

Alcohol, Other Drug, and Multiple Drug Use Among Drivers

Introduction and Research Overview

Jana Price

Peer Reviewer Organizations

New York State Police Forensic Investigation Center

Orange County Crime Laboratory

San Francisco Office of the Chief Medical Examiner

Wisconsin State Laboratory of Hygiene

San Diego Sheriff's Office

NMS Labs

US Food and Drug Administration

National Highway Traffic Safety Administration

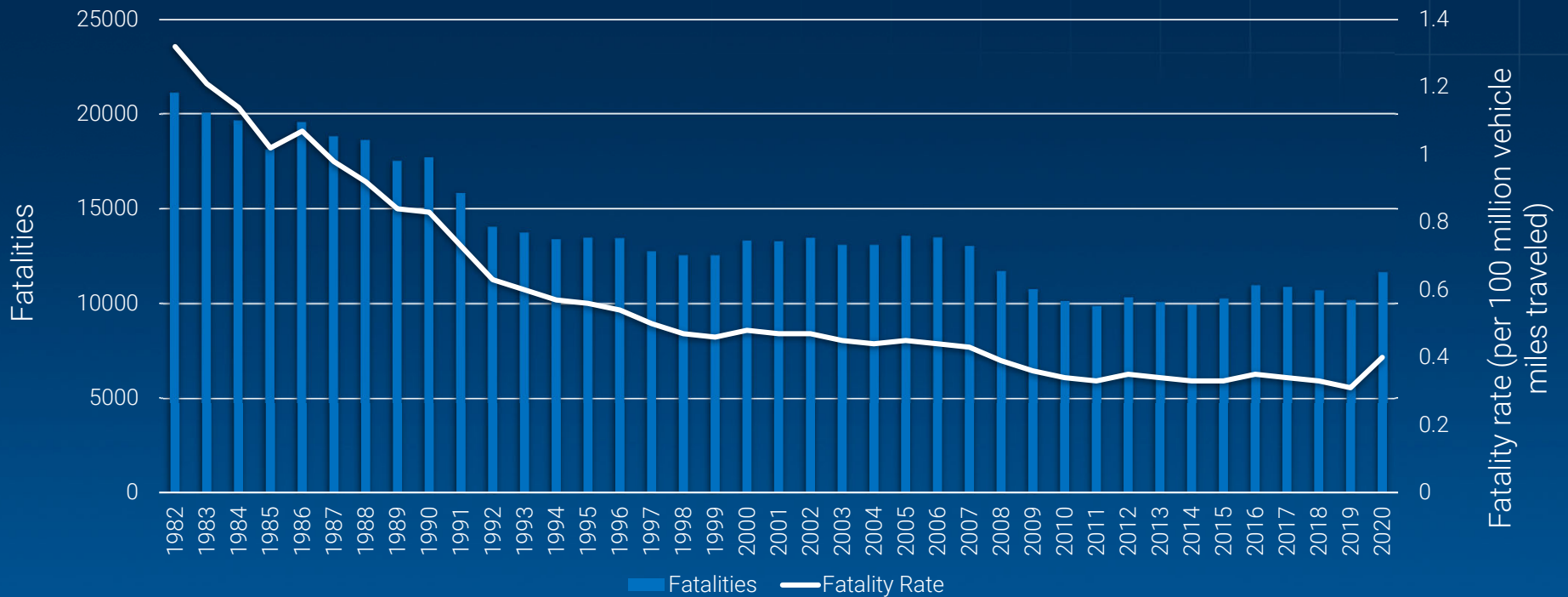
National Safety Council Alcohol and Other Drugs Impaired Driving Committee

NTSB Impaired Driving History

- Crash investigations
- Safety research and forums
- >150 NTSB Safety Recommendations
- NTSB Most Wanted List



Alcohol-Impaired Fatalities and Fatality Rates



Source: National Highway Traffic Safety Administration (NHTSA) Fatality Analysis Reporting System (FARS)

Other Drugs and Driving

- NHTSA's Fatality Analysis Reporting System (FARS) drug data are inadequate for generating trends or comparisons with alcohol
- Other sources indicate driver use of potentially impairing drugs is a growing concern for driving safety
 - National Roadside Survey
 - Driver self-reports
 - Cannabis legalization
 - Novel psychoactive substances
- What NTSB found:
 - National-level databases cannot be used to estimate drug prevalence among drivers

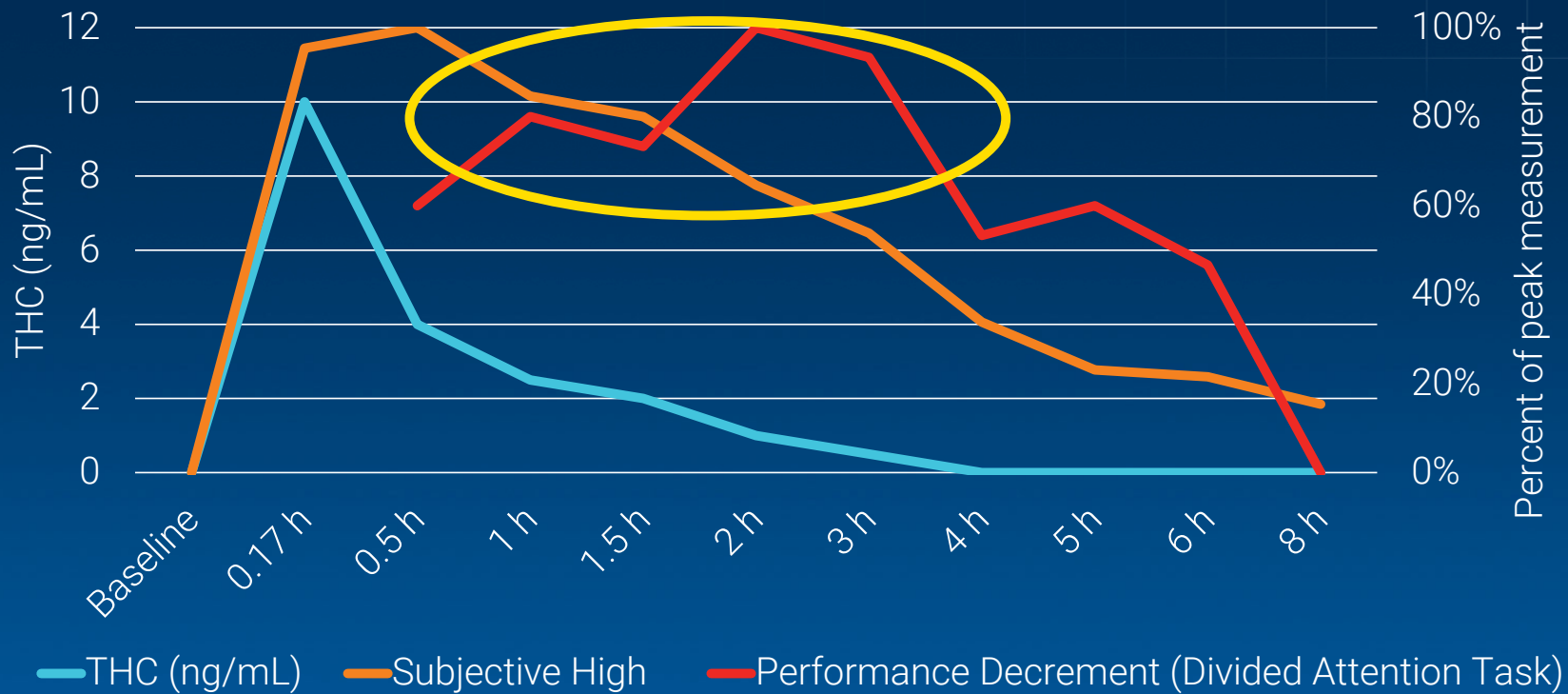
Research Goals

1. Summarize what is known about how drugs affect driving performance and crash risk
2. Analyze the prevalence of potentially impairing drug use among drivers
3. Consider measures to reduce the likelihood of drug-impaired driving and to improve the ability to track its prevalence

Challenges in Drug-Impaired Driving Research

- Hundreds of potentially impairing drugs and drug combinations
- Drug effects can vary based on several factors
 - User characteristics
 - How drugs are used
- Drugs may affect driving performance in different ways
- Biological measurements may not correlate with impairment

THC Concentration in Blood, Subjective High, and Negative Performance After Smoking Cannabis



Source: Spindle and others 2018; 2019

Research Methodology

- Literature review of impaired driving research
- Analysis of toxicology data from fatally injured drivers and drivers arrested for impaired driving from four laboratories

Literature Review

- Focus on meta-analyses, which combine results of multiple independent studies
 - Epidemiological studies of crash risk and crash responsibility associated with drug use
 - Experimental studies that examined how drug use affects driving performance on the road or in driving simulators

Drug Effects on Crash Risk and Driving Performance

- What NTSB found:
 - Multiple drugs and drug categories—including alcohol, cannabis, and numerous illicit, prescription, and over-the-counter (OTC) drugs—can impair driving performance and are associated with increased crash risk



Prevalence Analysis Method and Results

Ryan Smith

Identification of Toxicology Datasets

- Worked with toxicology experts to identify high-quality data from leading US toxicology laboratories
- Toxicology data used for this research met key criteria:
 - Used a comprehensive drug panel
 - Used blood specimens for testing
 - Tested all drivers for other drugs regardless of BAC
 - Allowed for deidentified transmission of raw data to NTSB

Toxicology Laboratories

Data Provided	Orange County Laboratory	Wisconsin Laboratory	Wisconsin Laboratory	San Francisco Laboratory	New York Laboratory
Driver Population	Impaired driving arrests	Crash-involved impaired driving arrests	Crash-involved fatally injured	Impaired driving arrests	Crash-involved suspected impaired driving cases involving fatality or serious injury
Potentially Impairing Compounds Tested	183	136	136	54	39
Data Start Date	8/1/2018	1/1/2019	1/1/2019	3/20/2015	5/7/2020
Data End Date	7/30/2020	3/31/2021	3/31/2021	12/31/2018	6/8/2021
Sample Size	14,051	9,569	406	2,075	217

Data Analysis Approach

- Drug toxicology data are expansive and complex
- A novel approach was developed to code and analyze drug data
- Only potentially impairing drugs were included in the analysis

Data Analysis Approach

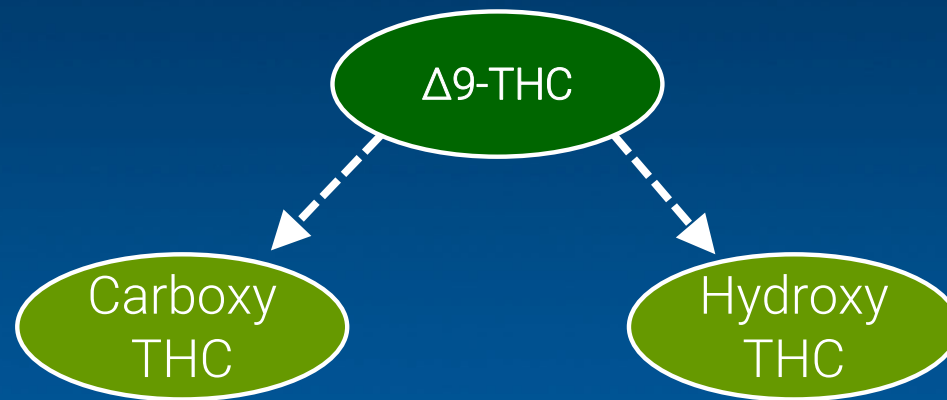
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Δ9-THC

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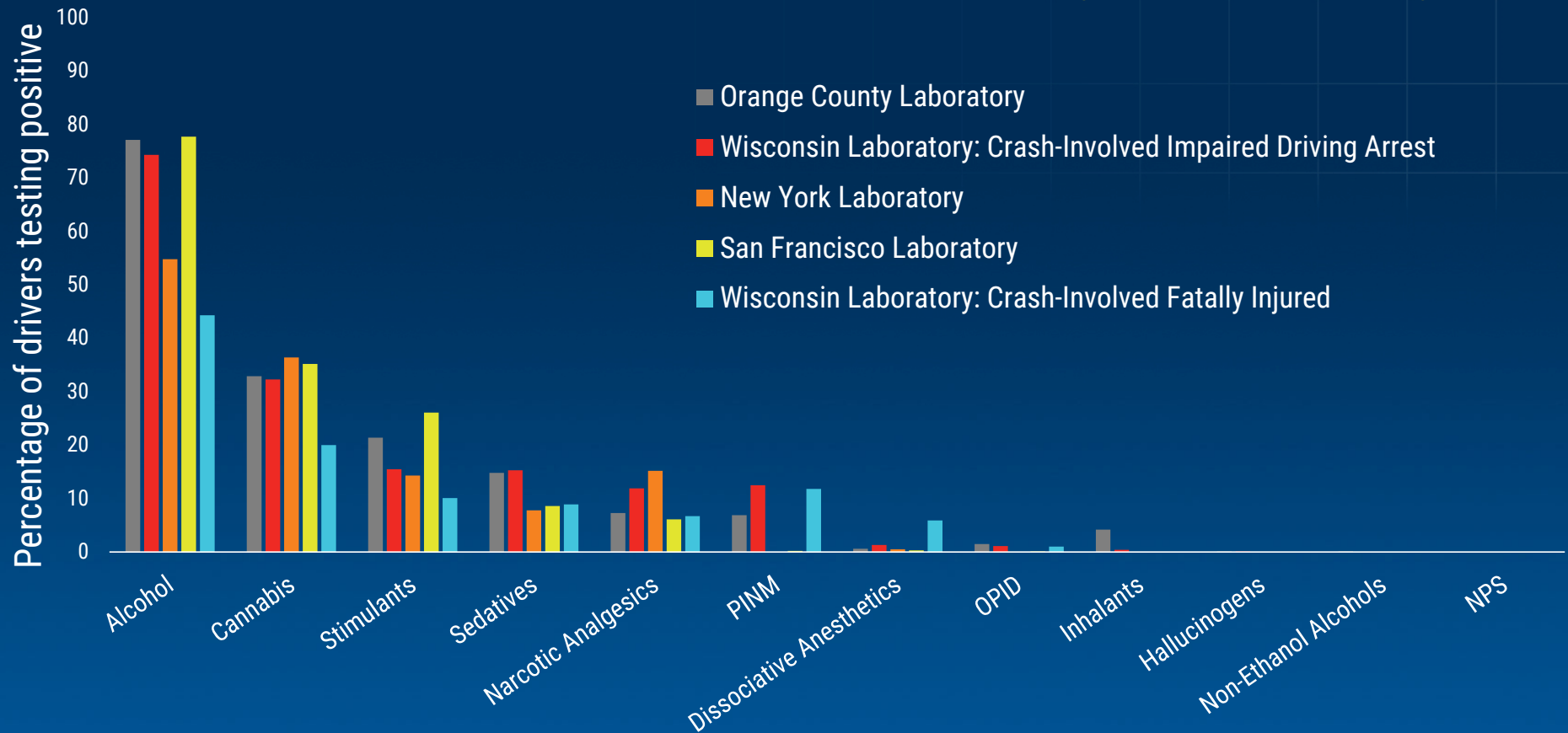
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- Development of a drug categorization scheme

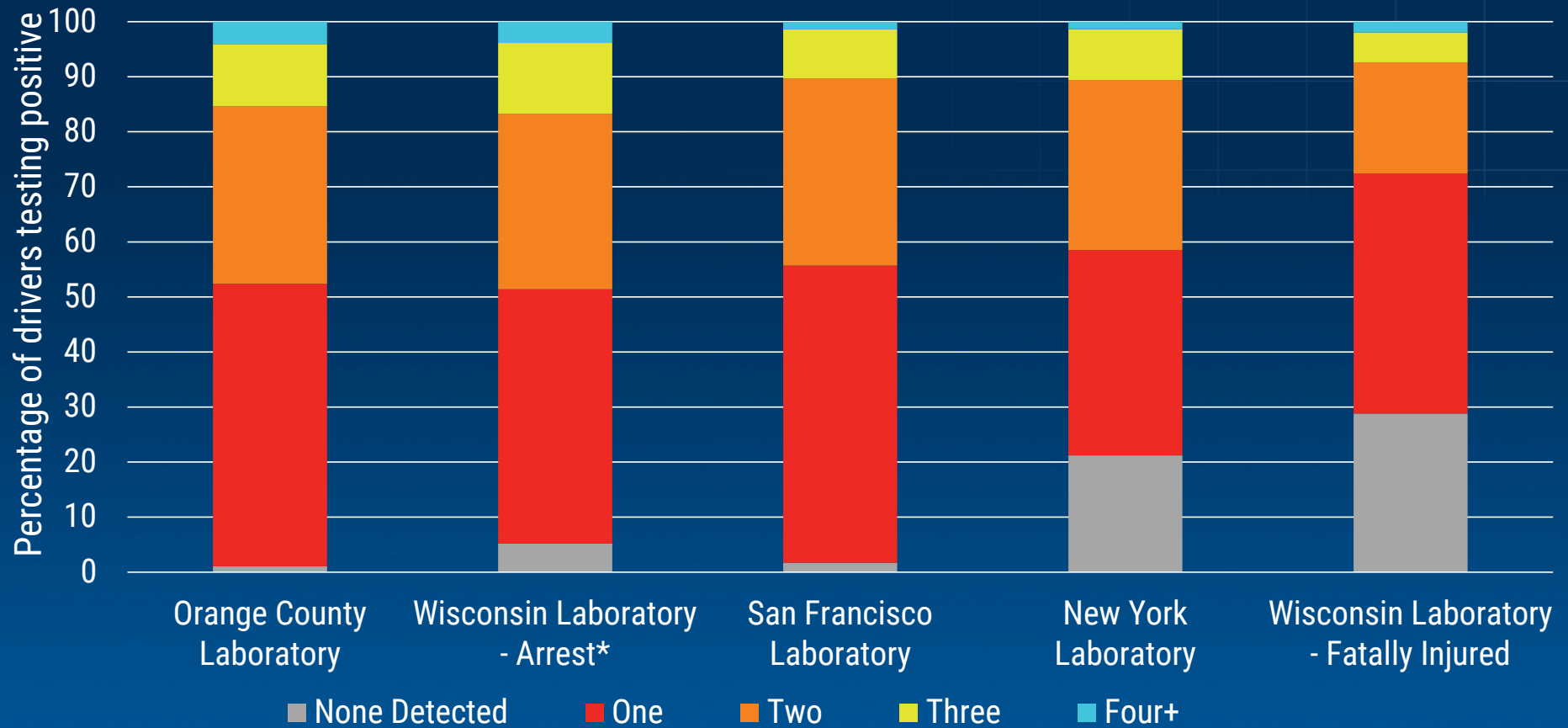
Drug Categorization Scheme

- Alcohol (Ethanol)
- Non-Ethanol Alcohols
- Cannabis
- Potentially Impairing Neuropsychiatric Medications (PINM)
- Hallucinogens
- Inhalants
- Dissociative Anesthetics
- Sedatives
- Stimulants
- Narcotic Analgesics
- Novel Psychoactive Substances (NPS)
- Other Potentially Impairing Drugs (OPID)

Percentage of Drivers Testing Positive by Drug Category



Percentage of Drivers Testing Positive for Multiple Drug Categories



Frequency of Drug Categories and Combinations in Orange County

Drug Categories and Combinations of Drug Categories	Frequency	Overall Percent
Alcohol Only	5,926	42.17
Alcohol and Cannabis	2,022	14.39
Alcohol and Stimulants	739	5.26
Cannabis Only	685	4.88
Stimulants Only	455	3.24
Alcohol, Cannabis, and Stimulants	376	2.68
Alcohol and Sedatives	356	2.53
Cannabis and Stimulants	264	1.88
Cannabis and Sedatives	175	1.25
Alcohol, Cannabis, and Sedatives	166	1.18
Narcotic Analgesics and Stimulants	157	1.12
No Alcohol or Other Drugs Detected	148	1.05
Alcohol and Inhalants	143	1.02
Alcohol and Potentially Impairing Neuropsychiatric Medications	143	1.02
All Other Single Drug Categories or Combinations of Drug Categories	2,296	16.34
Total	14,051	100.00

Alcohol Prevalence Across Laboratory Samples

Alcohol	Orange County Laboratory	Wisconsin Laboratory (Crash-Involved Impaired Driving Arrests)	Wisconsin Laboratory (Crash-Involved Fatally Injured Drivers)	San Francisco Laboratory	New York Laboratory
Alcohol Only	42.2%	39.7%	26.9%	43.6%	22.6%
Alcohol and Other Drugs	34.9%	34.6%	17.4%	34.1%	32.3%
Alcohol Total	77.1%	74.3%	44.3%	77.7%	54.9%

Cannabis Prevalence Across Laboratory Samples

Drug Category	Orange County Laboratory	Wisconsin Laboratory (Crash-Involved Impaired Driving Arrests)	Wisconsin Laboratory (Crash-Involved Fatally Injured Drivers)	San Francisco Laboratory	New York Laboratory
Cannabis Only	4.9%	2.9%	5.2%	5.5%	8.8%
Cannabis and Alcohol Only	14.4%	15.6%	6.7%	16.1%	17.1%
Cannabis, Alcohol, and Other Drug	5.0%	6.8%	3.2%	6.6%	5.5%
Cannabis and Other Non-Alcohol Drugs	8.6%	7.0%	4.9%	7.0%	5.1%
Cannabis Total	32.9%	32.3%	20.0%	35.2%	36.4%

Summary of Results

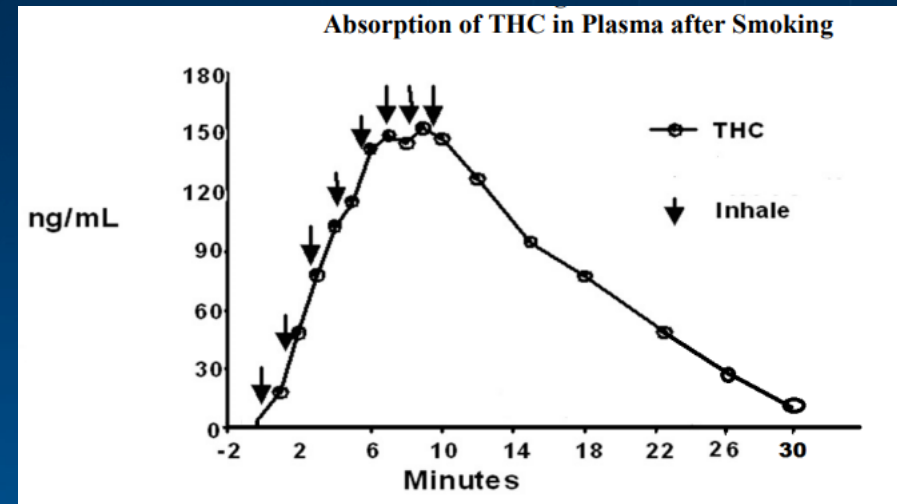
- What NTSB found:
 - Alcohol was the most prevalent drug found among impaired drivers and about half were positive for other drugs or multiple drugs, indicating that although alcohol-related countermeasures must remain the highest priority, countermeasures that address other drugs and drug combinations are also needed
 - Alcohol was most often detected alone, whereas cannabis was most often detected in combination with alcohol or other drugs
 - Cannabis and other potentially impairing drugs contribute to the problem of impaired driving crashes

Effects of “Stop-Testing” Procedures

- Stop testing refers to cancelling additional drug testing if alcohol is detected over a certain BAC
- Estimated data loss if Orange County laboratory had used stop testing at BAC \geq 0.08 g/dL
 - About 70% would not have been tested for other drugs
 - Within that group, 43% tested positive for other potentially impairing drugs, representing 30% of all drivers

Time Between Event and Sample Collection

- Drugs may quickly metabolize out of a driver's system
- Reducing time delays between a traffic event and specimen collection is critical
- THC concentrations rise rapidly over the course of minutes
- Within 30 minutes THC concentrations drop 80-90% from peak
- After a few hours, only low or no THC can be detected in blood



Time Between Event and Sample Collection

- In the Wisconsin Laboratory data, average delay between the event and sample collection was 1 hour 51 minutes
- In the San Francisco Laboratory data, the average time was 2 hours 4 minutes

Summary of Results

- What NTSB found:
 - Policies that limit drug testing when a driver's blood alcohol concentration is over a certain level result in a loss of valuable information that could otherwise be used to customize policies, treatment, and other countermeasures
 - Reducing the time between an impaired driving event and biological specimen collection increases the likelihood that toxicological test results will reflect drug presence at the time of the event



Safety Issues

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Safety Issues

- Implement proven countermeasures for alcohol-impaired driving
- Address the growing problem of cannabis-, other drug-, and multiple-drug-impaired driving
- Improve drug-impaired driving laws and enforcement
- Ensure that driving safety is considered in the evaluation of prescription and over-the-counter drugs
- Enhance systems for documenting and tracking the incidence of drug use and driving



Implement Proven Countermeasures for Alcohol-Impaired Driving

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Implement Proven Countermeasures for Alcohol-Impaired Driving

- What we found:
 - Alcohol continues to be the drug with the most detrimental impact on traffic safety
 - Implementing countermeasures to reduce alcohol-impaired driving must remain a high priority

Proven Countermeasures for Alcohol-Impaired Driving

- Laws and enforcement
 - Per se BAC laws of 0.05 g/dL or lower
 - Utah accomplished this and reduced fatality rates
 - High-visibility enforcement
 - All-offender alcohol-ignition interlock laws
- In-vehicle technologies
 - Passive alcohol impairment detection
 - Advanced driver monitoring



Address the Growing Problem of Cannabis-, Other Drug-, and Multiple-Drug-Impaired Driving

Ryan Smith

Address the Growing Problem of Cannabis-, Other Drug-, and Multiple-Drug-Impaired Driving

- What NTSB found:
 - Cannabis and other potentially impairing drugs contribute to the problem of impaired driving
- Cannabis was second most prevalent and often found with other drugs
- About half of drivers arrested for impaired driving and 28% of fatally injured drivers were positive for multiple drug categories
- Drivers are less aware of the risks of cannabis and potentially impairing prescription drugs compared to alcohol
- Public campaigns and drug labeling may raise awareness

Public Campaigns

- What NTSB found:
 - Media campaigns have the potential to raise awareness of the risk of impaired driving associated with cannabis-, other drug-, and multiple drug-use, but it is unclear if they change driver behavior



Cannabis Labeling

- Federal law requires labels on alcohol but not on cannabis products
- Some states require labels warning users to not drive after cannabis use
- The absence of warnings on cannabis could mislead users
- What NTSB found:
 - Including driving-related warnings on cannabis products would increase awareness of the risks of cannabis-impaired driving
- What NTSB recommended:
 - Require a warning label on cannabis products advising users not to drive after cannabis use due to its impairing effects

Prescription and OTC Drug Labeling

- Prescription and OTC drugs were prevalent in the populations analyzed, but it is not known if drivers used the drugs consistent with labeling
- In 2000, NTSB recommended the US Food and Drug Administration (FDA) require warning labels on medications that may interfere with vehicle operation (I-00-5)
- FDA developed industry guidance for evaluating drug effects on the ability to operate a motor vehicle, but did not change labeling practices
- I-00-5 classified Closed—Reconsidered due to FDA's regulatory limitations

Prescription and OTC Drug Labeling

- AAA Foundation for Traffic Safety Research
 - In 2022, found that half of drivers reported potentially impairing medication use in the past 30 days
 - In 2018, an expert panel identified prescription and OTC drug labeling limitations and called for graphics on labels to depict risk

Prescription and OTC Drug Labeling

- What NTSB found:
 - Additional effort is needed to identify drug label characteristics that can effectively convey driving risk to consumers
- What NTSB recommended:
 - FDA: Conduct a study to understand how prescription drug labeling and over-the-counter drug labels could be modified to increase user understanding and compliance with driving-related warnings; publish the study findings



Improve Drug-Impaired Driving Laws and Enforcement

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Drug-Impaired Driving Laws and Enforcement

- Oral fluid for impaired driving enforcement
- Electronic warrants
- Impairing drug definitions in impaired driving statutes
- State efforts to address drug-impaired driving

Oral Fluid

- Blood and oral fluid are optimal biological specimens for identifying potentially impairing drugs
- Collecting blood can be challenging and time consuming, resulting in a loss of information
- Oral fluid may be collected rapidly and less invasively
- Oral fluid samples may be used for drug screening at roadside or for confirmatory testing at a laboratory

Oral Fluid for Impaired Driving Enforcement

- What NTSB found:
 - Oral fluid is a valuable but underutilized biological specimen that can support the enforcement of impaired driving laws
- 2018 NTSB recommendation to NHTSA concerning oral fluid screening devices (H-18-56)
- DC and 28 states do not explicitly authorize the use of oral fluid
- What NTSB recommended:
 - Modify impaired driving laws to allow for oral fluid collection, screening, and testing for the detection of drug use by drivers

Electronic Warrants

- Electronic warrant systems allow for the requesting and transmitting of search warrants through online management systems
- What NTSB found:
 - Electronic warrants can expedite collection of biological specimens, increasing the likelihood that impairing drugs present at the time of driving will be detected
- Puerto Rico and 17 states do not use electronic warrant systems
- What NTSB recommended:
 - Allow the use of electronic warrants to obtain biological specimens during impaired driving arrests by modifying laws or removing administrative barriers

Impairing Drug Definitions in Impaired Driving Statutes

- Five states' impaired driving laws specify a limited set of drugs
- Drivers impaired by drugs not listed in the statute or by novel psychoactive substances are less likely to be prosecuted
- What NTSB found:
 - Laws that specify only certain drugs that can impair driving limit the ability to prosecute drug-impaired drivers
- What NTSB recommended:
 - Enact laws specifying that drivers under the influence of a drug or multiple drugs that may impair driving are considered to be impaired under the definition of drug-impaired driving

Drug-Impaired Driving Criminal Justice Evaluation Tool

- Laws are most effective when paired with programs to facilitate enforcement, education, and treatment
- Stakeholder commitment and funding needed for programs
- What NTSB found:
 - NHTSA's Drug-Impaired Driving Criminal Justice Evaluation Tool can help states and communities identify opportunities to improve efforts to address drug-impaired driving
- What NTSB recommended:
 - Complete an assessment using NHTSA's Drug-Impaired Driving Criminal Justice Evaluation Tool, and, if gaps are identified, apply to NHTSA for support in establishing programs to reduce drug-impaired driving

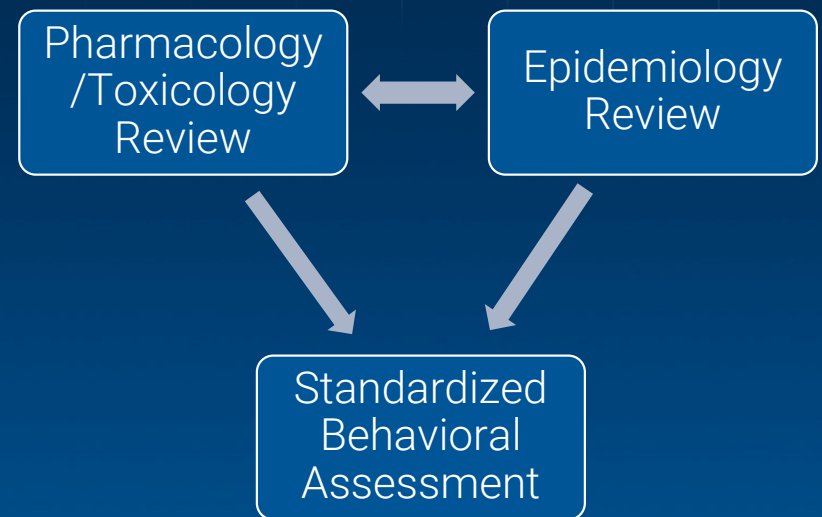


Ensure that Driving Safety is Considered in the Evaluation of Prescription and OTC Drugs

Ryan Smith

Ensure that Driving Safety is Considered in the Evaluation of Prescription and OTC Drugs

- NHTSA protocol for assessing the potential of drugs to impair driving
- Incorporated in FDA guidance to industry
- 50 new drug applications each year
- Some drugmakers have used the guidance to assess drugs and provide driving warnings in labeling materials
- Unknown if guidance is consistently applied by drugmakers



Evaluating Potential Effects on Driving Safety During Drug Development

- What NTSB found:
 - FDA has provided guidance for a systematic method of evaluating driving safety during drug development, but it is unknown if the guidance is consistently applied
- What NTSB recommended:
 - FDA: Develop a system to audit drugmaker compliance with your 2017 “Evaluating Drug Effects on the Ability to Operate a Motor Vehicle: Guidance for Industry”

Continued Surveillance of Prescription and OTC Drugs

- Adverse drug effects sometimes discovered in postmarket phase
- Example: crash risk findings led to dosing changes and warning labels
- FDA postmarket drug safety programs:
 - Adverse Event Reporting System
 - Sentinel System
 - Plan to increase use of real-world data
- More than 1 in 10 drivers arrested for impaired driving in our analyses tested positive for potentially impairing prescription or OTC drugs

Continued Surveillance of Prescription and OTC Drugs

- What NTSB found:
 - The FDA's drug safety surveillance systems have improved the likelihood that adverse drug effects will be detected; but they could be enhanced by better incorporating information about drug use and driving safety
- What NTSB recommended:
 - FDA: Incorporate additional data and research concerning drug use and driving to improve US Food and Drug Administration drug safety surveillance systems

Enhance Systems for Documenting and Tracking the Incidence of Drug Use and Driving

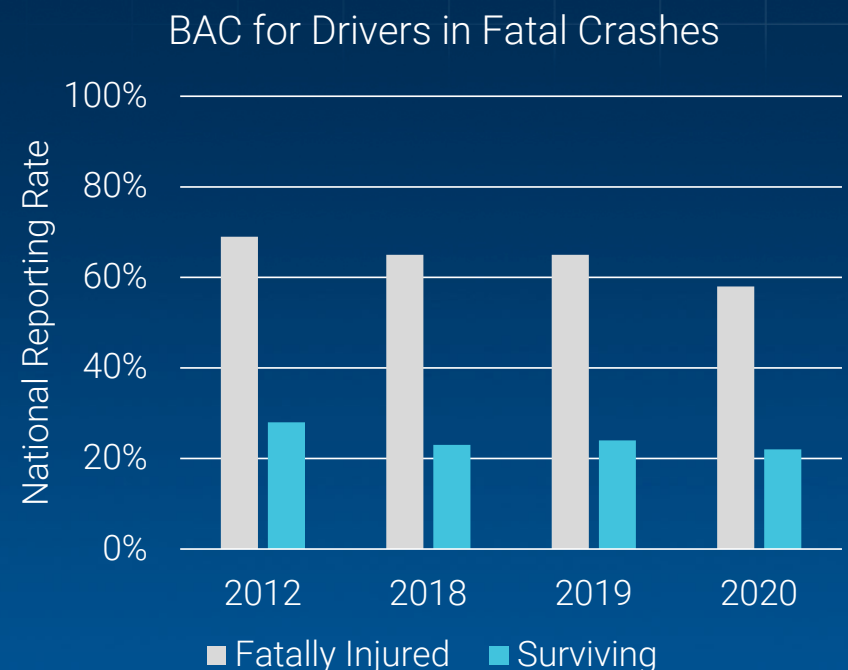
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Improve Systems for Documenting and Tracking the Incidence of Drug Use and Driving

- BAC testing and reporting
- Other drug testing and reporting
- Improving and standardizing drug toxicology testing
- Monitoring and treatment programs to prevent recidivism
- Sentinel surveillance systems to track drug use in crash-involved drivers

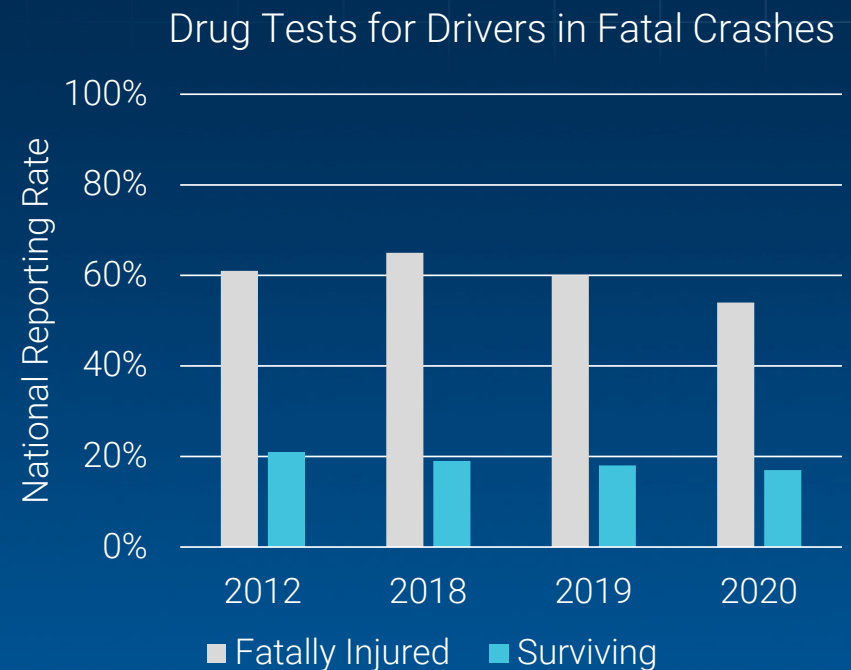
BAC Testing and Reporting

- Several states below BAC reporting goals
- What NTSB found:
 - Some states have improved BAC reporting rates, but additional efforts are needed to ensure accurate tracking of national alcohol-impaired driving trends and to develop and evaluate appropriate countermeasures



Other Drug Testing and Reporting

- No widely-used standard for drug testing drivers after crashes or impaired driving arrests
- 2012 NHTSA recommendation (H-12-33) to provide a common standard of practice not met
- Recent efforts: toxicology liaison program, expansion of FARS to allow >3 drugs per driver
- Drug data in FARS still inadequate



Driver Drug Testing Recommendations and Standard

- National Safety Council division recommendations for toxicological investigation of drug-impaired driving cases and motor vehicle fatalities
- ANSI/ASB Standard 120 for the *Analytical Scope and Sensitivity of Forensic Toxicological Testing of Blood in Impaired Driving Investigations*
 - 33 drugs or drug metabolites
 - Screening and confirmation cutoffs

Driver Drug Toxicology

- What NTSB Found:
 - Because there is no common standard of practice for the collection, testing, and reporting of driver drug toxicology data in the US, critical information is not being captured or analyzed
 - Widespread adoption of ANSI/ASB Standard 120 would improve our understanding of the prevalence of drug use among drivers
- What NTSB recommended:
 - NHTSA: Disseminate ANSI/ASB Standard 120 to state officials for use as the common standard of practice for drug toxicology testing

Improving and Standardizing Driver Drug Toxicology

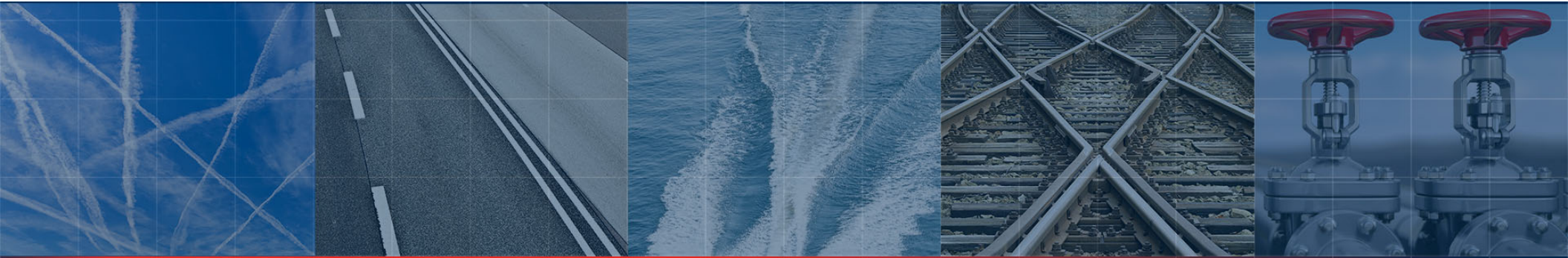
- Toxicology laboratories will need resources to meet Standard 120
- NHTSA can incentivize adoption by providing support
- States can provide funding and can require that government-funded laboratories follow the standard
- What NTSB recommended:
 - NHTSA: Establish a program to support toxicology laboratories' compliance with ANSI/ASB Standard 120
 - States, DC, PR: Require government-funded laboratories that conduct forensic toxicology testing to adopt and routinely apply (regardless of driver BAC) ANSI/ASB Standard 120, and provide funding for equipment, personnel, and training, to facilitate testing meeting that standard

Using Toxicology Data to Customize Monitoring and Treatment Programs

- A standard approach to toxicology testing can lead to the development of effective treatment and other tailored countermeasures
- Intervention programs may include treatment, ignition interlocks, and court monitoring
- What NTSB found:
 - Early intervention and post-conviction intervention treatments can be effective tools for reducing impaired driving recidivism

Sentinel Surveillance Systems to Track Drug Use in Crash-Involved Drivers

- Sentinel surveillance systems: a collection of reporting sites that provide timely and high-quality data concerning a public health issue
- AAA Foundation for Traffic Safety study found trauma centers are an optimal source for driver drug use data
- What NTSB found:
 - A trauma center-based sentinel surveillance system could improve our understanding and assist in the development of policy to reduce impaired driving crashes
- What NTSB recommended:
 - NHTSA: Establish a trauma center-based sentinel surveillance system to track drug use among crash-involved drivers



For the full report, see www.nts.gov/safety/safety-studies/Documents/SRR2202.pdf