deduced from the available evidence.

Per se laws with non-zero limits require more precise chemical evidence than zero tolerance laws because a concentration above the *per se* limit rather than just a non-zero concentration must be demonstrated. Delays in obtaining a blood sample may allow the drug concentration to drop below the *per se* limit. Washington has a marijuana *per se* law and Colorado has a marijuana reasonable inference law, both with a 5 ng limit, but it's uncertain whether these laws have had much effect: a majority of recent DUID citations for marijuana in both states have concentrations below 5 ng (Logan, 2014; Wood, 2014).

Zero tolerance and *per se* laws need to account for legitimate users of prescription medications. A standard method is that zero tolerance or *per se* laws for a drug do not apply to drivers holding a valid prescription for that drug. Impairment-based DUID laws still apply.

TWO-TIER SYSTEM: DUID AND ZERO TOLERANCE OR *PER SE* LAWS

Some jurisdictions combine the two law types, with both an impairment-based DUID law covering all drugs and a zero tolerance or *per se* law for some drugs. Twenty-one states now have some form of this strategy in place. It combines the advantages of both systems. On the limited evidence to date, the addition of a zero tolerance or *per se* law does not appear to introduce complications into the standard DUID law.

SUMMARY OF CURRENT LAWS FOR MARIJUANA IMPAIRED DRIVING

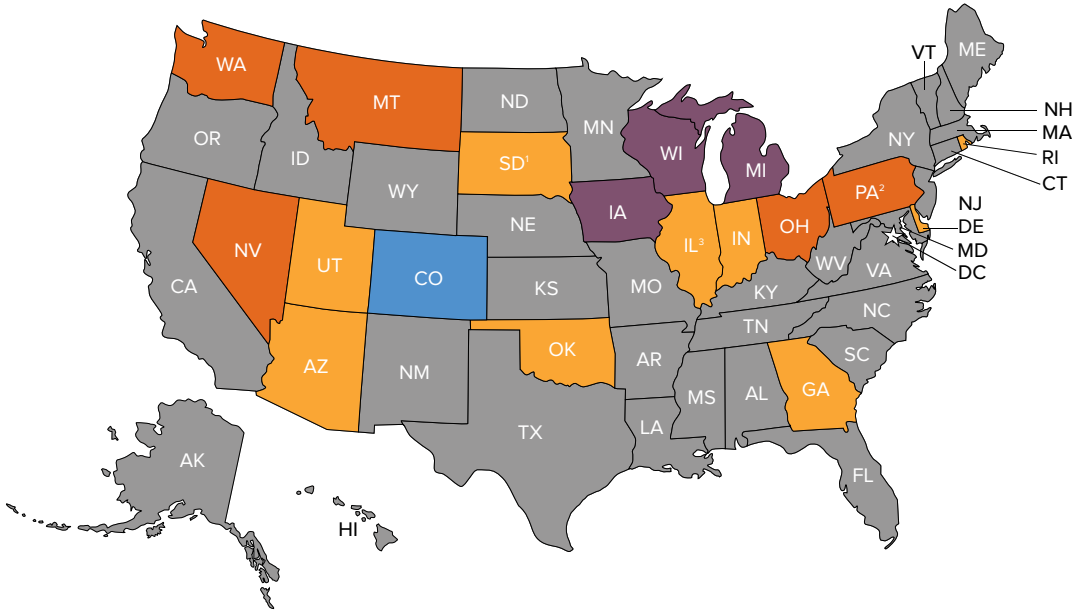
18 states have zero tolerance or non-zero *per se* laws for marijuana.

- 9 states: zero tolerance for THC or a metabolite (AZ, DE, GA, IL, IN, OK, RI, SD, UT).
- 3 states: zero tolerance for THC but no restriction on metabolites (IA, MI, WI).
- 5 states: *per se* limits for THC of 1 ng (PA), 2 ng (NV and OH), or 5 ng (MT and WA); NV, OH, and PA also have non-zero *per se* limits for metabolites.
- 1 state: reasonable inference law for THC with a 5 ng limit (CO).

STATE BY STATE:

Marijuana Drug-Impaired Driving Laws

AS OF AUGUST 2015



1 South Dakota is a zero tolerance state only for drivers under the age of 21.

2 Pennsylvania is often classified as both a zero tolerance and *per se* state. A minimum threshold of 1 ng is needed for a chemical test to be admitted into evidence for prosecution purposes.

3 Illinois is currently classified as a zero tolderance state. However, legislation has been passed and is awaiting the Governor's signature that would create a 15 ng *per se* limit.

Click on a color to highlight the states in that category

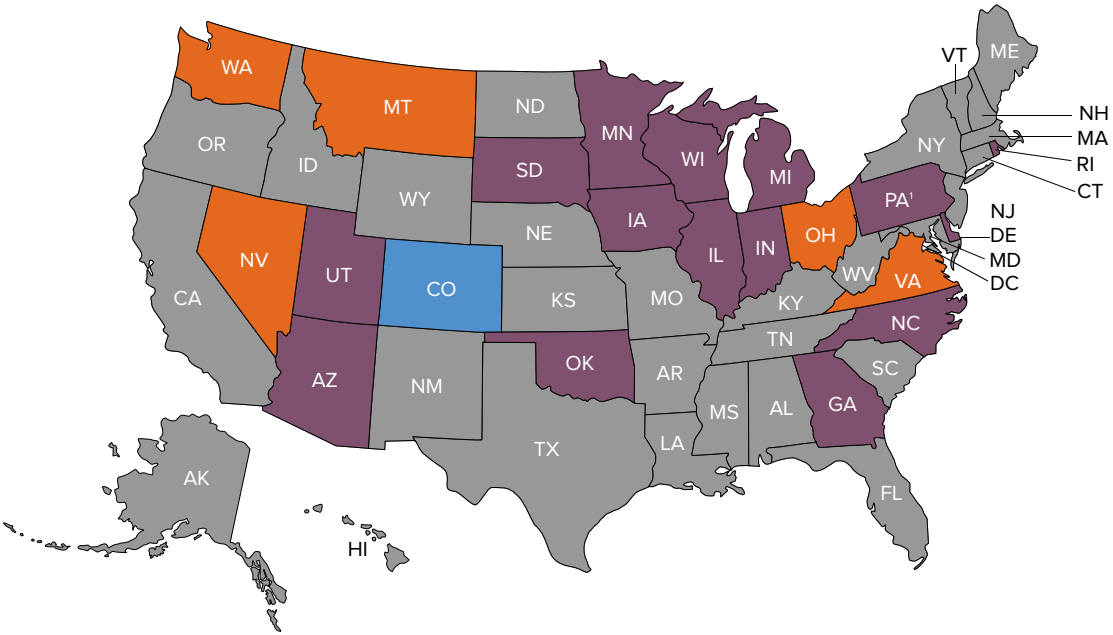
- Zero tolerance for THC and metabolites
- Zero tolerance for THC only
- THC *per se*
- Reasonable inference THC Law
- No zero tolerance or *per se* laws for marijuana

SHOW FULL MAP

STATE BY STATE:

DUID ZT or *Per se* for Some Drugs

AS OF AUGUST 2015



1 Pennsylvania has both a zero tolerance law for some drugs and a 1 ng *per se* law for THC. Pennsylvania's 1 ng *per se* law is in effect a zero tolerance law.

Click on a color to highlight the states in that category

- *Per se* limit greater than zero for some drugs
- Zero tolerance for some drugs
- Reasonable inference law with a limit greater than zero for THC

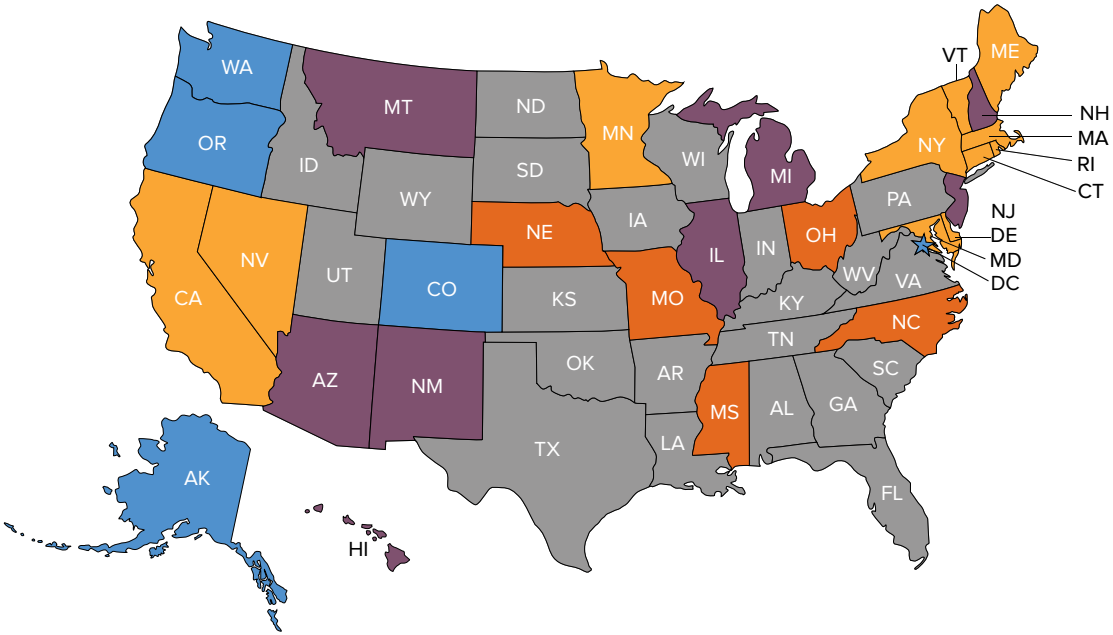
SHOW FULL MAP

NCSL 2015c.

STATE BY STATE:

Marijuana Possession and Use Laws

AS OF AUGUST 2015



Click on a color to highlight the states in that category

- Decriminalized (not medical or recreational)
- Medical (not decriminalized or recreational)
- Decriminalized and medical but not recreational
- Everything— recreational, decriminalized, and medical

SHOW FULL MAP

NCSL 2015a, 2015b.

ACROSS THE GLOBE:

Laws in Other Countries

In **Europe** in 2011, **9 countries had impairment laws like DUID, 13 countries had zero-tolerance laws, and 6 countries combined these two approaches into a two-tier system,** with three impairment-law countries planning on adding zero tolerance laws (Verstraete et al., 2011).

Per se limits for some 20 drugs have been established in Norway (Vindenes et al., 2012; CCSA, 2014; Schulze et al., 2012).

The United Kingdom appears to be **moving to a zero tolerance law** for more than a dozen illegal drugs (Ellis, 2014).

Australian states have two-tier systems with zero tolerance for some drugs while **Canada has an impairment law** (CCSA, 2014; Solomon and Chamberlain, 2014).

HOW ARE DUID LAWS ENFORCED?

AT THE ROADSIDE

DUID and DUI law enforcement begin in the same way. A driver is stopped for a traffic law violation or at a checkpoint. Then the officer determines if there is any reason to suspect that the driver is impaired by alcohol or a drug. This is based on what the officer observes about the driver's behavior and any other signs such as the odor of alcohol or marijuana, beer bottles, marijuana cigarettes, or the like.

The behavioral signs of impairment by drugs differ from alcohol and differ by the type of drug (GAO, 2015). In brief:

- Alcohol: slurred speech, poor balance, alcohol odor
- Depressants: slurred speech, drowsy, disoriented
- Cocaine: hyperactive and alert, talkative, irritable, nervous, anxious
- Marijuana: tremors, incomplete thoughts, marijuana odor

SFST

If impairment is suspected, the officer usually will begin by checking for impairment from alcohol using field sobriety tests (SFSTs) or Preliminary Breath Test (PBT) instruments. The procedures for making an arrest, obtaining a BAC from a breath or blood sample, prosecuting a DUI charge, and obtaining a conviction are far easier, quicker, and cheaper for DUI than for DUID. As a result, if an officer observes impairment and detects or suspects that alcohol is a cause, often only DUI evidence and charges will be pursued. Other drugs will be considered only if alcohol is ruled out or the observed impairment is not consistent with the driver's BAC level (GHSA, 2015).

The SFSTs also provide a reasonable initial screen for impairment from stimulants, depressants, marijuana, and narcotic analgesics (Porath-Waller and Beirness, 2014a, 2014b; Papafoitou et al., 2006). But they fail to detect other drugs, especially amphetamines (Downey et al., 2012a; Silber et al., 2005) and low levels of marijuana (Bosker, Kuipers et al., 2012; Downey et al., 2012b). In general, the SFSTs detect drug impairment better in field situations, where officers can observe and use other clues, than in experimental laboratory studies.

Many officers have not been trained to recognize the behavioral signs of drugs other than alcohol (GAO, 2015). ARIDE, the 16-hour Advanced Roadside Impaired Driving Enforcement course, provides officers with basic information on drug impairment, including the signs and symptoms of impairment produced by the major drug categories. Unlike SFST, ARIDE typically is not included in basic police academy training. As a result, ARIDE penetration varies considerably by state, from most officers in some states to only a few in others (GHSA, 2015). In 2013, a total of 541 in-person ARIDE classes trained approximately 10,440 officers (IACP, 2013) out of more than 700,000 patrol officers nationwide (Reaves, 2011). Other officers received online ARIDE training.

SALIVA AND BREATH

A good saliva (oral fluid) device to test for the presence of key drugs would help roadside enforcement substantially (GAO, 2015). It would provide objective data to justify an arrest and to require a blood or urine sample for an evidential test and would identify the drug category that the evidential test should examine. It should be quick, easy, minimally invasive, and inexpensive.

The effectiveness of a testing device is summarized by three measures:

- **Sensitivity:** the proportion of drug-positive drivers that were correctly identified.
- **Specificity:** the proportion of drug-negative drivers that were correctly identified.
- **Accuracy:** the overall proportion of tests that were correct, both positive and negative.

While high accuracy is ideal, the two components may not be equally important. If sensitivity is low, then many drug-positive drivers will not be detected. If specificity is low, then many drug-negative drivers will be arrested and required to provide a blood sample for testing, only to have their charges dismissed when no drugs are found in a blood or urine test.

Several oral fluid devices are now available. The best current models would serve as useful roadside screeners. They are easy to use, are not intrusive, and can identify the most common drugs that impair drivers. They cost about $20 per use and produce results in less than 5 minutes. They have high specificity so that most drug-negative drivers will be correctly identified. Several states have conducted field tests of oral fluid screeners with promising results. In a formal evaluation, DRUID evaluated eight devices and found three with both sensitivity and specificity of more than 80% (Schulze et al., 2012). Logan et al. (2014) evaluated two in a field test and found sensitivities of 51 and 53%.

The currently available devices are not yet of evidential quality. GAO (2015) concluded that “currently, there is no validated roadside drug-testing device.” Owusu-Bempah (2014) reviewed four studies of oral fluid devices for marijuana and concluded that, while promising, current devices “have not yet achieved an acceptable level” of sensitivity, specificity, and accuracy.

A portable breath test device similar to the PBT would be a valuable roadside screening tool, even if it could detect only a few key drugs. Research is currently underway to develop one for marijuana (Santos, 2014). Even if this research is successful, it will be several years before a breath test device becomes commercially available.

AT THE POLICE STATION

If the officer has sufficient evidence at the roadside to justify a DUID charge, the driver is arrested and taken to a police station or other processing area. There are two main tasks at the station in addition to the standard procedures for an arrest: to obtain additional behavioral evidence of impairment by drugs and to obtain a blood or urine sample for chemical analysis.

BEHAVIORAL EVIDENCE: DEC

The Drug Evaluation and Classification (DEC) program trains officers to be Drug Recognition Experts (DREs) who can identify the signs and symptoms of impairment by different categories of drugs. At the police station a DRE performs a 90-minute 12-step evaluation including both behavioral tests and a physical examination.

As of December 2013, there were **7,155 certified DREs** active in all 50 states and the District of Columbia, with **1,129 new DREs added** in 2013 (IACP, 2014).

In 2013, the states reported **24,193 DRE evaluations** conducted by 4,511 DREs to NHTSA's data tracking site. The 48 reporting states averaged **504 evaluations**, with very few states either under 100 or over 1,000.

DREs usually are quite accurate in confirming a driver's drug impairment and identifying the type of drug responsible for the impairment (Porath-Waller and Beirness, 2010; 2014b). The main issues are the expense of training and the need to provide adequate coverage. The DRE training of 72 hours in the classroom and 40 to 60 hours in the field takes an officer away from regular duties for 3 to 4 weeks. To be effective, a DRE should be available to evaluate a substantial proportion of drivers suspected of impairment by drugs. This means that a state must have an adequate number of DREs and they should be located throughout the state (Davis, 2015).

It's also important to remember that a DRE cannot evaluate a driver unless the investigating officer at the roadside has enough evidence of drug impairment to arrest the driver and bring him or her to the police station. And while a DRE's evidence is important, it may not be essential: it's only one part of the evidence supporting a DUID conviction.

CHEMICAL EVIDENCE: BLOOD TESTS

A chemical test of a driver's blood, urine, or saliva provides objective proof of the presence or absence of drugs in a driver's body. Blood tests are the most accurate and most commonly used (Logan et al., 2013; GAO, 2015). An officer can request a blood sample from a driver arrested for DUID, but the driver may refuse, as did 31% of recent DUI arrestees in Colorado (Davis, 2015). State laws on the consequences of refusal vary substantially.

Obtaining a blood sample can take several hours. A search warrant from a judge is required for a non-voluntary blood draw except in rare circumstances. To speed up this step, Washington is pilot testing ELIAS – the Electronic Law Enforcement Interface for Acquisition of Search Warrants – a statewide, web-based electronic search warrant system for law enforcement, judiciary, prosecutors and court staff (Baldwin, 2014).

If a trained phlebotomist is not available to draw a blood sample at the police station, the driver may need to be transported to a hospital or clinic. The delay from the driver's first contact with law enforcement at the roadside until a blood sample is drawn may allow the driver's drug concentration to drop considerably (GAO, 2015).

Analyzing a blood sample can be expensive: about $150 in Vermont (Flannigan, 2015) and $300 in Colorado (Davis, 2015). Laboratory backlogs may produce long delays until results are available, so that some DUID cases may need to proceed without the test results (GAO, 2015; GHSA, 2015). Laboratory test procedures are not standardized so that different laboratories test for different drugs and use different threshold values (Logan et al., 2014; GAO, 2015; NTSB, 2012). Hundreds of different drugs can impair. The National Safety Council recommends testing for 33 "Tier 1" drugs "that are most prevalent in US driving populations, and for which there is the strongest evidence of impairment. Importantly, the Tier 1 drugs can all be detected by the use of commercially available immunoassays, utilized in most laboratories" (Logan et al., 2013).

HOW ARE DUID CHARGES PROSECUTED AND ADJUDICATED?

Many prosecutors and judges are not familiar with DUID cases. If a case involves both DUID and DUI, prosecutors usually will bring only the DUI charge because it is easier to explain to the judge and jury and is less expensive to prosecute (Thomka, 2014). Marijuana in particular may be perceived by judges and juries as "just marijuana" and medical or recreational marijuana may be legal in the state where the case is tried.

Some states report that DUID prosecution is difficult because judges expect a specific drug concentration that's considered impairing, similar to .08 BAC (GHSA, 2015). Others note that judges may not accept DRE evidence of impairment (GHSA, 2015).

Prosecutors, judges, and juries accustomed to alcohol impairment may not understand that drug impairment differs. For example, an officer's description or a video recording of a drug-impaired driver's roadside behavior will differ from what judges and juries expect of a drunk driver (Thomka, 2014). Prosecutors and judges both need training in DUID (Thomka 2014; GAO 2015).

Many prosecutors and judges
ARE NOT FAMILIAR
with DUID cases.

WHAT ARE EFFECTIVE SANCTIONS FOR CONVICTED DUID OFFENDERS?

The basic sanctions for DUID should be comparable to those for DUI. There's one exception: an alcohol interlock is required for repeat DUI offenders in many states and first-time DUI offenders in 25 states but is useless for DUID offenders. Enhanced sanctions are appropriate for drivers using both alcohol and drugs because of the greatly increased crash risk produced by their combined effects.

An essential consideration in sanctions for convicted DUID offenders is that their drugged driving offense likely is only one manifestation of drug dependence or addiction. The same is also true of some DUI offenders. This dependence or addiction means that the standard deterrence model of traffic laws and sanctions may have little effect. Instead, DUID sanctions can help offenders change their drug use which in turn will reduce drug-impaired driving. Four interrelated components that can help are drug screening, drug treatment, intensive supervision, and drug courts. More generally, traffic safety efforts to reduce DUID should partner with agencies and programs that address drug issues broadly.

DRUG AND ALCOHOL SCREENING

Both DUID and DUI offenders should be screened and assessed for substance use disorders. Several screening and assessment instruments are available. The National Institute on Drug Abuse (NIDA) provides information on drug and alcohol screening and assessment instruments at http://www.drugabuse.gov/nidamed-medical-health-professionals/tool-resources-your-practice/screening-assessment-drug-testing-resources/chart-evidence-based-screening-tools-adults. Two instruments for use with impaired drivers have been developed and are being tested: the Cambridge Health Alliance's Computerized Assessment and Referral System (CARS) and the American Probation and Parole Association's Impaired Driving Assessment (IDA). See http://responsibility.org/wp-content/uploads/2015/03/CARS-Summary-2014.pdf and http://www.nhtsa.gov/staticfiles/nti/pdf/812022-Screening_for_Risk_and_Needs.pdf for more information on CARS and IDA respectively.

DRUG TREATMENT

Most states responding to GHSA's survey use some form of drug treatment for DUID offenders. Drug treatment can be effective, but only if the treatment regime is followed carefully. Judges and probation officers can monitor offenders and can provide incentives and motivation to stick with the treatment requirements as well as impose consequences for failures.

INTENSIVE SUPERVISION

Half the states responding to GHSA's survey reported using some form of intensive supervision to monitor convicted DUID offenders. One model is South Dakota's 24/7 program, begun in 2005, for DUI offenders who must abstain from alcohol as a condition of probation (http://apps.sd.gov/atg/dui247/index.htm). It requires offenders to be tested twice daily. The program reduced repeat DUI and domestic violence arrests for participating offenders (Kilmer et al., 2013). Washington's 24/7 sobriety program operates similarly and tests for alcohol, marijuana, and any controlled substance (www.waspc.org/24-7-sobriety-program).

DUI/DRUG COURTS

DUI courts and drug courts combine treatment, close supervision, and regular court appearances to change offender behavior. DUI (or DWI) courts traditionally deal with convicted DUI offenders. The National Center for DWI Courts (NCDC) lists more than 625 DUI courts in the United States (www.dwicourts.org/find-a-court). Adult drug courts traditionally deal with non-traffic drug offenders. The National Association of Drug Court Professionals (NADCP) lists more than 2,800 in the United States (www.nadcp.org/learn/find-drug-court). A DUI/drug court is a combination of the two, dealing with the special issues of DUID offenders, often operating within a drug court. As of June 2014 there were 448 DUI/drug courts in operation (Harron and Kavanaugh, 2015).

Most states responding to GHSA's survey reported using drug, DUI, or DUI/drug courts for some DUID offenders. Michigan has regionalized their DUI/drug courts with a goal of having one available to any offender in the state who qualifies (GHSA, 2015).

Mitchell et al. (2012) reviewed 28 evaluations of DUI/drug courts. Their meta-analysis found substantial reductions in recidivism in most studies. They concluded that "the evidence assessing [DUI/drug] courts' effectiveness is very promising but more experimental evaluations are needed."

EDUCATION PROGRAMS

In addition to the basic strategy of enacting, enforcing, prosecuting, and adjudicating DUID laws, education programs to address drugged driving can be directed to the public or to assist persons involved in activities to control drugged driving.

PROGRAMS FOR INFORMING THE PUBLIC

The public's understanding of drug-impaired driving is limited. Programs for the public seek to raise awareness and knowledge. "Public education more explicitly focused on the dangers of drugged driving is needed, particularly on impairment due to prescription and OTC medications and marijuana" (GAO, 2015). Examples of state drugged driving messages used in their traffic safety campaigns include:

PRESCRIPTION MEDICATIONS:

- **Arkansas:** Arkansas Take Back, a program to dispose of unused medications (artakeback.org)
- **New York:** Drugged Driving Is Impaired Driving (www.safeny.ny.gov/audiovideo.htm)
- **Oklahoma:** as part of their overall ENDUI (End DUI) campaign (enduiok.com)

MARIJUANA:

- **Colorado:** Drive High, Get a DUI; both marijuana and medications. (www.codot.gov/safety/alcohol-and-impaired-driving/druggeddriving)
- **Washington:** Drive High, Get a DUI BBQ. (wtsc.wa.gov/programs-priorities/impaired-driving/)

YOUNG DRIVERS:

- **Ohio:** Drugged Driving = Done Driving is a grassroots program launched by RADD, in partnership with the Office of National Drug Control Policy (ONDCP), SADD, GHSA, Ford Driving Skills for Life, and the Ohio Office of Traffic Safety. This is one of the first statewide efforts to reach teens about the dangers of drugged driving. The campaign includes peer-to-peer social media efforts, grassroots engagement through youth and traffic safety groups, public service announcements, and support from local and national celebrities, political and law enforcement leaders, and national organizations. This effort is modeled after successful public/private partnerships that effectively addressed seat belt use and alcohol-impaired driving. The initial advertising campaign of August 2015 previewed material that will be used for the full

campaign launch occurring in October 2015. See www.radd.org for more information.

GAO's only recommendation to NHTSA in its 2015 report *Additional Support Needed for Public Awareness Initiatives* is that "the Secretary of Transportation direct the Administrator of NHTSA to identify actions – in addition to the agency's currently planned efforts – to support state efforts to increase public awareness of the dangers of drug-impaired driving" (GAO, 2015). NHTSA accepted this recommendation.

Holmes et al. (2014) reviewed the literature on youth drugged driving prevention programs. They document four program models and three awareness campaigns that show some promise in altering youth attitudes and perceptions about drug use and driving.

Beirness (2014a) reviewed four good drug prevention campaigns, not specific to driving, that had been evaluated. The evaluations found that the campaigns produced modest changes in attitudes, awareness, and knowledge but little evidence of behavior change. He identified approximately 100 drugged driving awareness messages, using a wide variety of strategies, media, and target audiences.

Beirness' findings and recommendations agree with those from an overall assessment of highway safety public information and education campaigns (Williams, 2007). If done well – and many are not – they can provide information and help form attitudes but by themselves are unlikely to change behavior. Good campaigns should

- **Start with a plan:** define their goals and target audiences carefully;
- **Say something new:** communicate something the target audiences don't already know;
- **Do their homework:** know what strategies, messages, and delivery methods will be effective with the target audiences; and
- **Be high-quality and long-term:** deliver the messages effectively, with sufficient intensity, over enough time to make an impact.

For an overview of behavioral theories which road safety campaigns are based on and a summary of the research evidence on campaign effectiveness see Robertson and Pashley (2015).

DRIVER EDUCATION

Half the states responding to GHSA's survey reported that their driver education courses included information on drugged driving.

EMPLOYER PROGRAMS

One-third of the states responding to GHSA's survey reported that some employers provided programs or training regarding drugged driving.

OTHER EDUCATION AND PREVENTION PROGRAMS

A host of programs address drug use in general and are not discussed here. One with a close connection to DUID is Drug Impairment Training for Educational Professionals (DITEP), a two-day course derived from and offered through DEC. Its goal is to make high school nurses, principals, and other staff competent and confident in evaluating and documenting students suspected of abusing and being impaired by drugs (www.decp.org/community/ditep.htm).

PROGRAMS FOR PERSONS INVOLVED IN CONTROLLING DRUGGED DRIVING

TRAINING

The ARIDE and DEC courses for law enforcement are discussed in previous sections. In addition, many states include some basic drug driving awareness in their SFST training. Information on ARIDE and DEC training is available through the International Drug Evaluation & Classification Program (DECP) at www.decp.org/training/.

Prosecutor training is available through the National Traffic Law Center (NTLC) and the National Center for DWI Courts (NCDC). NTLC's Prosecuting the Drugged Driver: A Trial Advocacy Course is designed to create a team building approach between prosecutors and law enforcement officers. Each participant has the opportunity to prosecute a mock case including the opportunity to conduct a direct examination of a DRE and a toxicologist. Information is available at www.ndaa.org/ntlc_training.html and www.decp.org/training/.

Most states have a Traffic Safety Resource Prosecutor (TSRP) who can help provide education and training to prosecutors. See www.ndaa.org/ntlc_resources.html for the contact list as well as for other resources available through NTLC.

A Drugged Driving Essentials course for judges is offered through the National Judicial College (NJC) (www.judges.org/courses/2014/dde0514.html). It recognizes that "drugged driving has no bright-line test for impairment. These cases require a judge to utilize a variety of tools to effectively adjudicate." Participants learn to "describe the major classes of drugs and how they affect driving; discuss the role of a drug recognition expert (DRE) and qualify him or her as an expert; identify effective and efficient sentencing options; and prepare legally sufficient orders for continued court supervision."

Some states have developed their own training for law enforcement, prosecutors, and judges.

RECOMMENDATIONS FOR STATES

The major bullet points (■) give the key recommendations for states. The minor bullet points (●) provide suggestions for states to consider as they implement the key recommendations. In these, DUID refers to the offenses of Driving Under the Influence of Drugs in state law.

PLANNING AND COORDINATION: THE ABCs OF IT

A

- **Assess** your state's drugged driving issues: understand where you stand now.
  - Drugged driving in your crash and arrest data and any available survey data
  - Public knowledge and attitudes regarding drugged driving
  - DUID laws
  - DUID enforcement, prosecution, adjudication, and sanction
  - Drugged driving education and prevention programs

B

- **Build** partnerships.
  - Identify partners and stakeholders broadly, from health groups to marijuana and industry activists
  - Consider forming a broadly based statewide impaired driving task force to address both DUI and DUID

C

- **Create** a drugged driving strategic plan, working with partners and stakeholders.
  - Network with other states, especially those that have legalized recreational marijuana
  - Plan for the next stage of legal marijuana – decriminalized, medical, or recreational, depending on your state's current laws
  - Get the key components in place before they're needed: education campaigns, laws, training, testing, data systems; be proactive, not reactive
  - Perhaps incorporate portions of the drugged driving strategic plan into your Strategic Highway Safety Plan

Discussion: Drug-impaired driving efforts should work closely with all partners and stakeholders. These include representatives of law enforcement, prosecutors, judges, probation, treatment procedures, professional, toxicologists, researchers, testing equipment manufacturers, public health organizations, hospitals, EMS, physicians, pharmacists, drug manufacturers, advocacy groups that support or oppose recreational drug use, and others. One method used in several states is a comprehensive impaired driving task force addressing both alcohol and drugs.

More than half the states allow either recreational or medical marijuana use or have decriminalized possession of small amounts. Bills to legalize or decriminalize are introduced regularly in more than a dozen states. When a bill is enacted it can take effect quickly, while proper preparation for a law's implementation can take several years. States are well advised to plan ahead for what may happen rather than being surprised when it does happen. This includes assessing where you are now and what may change, building partnerships, and strategic planning. Consider networking with states that already have recreational, medical, or decriminalized marijuana to learn what they did and what they wish they had done.

States can address some of the recommendations, such as continuing ARIDE and DEC training for law enforcement officers, fairly quickly and easily with available resources. Other recommendations, such as expanding drug testing, could be accomplished soon but would require additional funds. Others, such as data system changes, will take both additional funding and substantial time. Still others depend on successful research and development, such as methods for accurate drug screening at the roadside. As they develop their strategic plans, states must balance the costs, benefits, and implementation time of the various actions they could implement.

EDUCATION

- Develop and implement education campaigns on drugged driving: the size of the problem, the risks of drugged driving, and the laws and penalties for DUID; include prescription medicines.
  - Do your homework: define target audiences, message points, and delivery methods carefully; DUI messages and strategies may not be appropriate
    - Your state's crash, arrest, licensing, and court data will help define the problem size and characteristics
    - Your state's survey data will help clarify the public's knowledge and attitudes
    - Key targets include youth, parents, physicians and pharmacists, and marijuana advocates and users
  - Include drugged driving in driver education, high school programming, and employer programs
  - Educate physicians and pharmacists on prescription medicine risks

Discussion: the public knows little about drugged driving – what drugs can impair and how they impair, the risks of driving while impaired, the contribution of drugged driving to crashes, injuries, and fatalities, and the laws and penalties for DUID. Raising the priority of DUID requires public support, which in turn depends on public knowledge and attitudes. As discussed earlier, a campaign should be well planned and executed. It should be based on facts: states may wish to begin planning by examining the extent of drug-impaired driving in their crash and arrest data and public knowledge and attitudes in their survey data.

LAWS AND SANCTIONS

- Establish a zero tolerance law for illegal drugs.
- Establish a zero tolerance law for all drugs, including marijuana, for drivers under 21.
- Establish a *per se* law for marijuana if recreational marijuana use is legal.
- Examine your state's DUID laws and revise as needed; potential topics include:
  - Consider separate charges and penalties for DUI and DUID and enhanced penalties for drivers impaired by both alcohol and drugs
  - Allow oral fluid and other bodily fluid screening tests
  - Include oral fluid tests in implied consent laws
  - Provide substantial penalties for test refusal
  - Assure that DUI and DUID laws and sanctions are comparable; for example, consider administrative license revocation (ALR) for DUID

Discussion: DUID already is illegal in all states. A zero tolerance law for illegal drugs can help DUID enforcement, prosecution, and adjudication, in much the same way that .08 BAC *per se* laws help DUI enforcement, prosecution, and adjudication. A zero tolerance law also sends a strong message to drivers. In recreational marijuana states a *per se* law sends the message that marijuana can impair. There is no scientifically-based *per se* level comparable to the .08 BAC level for alcohol, so the marijuana *per se* level will be driven by political and operational considerations.

States should craft their laws carefully. States may wish to define minimum thresholds for concentrations of the most common drugs and determine if the law will include metabolites. States should enact any other laws or policies needed to support zero tolerance laws and *per se*, such as providing substantial penalties for test refusal, allowing for oral fluid screening tests in addition to an evidentiary test, and allowing for electronic warrants for tests if needed.

DUID is impaired driving, so the basic sanctions for DUID should be comparable to those for DUI. There's one exception: an alcohol interlock should not be required for DUID offenders unless both drugs and alcohol were used.

In addition, states should consider enhanced sanctions for drivers using both alcohol and drugs because of the greatly increased crash risk posed by combining alcohol and drugs.

Many states combine DUI and DUID under "impaired driving" in crash reports, arrests, and charges. This practice makes it very difficult to determine the size and characteristics of drug-impaired driving. States should separate the two and should encourage law enforcement to use either or both as appropriate.

TRAINING

- Train law enforcement officers.
  - Basic drugged driving awareness for all
  - ARIDE (Advanced Roadside Impaired Driving Enforcement) for patrol officers
  - DEC (Drug Evaluation and Classification) for enough officers to provide timely response to DUID arrests
  - Set annual goals for ARIDE and DEC training
- Train prosecutors.
  - Resources include your Traffic Safety Resource Prosecutors (TSRPs) and the National Traffic Law Center (NTLC) on-line publications
- Train judges.
  - Resources include your Judicial Outreach Liaisons (JOLs) and the National Judicial College (NJC)

Discussion: training is critical. All officers should receive some basic awareness training regarding DUID, perhaps as part of their required SFST training. States should set a goal of providing ARIDE training to all patrol officers. States should have enough DREs available to provide adequate coverage. States with limited ARIDE- or DEC-trained officers should set annual goals.

Prosecutors and judges responsible for DUI and DUID cases also should receive training. Prosecutor training should be ongoing, as DUID cases often are assigned to relatively inexperienced prosecutors.

TESTING

- Test all fatally-injured drivers for drugs.
  - Encourage testing of all surviving drivers in fatal crashes, as allowed by state law
- Test all DUID arrestees for drugs.
  - Allow electronic warrants for blood tests if appropriate
  - Encourage testing of all DUI arrestees for drugs
    - Consider oral fluid tests for roadside screening, followed by a chemical test only if screening is positive
- Assure that laboratories provide drug test results for timely prosecution of DUID cases.

Discussion: States should attempt to test all fatally-injured drivers. Many of the obstacles to obtaining drug tests, and the strategies to overcome them, are similar to those for BAC tests, which are described in Casanova et al. (2012). State medical examiners or coroners should make drug tests a part of their standard procedures for investigating accidental deaths, as is the case currently in several states. It would be useful to test as many surviving drivers in fatal crashes as is reasonably feasible. Many of them are treated in hospitals or emergency departments where blood is drawn routinely and analyzed for drugs to assist the driver's treatment. The costs to obtain these test results and enter them into the crash data system would be minimal.

DUID arrestees should be tested to obtain evidence for their prosecution. Use of oral fluid screening devices should help determine which drivers should be arrested for DUID and also help identify what drugs should be included in a chemical test, which in turn would reduce testing costs. Electronic warrants or the equivalent may be needed to assure that a blood or urine sample can be obtained relatively quickly. Test refusal penalties should be substantial enough to encourage cooperation.

Drug test costs are a major obstacle to increasing testing rates. The strategies noted above may help reduce costs.

Delays in obtaining drug test results can affect DUID prosecution. States should work with their toxicology laboratories to assure that they have the necessary facilities, equipment, and staff to provide prompt and accurate test results.

PROSECUTION AND ADJUDICATION

- Screen and assess all DUID and DUI offenders to identify drug and alcohol problems and any co-occurring mental health issues.
- Address offender drug problems through drug courts, intensive supervision, and drug treatment.

Discussion: Many DUID offenders are addicted to or dependent upon drugs or have undiagnosed mental health issues. Their drug-impaired driving is only one consequence of their lifestyle and can't be addressed in isolation. DUID offenders should be screened for drug abuse issues. If any are detected, drug treatment, encouraged by close supervision under the authority of a drug court judge, can help change their lives in many ways, not just their driving.

DATA

- Track DUID and DUI separately in crash, arrest, licensing, and court data to the extent possible.
- Use surveys to gauge public knowledge and attitudes regarding drugged driving.
- Evaluate the effects of any law or program changes.
  - Law changes include decriminalized, medical, or recreational marijuana
  - Program changes include education campaigns and increased law enforcement, prosecutorial, and judicial training
  - Consider roadside surveys to evaluate major law or program changes

Discussion: States cannot estimate the size or characteristics of their drugged driving problem without good data on drugs in crashes and arrests. This requires drugs and alcohol to be assessed and recorded separately.

All states conduct regular surveys to track highway safety issues such as impaired driving and Click It or Ticket seat belt use campaigns. A few questions on drugged driving in these surveys can provide valuable information on public knowledge and attitudes.

New York provides an example of a promising new DUID data system. The Institute for Traffic Safety Management and Research (ITSMR) has developed and implemented a data entry and management system for use by New York's DREs. The system allows DREs to enter data from their drug evaluations directly onto a tablet using pop-up screens. The data are then transferred directly into a central data system where they are easily accessible. The system also helps the New York DRE coordinator manage the statewide DRE program.

In 2014, approximately 125 DREs were trained in the use of the system and approximately 40 tablets were in use in the field. Approximately 130 more will be placed in service in 2015. Since inception, the tablets have received glowing remarks from users and administrators and New York has received inquiries from over 10 states seeking to use the system.

NATIONAL RESEARCH AND PROGRAM NEEDS

Several actions at the national level would help states reduce drug-impaired driving.

EDUCATION

- Develop and implement a national drugged driving education campaign.
- Develop materials for prosecutors and judges on prosecuting, adjudicating, and sentencing DUID offenders, perhaps beginning with an on-line ARIDE course for prosecutors.
- Provide information for state legislators through the National Conference of State Legislatures (NCSL).

NATIONAL EDUCATION CAMPAIGN

A national campaign would support and complement state education efforts, as recommended by GAO (2015).

INFORMATION FOR PROSECUTORS, JUDGES, AND LEGISLATORS

A series of short briefs for prosecutors on basic drugged driving information would be useful and well-received. Topics could include basic DUID, marijuana, and prescription medications. Similarly, many judges could use short briefs on legal issues of DUID such as DRE evidence and Frye or Daubert hearings as well as information on sentencing practices and how to deal with offenders' drug addiction. State legislators could use accurate, focused, and impartial information when faced with pressures to legislate.

ENFORCEMENT

- Develop accurate, inexpensive, and convenient roadside oral fluid testing devices.
- Develop accurate, inexpensive, and convenient roadside breath testing for marijuana.
- Continue evaluating the usefulness of the Standardized Field Sobriety Tests (SFSTs) for identifying impairment by various drugs; if needed, explore whether additional roadside behavioral tests could help.

ROADSIDE ORAL FLUID TEST DEVICE

An accurate, reliable, and inexpensive oral fluid test device that could be used at the roadside would be very useful. It should be quick and easy to use and should detect the most common drugs that impair drivers. If an oral fluid test were of evidential quality for some drugs it might reduce the need for blood tests. Research is needed to continue refining, evaluating, and eventually establishing standards for oral fluid test devices.

ROADSIDE MARIJUANA BREATH TEST DEVICE

A marijuana breath test device would be valuable. Marijuana is the most common drug used by drivers in most states, so a breath test specific to marijuana would be justified. Marijuana concentrations in the body dissipate rapidly, so the ability to test at the roadside would be especially valuable. Continuing research is needed to determine if a useful marijuana breath test device can be developed.

DATA

- Establish national drug testing best practices for the drugs to test and the threshold concentrations for each.
- Update the crash data collection guidelines related to drugs in the Model Minimum Uniform Crash Criteria Guideline (MMUCC) and other national guidelines.
- Revise the Fatality Analysis Reporting System (FARS) coding to include drug concentrations (ng levels) as well as drug presence.

The fundamental data gap is that there are no consistent national data on the extent of drug-impaired driving in the United States (GAO, 2015) and poor data in many states. There are several obstacles to obtaining accurate data:

- Many drivers in crashes or arrested for DUI are not tested at all for drugs.
- Drivers use many different drugs and it is impossible to test for all; in particular, new “designer drugs” are developed constantly.
- Drug testing is expensive.
- Current drug tests require a bodily fluid – blood, urine, or saliva. Obtaining a fluid is more time-consuming and invasive than obtaining a breath sample for an alcohol test.
- Some drug concentrations dissipate rapidly, so delays in drawing blood produce spuriously low results.
- Metabolites of some drugs remain in the body long after any impairment has disappeared, producing spuriously high results.

Nevertheless, drug-impaired driving data could be improved considerably by actions at both national and state levels.

DRUG TESTING FOR FATALLY-INJURED DRIVERS

The most likely group for which good data could be obtained is fatally-injured drivers. There are about 20,000 of them (20,156 in 2013), they are high-profile, they frequently are autopsied as required either by state law or medical examiner policy, and FARS assembles the available data on all of them. However, as noted in the first section, state drug testing practices for fatally-injured drivers differ substantially.

- Testing rates vary from 90% or greater (seven states) to 10% or fewer (two states), with 62.6% tested nationwide (FARS, 2015).
- Laboratories do not test for the same drugs and do not use the same cutoff values (GAO, 2015).

Both national and state actions are needed.

NHTSA should establish national standards, as recommended by NTSB (2012): "NHTSA [should] develop and disseminate to appropriate state officials a common standard of practice for drug toxicology testing, including (1) the circumstances under which tests should be conducted, (2) a minimum set of drugs for which to test, and (3) cutoff values for reporting the results." Candidate standards are available from the National Safety Council (Logan et al., 2013) and from SAMHSA (2012).

As discussed previously, states should implement policies and procedures for testing each fatally-injured driver for whom a drug test is feasible. States also should adopt the national standards for their toxicology testing once the standards are issued.

DRUG IMPAIRMENT OF ARRESTED DRIVERS

The first gap is that impairment by drugs may not be considered if alcohol impairment is found (GAO, 2015; GHSA, 2015). This means that drug impairment rates are under-estimated. At the very least, officers should record any observations of potential impairment by drugs in all crashes and arrests.

A second gap is that the time needed to acquire a blood sample for a drug test may allow drug concentrations to diminish. This gap can be reduced by efficient procedures such as electronic warrants for a blood test and trained phlebotomists at police stations. An accurate oral fluid or breath test device for common drugs that could be used at the roadside would address this gap.

DUID REPORTING AND DATA SYSTEMS

In many states, drug impairment is not separated from alcohol impairment in various stages of an impaired driving arrest and charge (GAO, 2015; GHSA, 2015). The officer's arrest and crash reports may not have separate designations for DUI and DUID. The state's statutes and data systems may not separate DUI and DUID.

As discussed previously, states should separate DUI and DUID in all phases of impaired driving data. States also should examine their data systems to assure that DUID arrests and convictions can be accessed easily from a centralized source.

RESEARCH

- Evaluate the effects of drugged driving laws and programs.
- Continue research on establishing the impairment produced by different concentrations of the most widely-used drugs.

EVALUATE DUID LAWS AND PROGRAMS

Many DUID laws and programs have not yet been evaluated well. Examples include the effects of zero tolerance and *per se* laws, the consequences of various test refusal penalties, and the characteristics and effects of employer programs.

RESEARCH ON IMPAIRMENT AND DRUG CONCENTRATIONS

Per se DUID laws imply a relation between drug concentrations and impairment. The scientific consensus is that the evidence to establish these relations does not exist (GAO, 2015). While some believe that it is impossible to determine precise relationships, others believe that additional research is needed. For example, HR 2598 would require NHTSA to determine "whether or not it is possible to reliably determine whether and to what extent an individual is cognitively or physically impaired by marijuana solely by measuring the concentration of tetrahydrocannabinol (THC) and derivatives in the individual's bloodstream or saliva" (http://1.usa.gov/1Cld6yr). It would be very useful to settle this issue either by documenting definitively the research that demonstrates that precise relationships cannot be determined or by additional research.

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