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Impaired Driving Drug Trends and Stop Limit Testing Evaluation – 2022 Update

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Disclaimer

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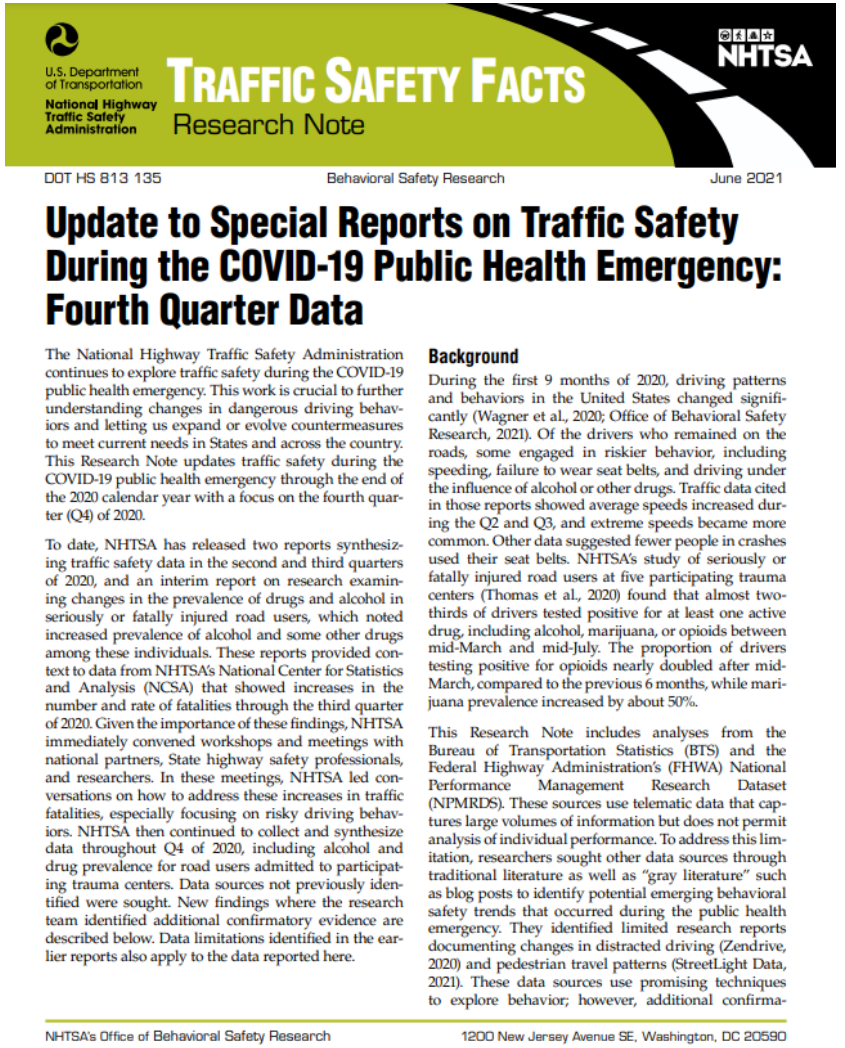
Driving Under the Influence of Drugs (DUID)

- National Highway Traffic Safety Administration (NHTSA)
- 56% of drivers involved in serious injury and fatal crashes tested positive for at least one drug
- Data was collected from participating Trauma Centers
  - Charlotte, North Carolina
  - Jackson and Miami, Florida
  - Baltimore, Maryland
  - Worcester, Massachusetts
- All results are from cases with confirmed positives for either an active parent or active metabolite



U.S. Department of Transportation
National Highway Traffic Safety Administration

TRAFFIC SAFETY FACTS
Research Note

NHTSA

DOT HS 813 135 | Behavioral Safety Research | June 2021

Update to Special Reports on Traffic Safety During the COVID-19 Public Health Emergency: Fourth Quarter Data

The National Highway Traffic Safety Administration continues to explore traffic safety during the COVID-19 public health emergency. This work is crucial to further understanding changes in dangerous driving behaviors and letting us expand or evolve countermeasures to meet current needs in States and across the country. This Research Note updates traffic safety during the COVID-19 public health emergency through the end of the 2020 calendar year with a focus on the fourth quarter (Q4) of 2020.

To date, NHTSA has released two reports synthesizing traffic safety data in the second and third quarters of 2020, and an interim report on research examining changes in the prevalence of drugs and alcohol in seriously or fatally injured road users, which noted increased prevalence of alcohol and some other drugs among these individuals. These reports provided context to data from NHTSA's National Center for Statistics and Analysis (NCSA) that showed increases in the number and rate of fatalities through the third quarter of 2020. Given the importance of these findings, NHTSA immediately convened workshops and meetings with national partners, State highway safety professionals, and researchers. In these meetings, NHTSA led conversations on how to address these increases in traffic fatalities, especially focusing on risky driving behaviors. NHTSA then continued to collect and synthesize data throughout Q4 of 2020, including alcohol and drug prevalence for road users admitted to participating trauma centers. Data sources not previously identified were sought. New findings where the research team identified additional confirmatory evidence are described below. Data limitations identified in the earlier reports also apply to the data reported here.

Background

During the first 9 months of 2020, driving patterns and behaviors in the United States changed significantly (Wagner et al., 2020; Office of Behavioral Safety Research, 2021). Of the drivers who remained on the roads, some engaged in riskier behavior, including speeding, failure to wear seat belts, and driving under the influence of alcohol or other drugs. Traffic data cited in those reports showed average speeds increased during the Q2 and Q3, and extreme speeds became more common. Other data suggested fewer people in crashes used their seat belts. NHTSA's study of seriously or fatally injured road users at five participating trauma centers (Thomas et al., 2020) found that almost two-thirds of drivers tested positive for at least one active drug, including alcohol, marijuana, or opioids between mid-March and mid-July. The proportion of drivers testing positive for opioids nearly doubled after mid-March, compared to the previous 6 months, while marijuana prevalence increased by about 50%.

This Research Note includes analyses from the Bureau of Transportation Statistics (BTS) and the Federal Highway Administration's (FHWA) National Performance Management Research Dataset (NPMRDS). These sources use telematic data that captures large volumes of information but does not permit analysis of individual performance. To address this limitation, researchers sought other data sources through traditional literature as well as "gray literature" such as blog posts to identify potential emerging behavioral safety trends that occurred during the public health emergency. They identified limited research reports documenting changes in distracted driving (Zendrive, 2020) and pedestrian travel patterns (StreetLight Data, 2021). These data sources use promising techniques to explore behavior; however, additional confirma-

NHTSA's Office of Behavioral Safety Research | 1200 New Jersey Avenue SE, Washington, DC 20590

Drug Positivity Q4 2019 – Q4 2020

Table 1

Drivers (Excluding Motorcyclists): Positive for Drug Category by Quarter

Drug Category	Q4 2019 (N=409)		Q1 2020 (N=536)		Q2 2020 (N=404)		Q3 2020 (N=603)		Q4 2020 (N=474)	
	n	%	n	%	n	%	n	%	n	%
Alcohol	90	22.0	137	25.6	102	25.2	166	27.5	127	26.8
Cannabinoids	78	19.1	118	22.0	133	**32.9[A,B]**	155	25.7	130	**27.4[A]**
Opioids	28	6.8	52	9.7	60	**14.9[A]**	88	**14.6[A]**	44	9.3
Stimulants	36	8.8	60	11.2	41	10.1	64	10.6	42	8.9
Sedatives	42	10.3	35	6.5	34	8.4	48	8.0	33	7.0
Antidepressants	11	2.7	12	2.2	1	**0.2[A]**	4	0.7	4	0.8
Over-the-Counter	4	1.0	22	4.1	6	1.5	10	1.7	8	1.7
Other Drugs	7	1.7	9	1.7	3	0.7	17	2.8	10	2.1
At Least 1 Category	211	51.6	292	54.5	260	**64.4[A,B]**	366	**60.7[A]**	266	56.1
Multiple Categories	69	16.9	120	22.4	92	22.8	150	**24.9[A]**	108	22.8

[A] Significantly different ($p < .05$) compared to Q4 2019 period.

[B] Significantly different ($p < .05$) compared to Q1 2020 period.

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Challenges in DUID Testing

Scope

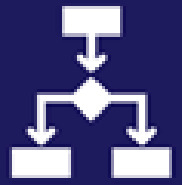
Complexity

Cutoffs

Policy

Resources

Procedures



National Safety Council's Alcohol, Drugs and Impairment Division (NSC-ADID)

- To combat some of these challenges the NSC-ADID started an initiative to standardize testing practices for DUID cases
- Surveyed labs on their testing practices, resources, various technologies, etc.
- NSC-ADID started issuing these recommendations in 2007 and released a recent update in 2021

nsc®

Alcohol, Drugs & Impairment Division

Projects Goals

- Test authentic DUID blood samples using a comprehensive scope and compare results to the NSC-ADID recommendations
- Characterize drugs contributing to DUID cases that are outside of the scope of testing set forth by NSC-ADID recommendations
- Analyze drug results relative to various BAC thresholds

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Impaired Driving Drug Trends

Sample Acquisition and Analysis

Acquisition

- Discarded and deidentified blood samples that were submitted for analysis in suspected DUID cases were re-analyzed for the study
  - January 2020 to December 2021
  - ~125 samples collected each month
- The data for ethanol and THC results were provided with the deidentified blood sample

Analysis

- Three different extractions were performed
  - Basic Drugs
  - Synthetic Cannabinoids
  - Gabapentin
- The samples were analyzed using a Sciex TripleTOF® 5600+ LC-QTOF coupled with Shimadzu Nexera UHPLC
  - Controls ran at NSC-ADID recommended cutoff concentrations

Tier I Drugs

Cannabinoids	**CNS Depressants Cont.**
Δ9-THC	Diazepam
Carboxy-THC	Nordiazepam
11-hydroxy-THC	Oxazepam
CNS Stimulants	Temazepam
Methamphetamine	Zolpidem
Amphetamine	**Narcotic Analgesics**
MDMA	Codeine
MDA	6-MAM
Cocaine	Buprenorphine
Benzoylecgonine	Norbuprenorphine
Cocaethylene	Fentanyl
CNS Depressants	Hydrocodone
Carisoprodol	Hydromorphone
Meprobamate	Methadone
Alprazolam	Morphine
Alpha-Hydroxyalprazolam	Oxycodone
Clonazepam	Oxymorphone
7-Aminoclonazepam	Tramadol
Lorazepam	O-Desmethyltramadol

Tier II Drugs

Cannabinoids	**CNS Depressants Cont.**
Synthetic cannabinoids	*Pregabalin*
CNS Stimulants	*Secobarbital*
Cathinones	Topiramate
Methylphenidate	Trazodone
Mitragynine	Tricyclic antidepressants
CNS Depressants	*Valproic Acid*
Atypical antipsychotics	Zopiclone
Barbiturates	**Narcotic Analgesics**
Carbamazepine	Fentanyl analogs
Chlordiazepoxide	Novel opioids
Chlorpheniramine	Tapentadol
Cyclobenzaprine	**Dissociative Drugs**
Diphenhydramine	Dextromethorphan
Doxylamine	Ketamine
Gabapentin	PCP
GHB	**Inhalants**
Hydroxyzine	*Difluoroethane*
Lamotrigine	*Inhalant class*
Mirtazepine	**Hallucinogens**
Novel benzodiazepines	Hallucinogens
Phenytoin	-

https://academic.oup.com/jat/article/45/6/529/6292018

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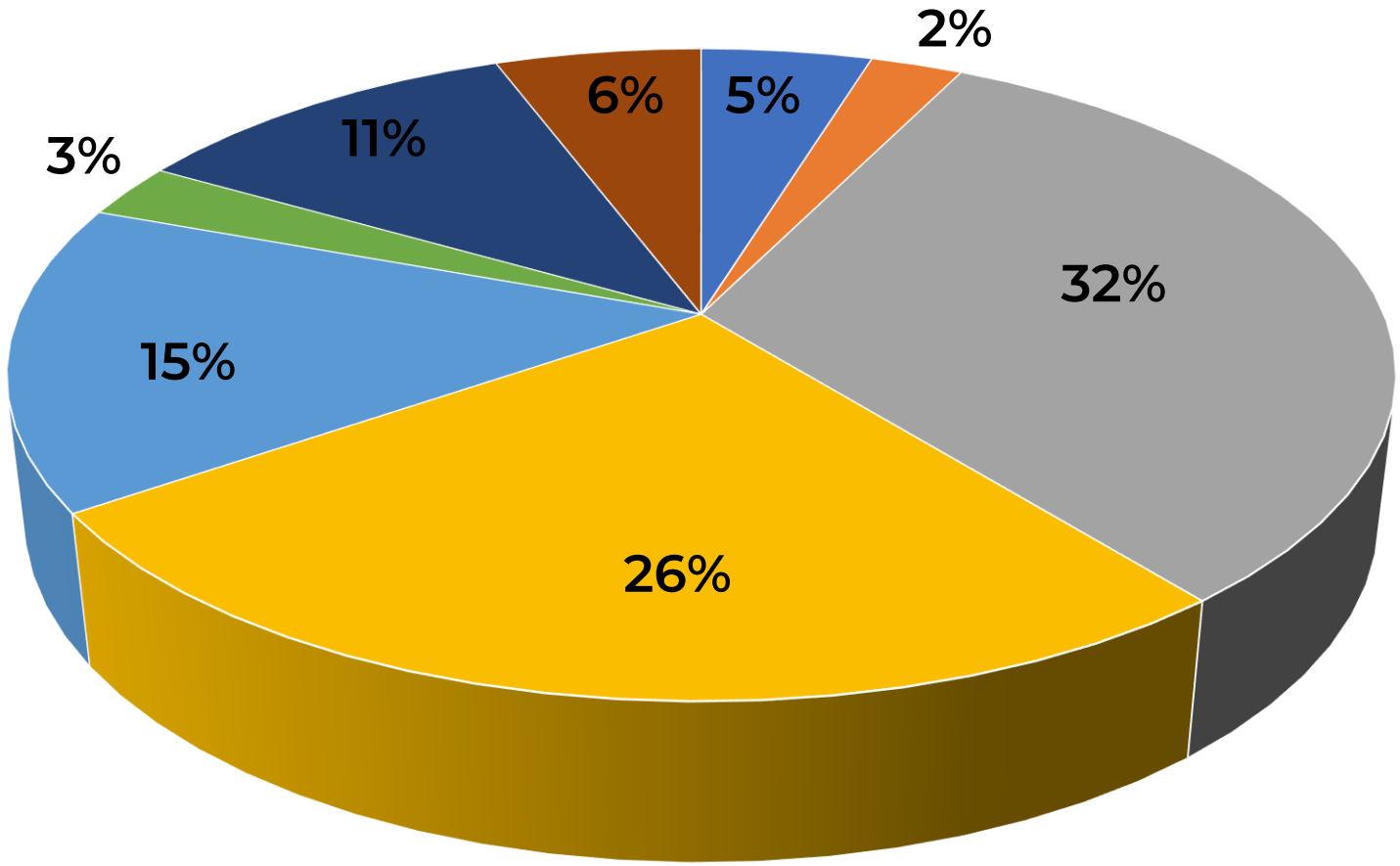
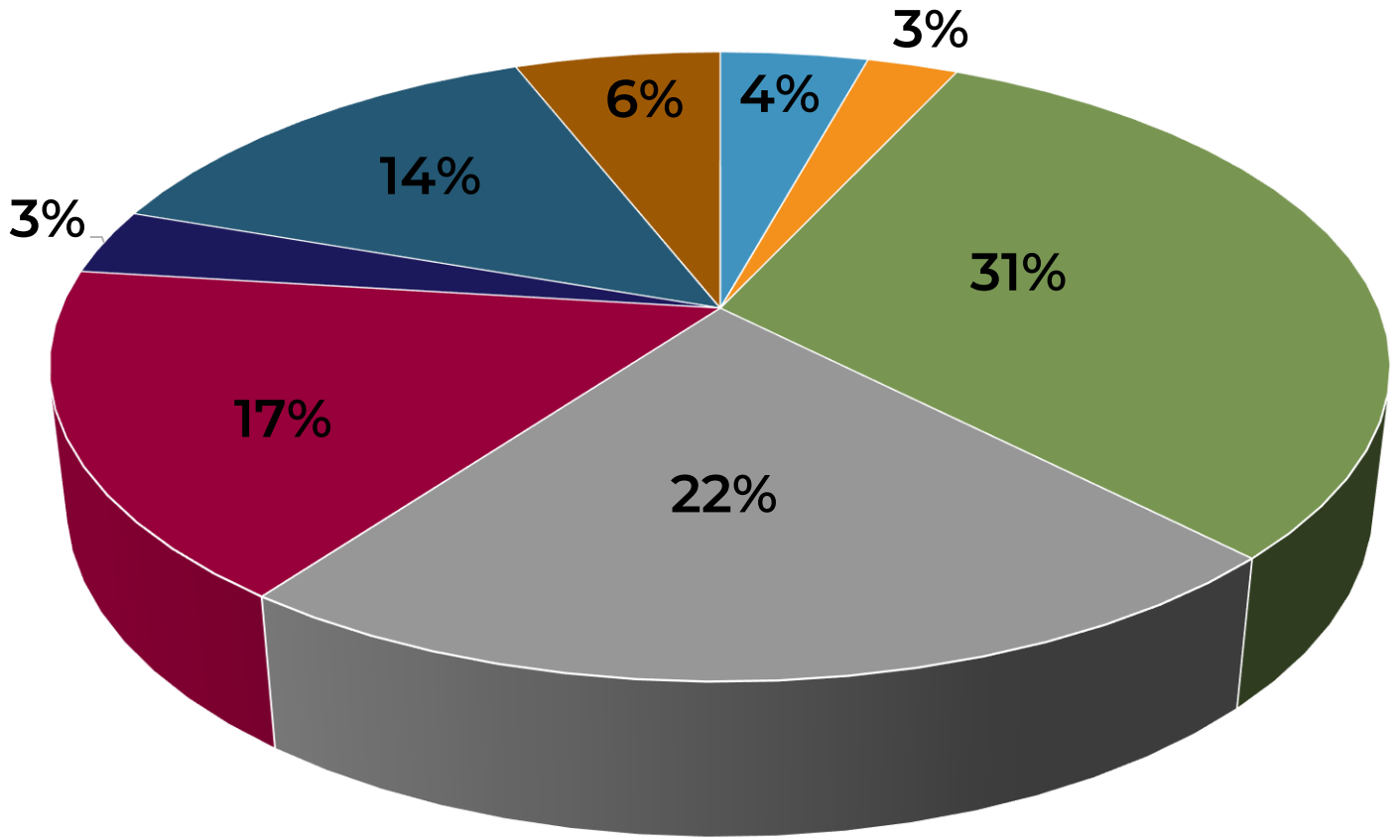
Impaired Driving Drug Trends - Results

Year 1 Percent Positivity Data (n=1,324)



Total Percent Positivity Data (n=2,514)



Tier I Findings (n=2,514)

Drug	No. of Positive Cases	Positivity (%)
THC	1227	48.8
Methamphetamine	391	15.5
Fentanyl	348	13.8
Amphetamine	347	13.8
Benzoylecgonine	174	6.9
Alprazolam	87	3.5
Cocaine	86	3.4
Methadone	68	2.7
7-Amino Clonazepam	62	2.5
Buprenorphine	52	2.0
Clonazepam	45	1.7
Oxycodone	42	1.6
Tramadol	28	1.1
Cocaethylene	27	0.9
Morphine	24	0.9
Lorazepam	23	0.9

Tier II Findings (n=2,514)

Drug	No. Positives Cases	Positivity (%)
Diphenhydramine	187	7.4
Gabapentin*	104	5.5
Hydroxyzine	90	3.5
8-aminoclonazolam	80	3.1
Fluorofentanyl	71	2.8
Trazodone	69	2.7
Cyclobenzaprine	54	2.1
Doxylamine	53	2.1
Lamotrigine	50	1.9
Etizolam	47	1.8
Eutylone	42	1.6
Mitragynine	34	1.4

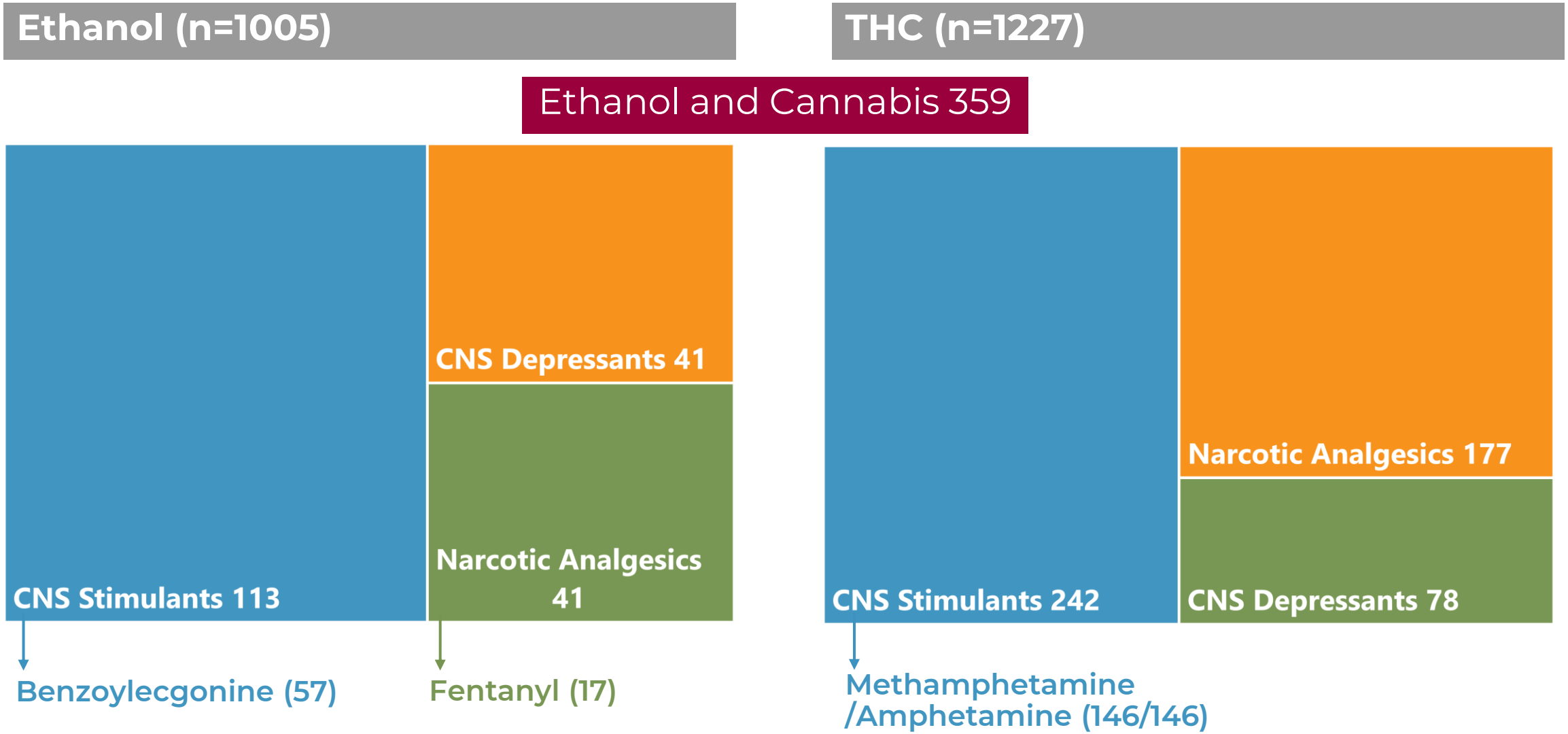
*** n=1,907**

THC and Ethanol Findings

Drug	Reporting Limit (ng/mL)	Max (ng/mL)	Average (±SD) (ng/mL)	Median (ng/mL)
THC (n=1,227)	0.5	96	8.11 (±9.42)	5.2
Carboxy-THC (n=1,230)	5	1000	60.1 (±64.7)	42
Hydroxy-THC (n=884)	1	270	5.02 (±11.5)	3.25

Drug	Reporting Limit (g/dL)	Max (g/dL)	Average (±SD) (g/dL)	Median (g/dL)
Ethanol (n=1,005)	0.01	0.61	0.16 (±0.07)	0.16

Ethanol and THC Combination with Tier I Drugs



Tier II: NPS Findings

Drug	No. of Positive Cases	Percent Positivity (%)
8-aminoclonazolam	80	3.2
Fluorofentanyl	71	2.8
Etizolam	47	1.8
Eutylone	42	1.6
Clonazolam	38	1.5
Flubromazolam	12	0.4
Flualprazolam	10	0.4

NPS Category	No. of Identifications
Novel Benzodiazepines	7
Cathinones	4
Novel Opioids	4
Synthetic Cannabinoids	3
Fentanyl Analogs	3
NPS Hallucinogens	1

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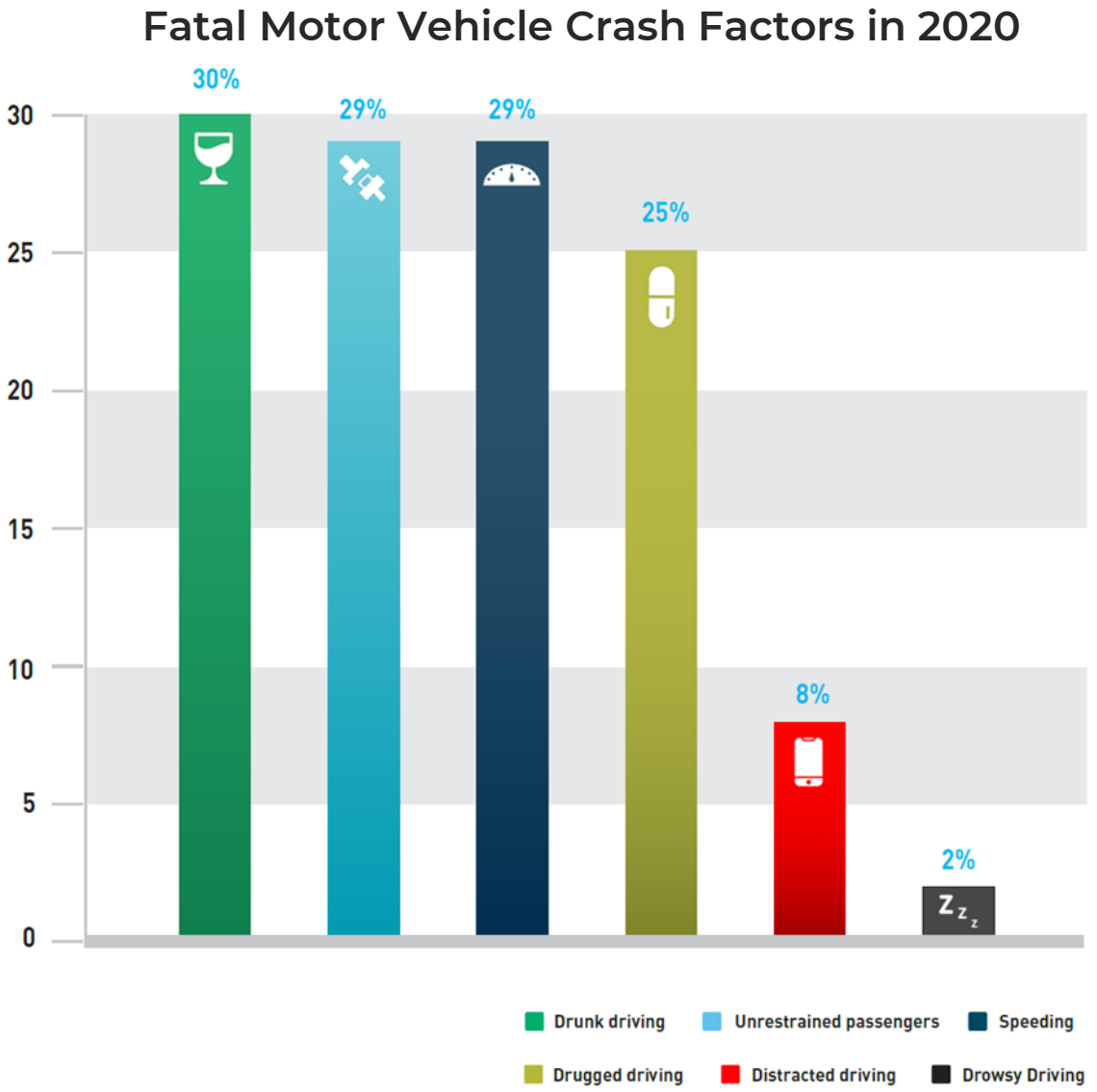
STOP LIMIT TESTING

Stop Limit Testing

- The practice of deciding whether to perform drug testing based on an administratively determined alcohol concentration
  - Confirming and quantifying the “most significant” drug
- Justification
  - Lack of enhanced penalties for drug and alcohol use
  - Impairment explained by BAC
  - Limited resources/budget
  - Agency requests
- Issues
  - Keeps us from getting comprehensive picture of drug involvement in impaired driving



Source: Responsibility.org

Stop Limit Testing in Practice

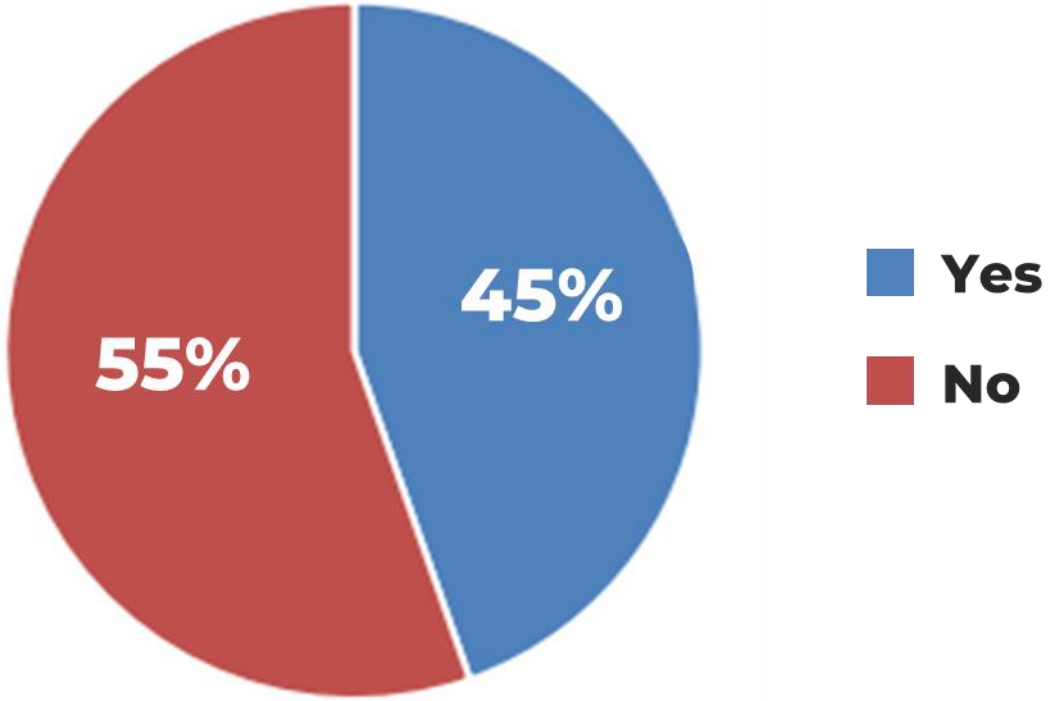
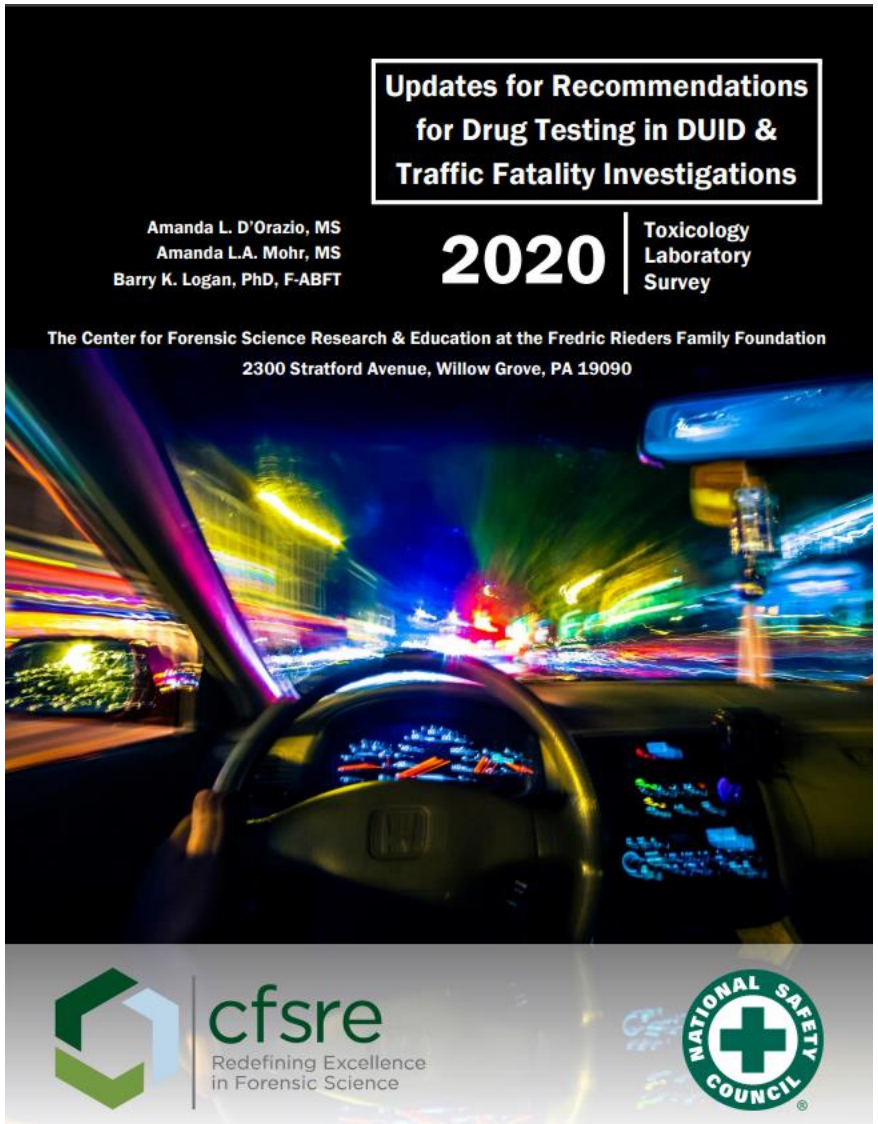


Figure 8. Is there an administrative decision to stop testing if a BAC result is at or above a certain concentration (n=64)?



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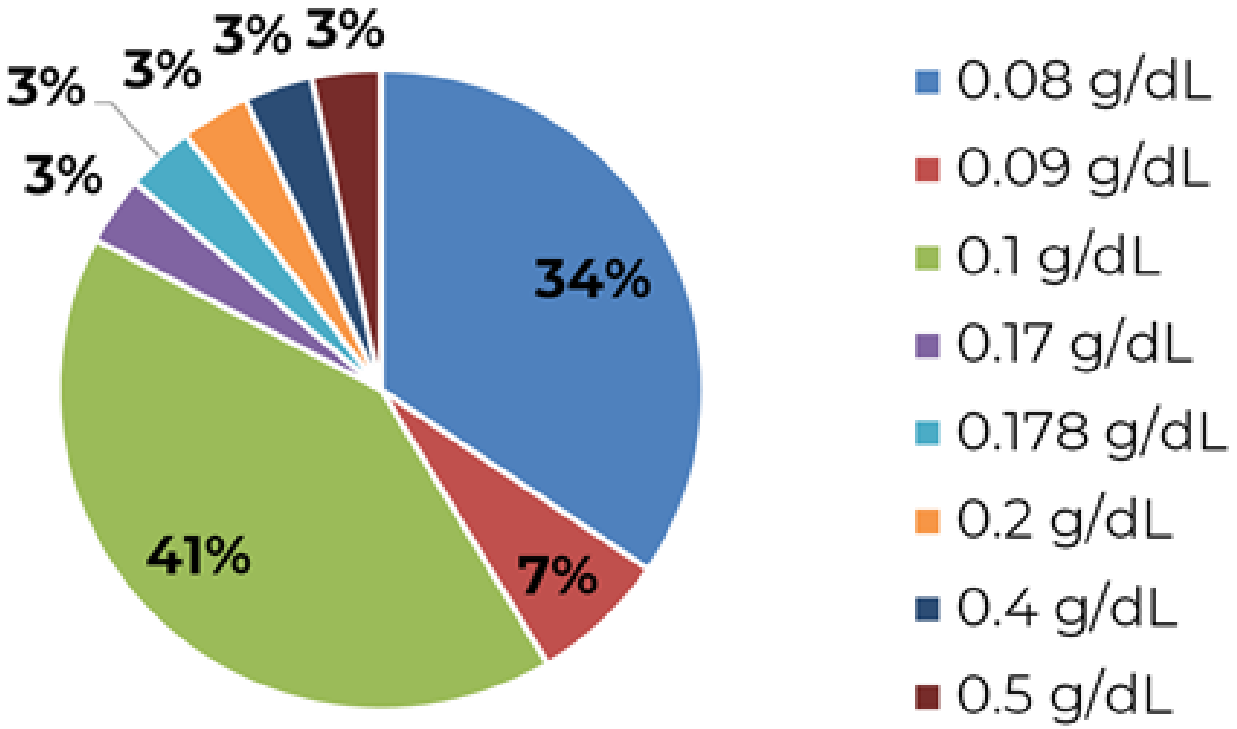
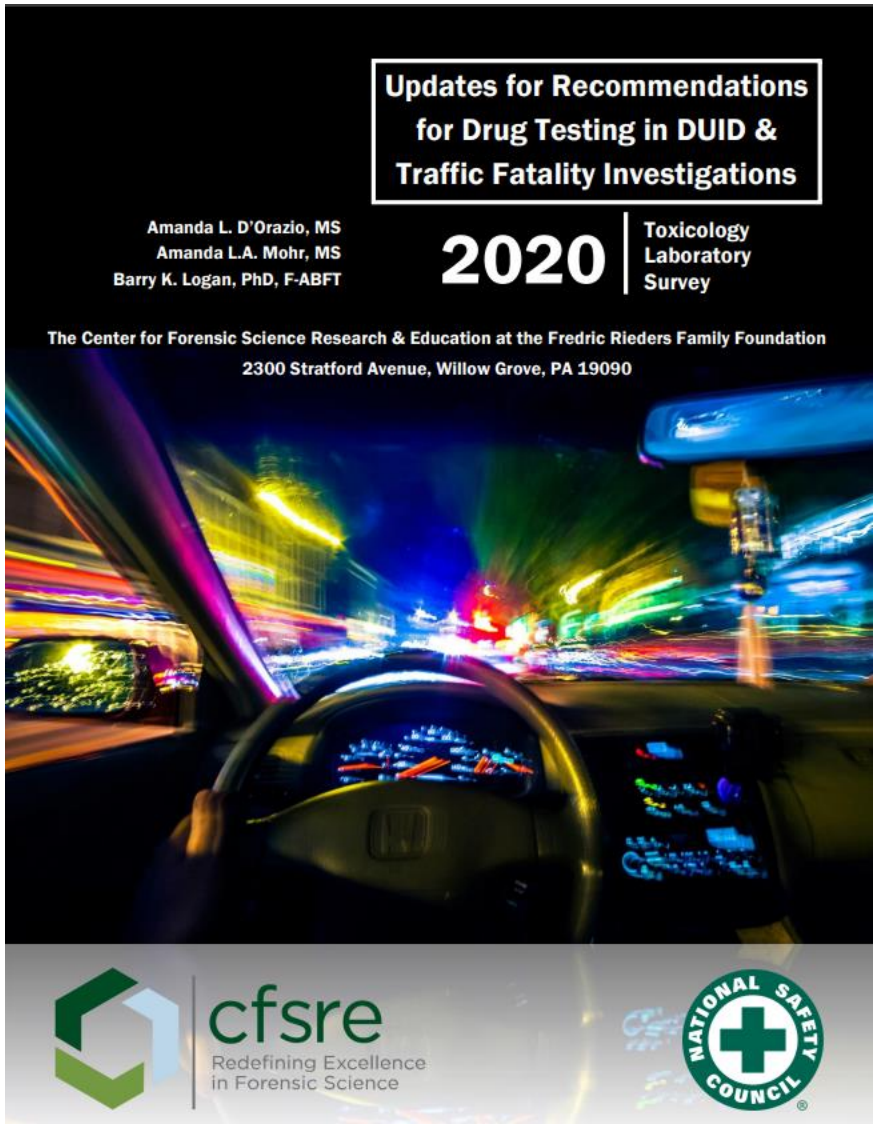


Figure 9. Is there a BAC concentration where there is an administrative decision to stop testing (n=29)?



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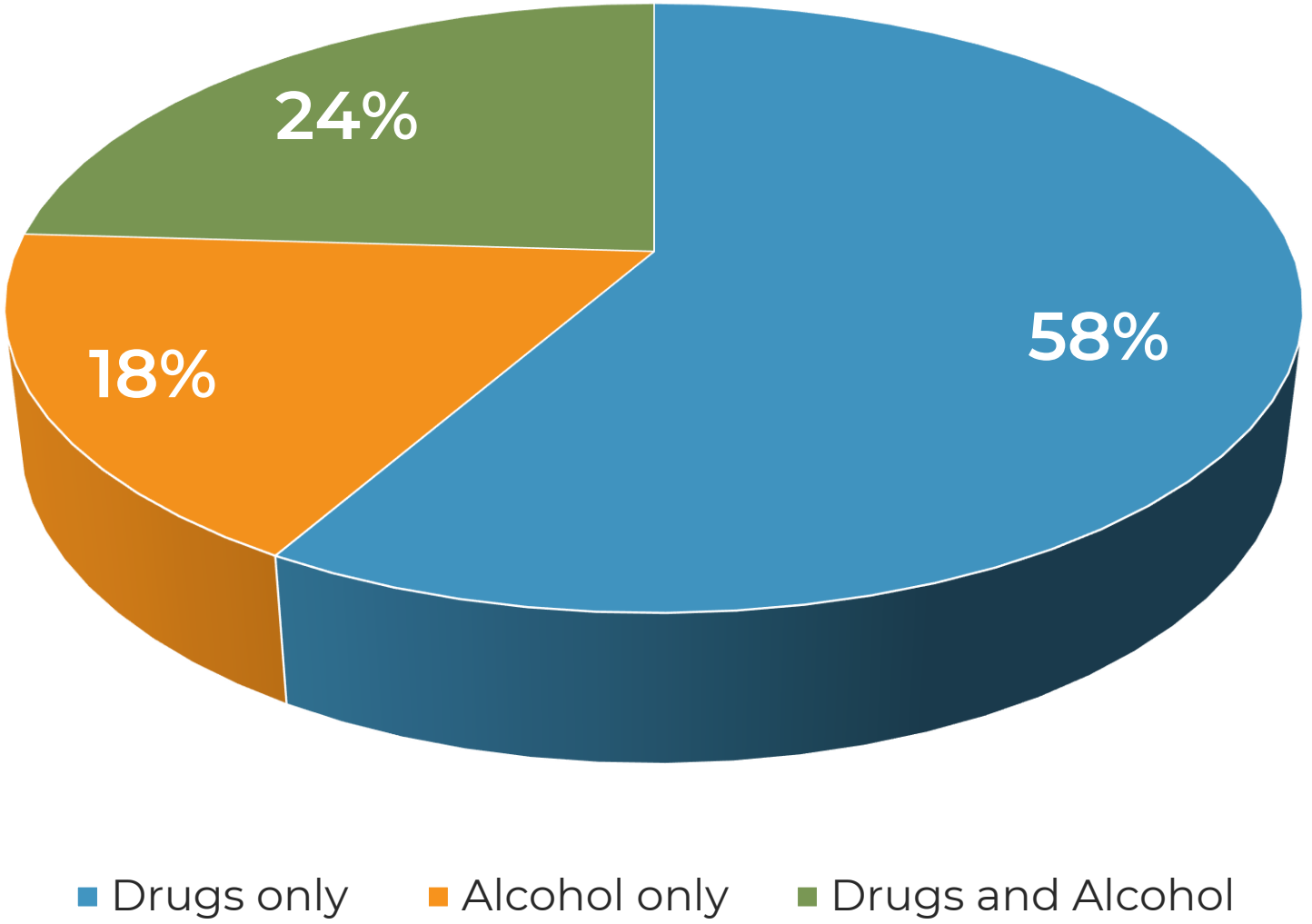
STOP LIMIT TESTING - RESULTS

Alcohol and Drug Data (n=2,407)



Drug Positivity at Various BAC Thresholds

Stop Limit Thresholds				
	<0.08 g/100 mL	**≥0.08 g/100mL**	**≥0.10 g/100 mL**	**≥0.15 g/100 mL**
Tier I Only Positivity	33.0% (n=829)	11.5% (n=288)	10.6% (n=266)	6.4% (n=152)
Tier II Only Positivity	2.9% (n=72)	3.1% (n=79)	2.8% (n=71)	2.1% (n=32)
Tier I and Tier II Positivity	23.9% (n=602)	4.4% (n=111)	3.9% (n=97)	2.7% (n=41)
Positivity for any Tier I, Tier II, or Combo	60% (n=1,503)	19% (n=478)	17.3% (n=434)	11.1% (n=280)

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Positivity for any Tier I, Tier II, or Combo	**60% (n=1,503)**	**19% (n=478)**	**17.3% (n=434)**	**11.1% (n=280)**

Tier I Drug Findings at Various BAC Thresholds

Drug	≥0.08 g/100 mL		≥0.10 g/100 mL	
	Number of Positive Cases	Percent of Cases with Drug	Number of Positive Cases	Percent of Cases with Drug
THC	226	25.4%	209	25.7%
BZE	24	2.6%	20	2.4%
Amphetamine	22	2.4%	20	2.4%
Cocaine	15	1.6%	11	1.3%
Methamphetamine	11	1.2%	11	1.3%
Fentanyl	11	1.2%	10	1.2%
Alprazolam	6	0.6%	6	0.7%
7-Aminoclonazepam	4	0.4%	4	0.5%

Case Example: Individual BAC 0.084 g/dL had a THC positive of 33 ng/mL

Discussion - Trends

- Our ongoing analysis showed that trends are relatively stable in terms of Tier I, Tier II and ethanol as well as the most frequently encountered drugs
- NSC-ADID recommendations for Tier I and Tier II drugs are supported by the findings of this research
  - The drugs with the greatest positivity were found in Tier I
  - Only two Tier I drugs were not detected in this data set
    - Alpha-hydroxyalprazolam and Oxymorphone
- Poly drug usage was frequently detected
- Novel benzodiazepines
  - 8-aminoclonazolam detected in 80 cases and alprazolam detected in 87 cases

Discussion – Stop Limit

- There are many reasons to justify stop limit testing but 82% of case contain drugs in them
- In the survey the most common stop limit threshold was 0.10 g/dL
  - 17.3% of cases were positive to Tier I and/or Tier II drugs
- Comparable Tier I drug positivity for the most common BAC cutoff thresholds
  - 0.08 g/dL and 0.10 g/dL

Conclusions

- Testing for the scope recommended Tier I drugs, and ethanol captures 93% of cases with an impairing substance
  - 79% of cases are positive for Tier I and/or Tier II drugs only
- Limiting testing based on BAC cutoffs keeping drug positivity information out of the picture
  - Leading to under reporting of drug contributions to impaired driving
- Suspect that drug positivity in DUID cases is actually higher due to many samples never making it to the lab
  - Limits our understanding to true extent of impaired driving
- Ongoing work to make a geographically diverse assessment

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- Katie Moody
- Carolina Noble
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- The National Institute of Justice

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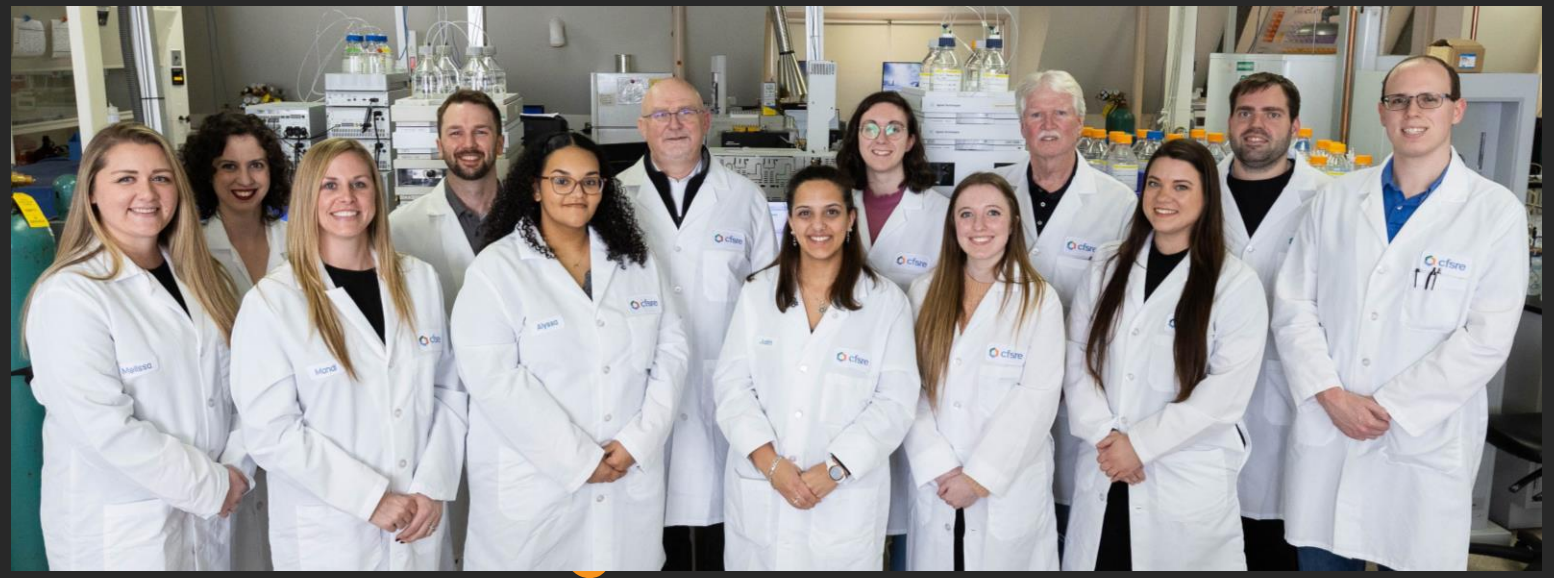

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