

Washington State Crashes Involving Drugs

By Joe Lee



TRAFFIC RECORDS INTEGRATION PROGRAM



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Purpose of this Report

An established issue in traffic safety is the prevalence of substances in crashes.¹ Washington State Department of Transportation (DOT) maintains statewide crash records which are collected by the Washington State Patrol (WSP). WSP operates toxicology labs and maintains records of substances related to driving-related infractions such as crashes.

The purpose of the following analysis is to explore drug data quality issues in Washington State Department of Transportation (DOT) crash records and Washington State Patrol (WSP) toxicology records, and to provide information about the Traffic Record Integration Program (TRIP) linkage between the DOT crash records and WSP toxicology records involving data quality issues regarding drugs. The current method of identifying drug and alcohol involvement in a crash is by using the 'contributing circumstances' category listed in a crash report (See Appendix A).

Determining the presence of drugs has been a consistent issue within crash records. Unlike alcohol, which can be typically detected by a roadside breathalyzer test, drug detection is not as simple. Drug recognition evaluations (DRE) are additional training that law enforcement uses to identify drug involvement in traffic and crash-related incidences.² DREs do not prove the presence of drugs, so the toxicology lab handles drug testing for driving-related incidents if drugs are suspected. The process for getting a drug record from the toxicology lab to the finalized crash data can be broken down into four important events, starting with the crash itself (See Appendix B):

1. Crash occurs
2. DRE performed
3. Toxicology testing begins
4. Police Traffic Collision Report (PTCR) amendment

The amendment to the Police Traffic Collision Report (PTCR) changes an existing PTCR which further complicates the process of managing data. This process requires follow-up which may or may not occur regularly. Due to the uncertainty of this process, DOT uses the contributing circumstances categories (See Appendix A) as the main way to record drug involvement in a crash in a standardized way. The use of the contributing circumstances has limitations on the amount of detail from drug related crashes. The data linkage TRIP provides can alleviate some issues while providing a new level of detail for substance-related crashes. This analysis is intended to provide a starting point for data quality related to how drugs are recorded in crash records.

¹ Substance related is the aggregation of the most current comprehensive method to record the role of drugs and/or alcohol in crashes which is determined from the contributing circumstances coding section of Police Traffic Collision Report.

<https://www.wsp.wa.gov/wp-content/uploads/2020/01/2020-Police-Traffic-Collision-Instruction-Manual-Tenth-Edition.pdf>

See Appendix for list of all options for contributing circumstances in Police Traffic Collisions Reporting.

²International Association of Chiefs of Police, "DRE Training", <https://www.theiacp.org/dre-training> ,Accessed 8/10/2023



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Data Utilized in this Report

WSDOT maintains statewide crash records, which WSP collects. WSP operates toxicology labs and maintains records of substances related to driving-related infractions, such as crashes.

Since crashes are the basis of the TRIP data repository, this report uses DOT's crash data and WSP's toxicology data. It is important to note that the toxicology data in TRIP only covers driving under the influence (DUI) and drug recognition evaluation (DRE) cases in Washington.³

In Washington, there were 1,555,266 total unlinked crashes from calendar year (CY) 2009-2021. There are 246,546 total records in the toxicology data. However, WSP's toxicology records start in CY 2012, and are currently linked through CY 2020. As such, this report will utilize linked DOT and WSP data from CY 2012 to 2020.

Furthermore, the TRIP linkage creates a subsample of total crashes and toxicology tests in Washington. From 2012-2020, Washington State DOT crash data has 0.3% of contributing circumstances in crashes that are related to drugs. The 0.3% of drug-related contributing circumstances represent 9,143 crashes in the DOT data. In total, there are 67,686 crashes that can be linked to a toxicology record.⁴ This subsample will be used to examine traffic safety issues regarding substances-related data.

Questions Addressed in this Report

How often is there a positive toxicology result with no contributing circumstance for drugs and what are those drugs?

PTCRs has two ways to record drug involvement in a crash using contributing circumstance records: 1) under the influence of drugs or 2) had taken medication, under the influence of drugs being the most common (See Appendix A). Table 1 breaks down the percent of records which have mismatched drug records between the linked DOT and WSP datasets.⁵ Table 1 shows that a slim majority of drug-related linked records, but has nondrug-related 'contributing circumstance' recorded and can be thought of as mismatched records. Table 1 shows that 49.7% of linked drug-related crashes are mismatched and listed without drug-related 'contributing circumstances in the DOT data, the TRIP linkage shows potential for a vast improvement in the ability to monitor the prevalence of drug-related crashes. As shown in Table 1, 1.0% of cases where drugs were involved in a crash, and no contributing circumstances were attributed.

³ Drug recognition evaluations are a set of roadside tests which law enforcement officers conduct to help determine the presence of drugs. DUI and DRE cases are designated by Washington State Patrol Toxicology Lab.

National Highway Traffic Safety Administration, "Advanced Roadside Impaired Driving Enforcement: Participant Guide", https://www.nhtsa.gov/sites/nhtsa.gov/files/2023-04/15941-2023_ARIDE_Participant_Guide-tag.pdf

⁴ A successful linkage is a TRIP ID which can be identified in both the DOT crash data and WSP toxicology data and shares a crash and offense date. The TRIP ID super sedes the offense data because a date of crash or offense does not match to a person first a record does not have a way to link between datasets.

⁵ A mismatched record is when the two data set records are successfully linked by TRIP ID and date generalized the records values do not align. In this report drugs records not aligning are considered mismatched.

A concern in crash records is when no contributing circumstances are associated with a crash, but a toxicology record can be linked to it. There are only 1.0% of cases (Table 1) where this is an issue, especially in the context that 40.5% of all crashes in Washington have no contributing circumstances attributed. In the subsample, this case occurs when drugs or alcohol are present in toxicology testing, but the PTCR has contributing circumstances listed as none or not distracted.

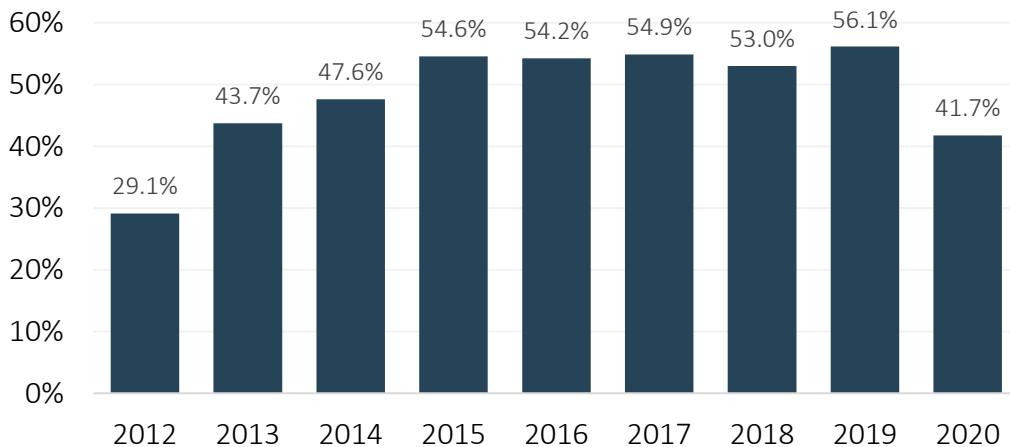
Table 1: Percentages of Total Crash Records Linked to Drugs with Mismatched Contributing Circumstances

Record Types	Percent
Not Drug-Related	49.7%
No Contributing Circumstances	1.0%

Note: No metabolites were counted for these percentages. All data is from TRIP and is a subsample generated from WSDOT crash data and WSP toxicology data covering the years 2012-2020.

The mismatch of records from linking the two datasets can be defined as toxicology drug records linked with a crash but having other contributing circumstances than drugs. Figure 1 shows the percent mismatched DOT drug-related ‘contributing circumstances’ to linked toxicology records over the sample period. Figure 1 shows an upward trend from 2012 to 2020 in the mismatch of drug testing from the toxicology lab and the DOT crash records. Five of the nine years have over half of non-drug related crashes registered as a toxicology-related drug record. From 2019 to 2020, the crashes linked to drugs with contributing circumstances not drug-related decreased by 14.4%, reflects the similar impact of COVID-19 on aggregate travel in Washington.⁶

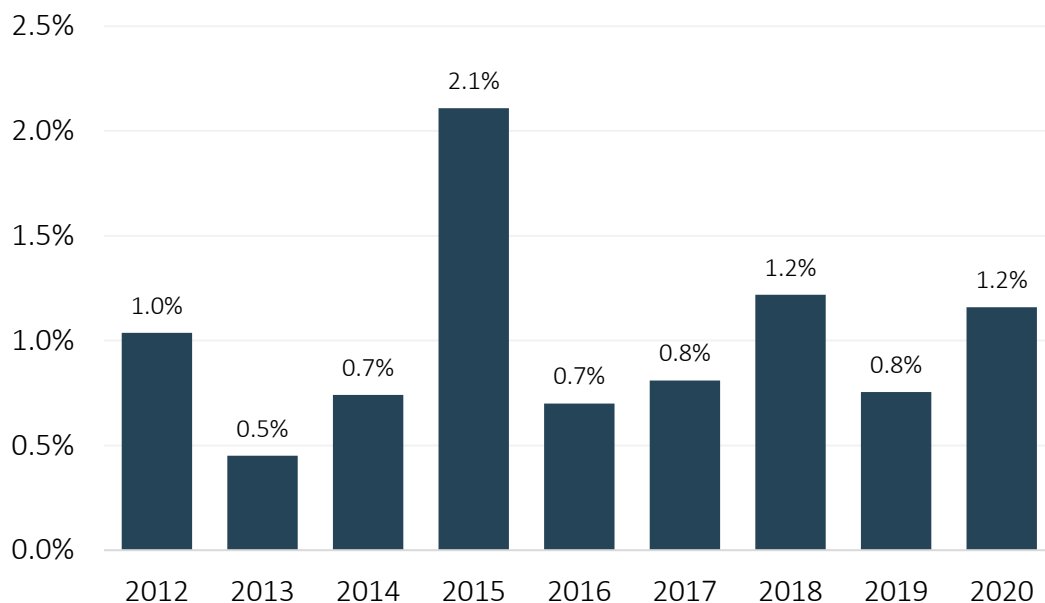
Figure 1: Percent of Crashes Linked to Drugs with Contributing Circumstances not Drug-Related 2012-2020



⁶ Washington State Department of Transportation, “Vehicle Miles of Travel (VMT) Targets – Interim Report” https://wsdot.wa.gov/sites/default/files/2022-06/VMT-Targets-Interim-Report-June2022_0.pdf, June 2022
 Washington State Department of Transportation, “Annual mileage and travel information” <https://wsdot.wa.gov/about/transportation-data/travel-data/annual-mileage-and-travel-information>, accessed 7/10/2023
 Bureau of Transportation Statistics, “U.S. Vehicle Miles” <https://www.bts.gov/content/us-vehicle-miles>, accessed 7/10/2023

Figure 2 shows the annual percent of linked drugs records between toxicology and crash data where ‘no contributing circumstances’ were recorded. Figure 2 shows an outlier in 2015 in crashes with no contributing circumstances with a positive toxicology result which is more than double the annual average of 1.0%. A potential reason for the lack of recorded drug-related crashes includes if a person is intoxicated, they might be screened for alcohol, and any drugs are not factored in. Additionally, an officer may not get a chance to screen for drugs because emergency medical services are needed.

Figure 2: Percent of Crashes Linked to Drugs with No Contributing Circumstances 2012-2020



The drugs where mismatches occur due to no contributing circumstances are not confined to a single class of drug, see Table 2. A total of 33 different drugs were found in cases where no contributing circumstances were not attributed. Many of the drugs listed are prescription drugs that have well-known impairing effects. Some of the drug classes represented in Table 2 are commonly accepted to be driving impairing such as opiates, central nervous system stimulants, benzodiazepines, first-generation antihistamines, etc.⁷ Tetrahydrocannabinol (THC), Fentanyl, Dextromethorphan (DXM),

⁷ Hetland A, Carr DB. Medications and impaired driving. *Ann Pharmacother*. 2014 Apr;48(4):494-506. doi: 10.1177/1060028014520882. Epub 2014 Jan 28. PMID: 24473486; PMCID: PMC3965581. National Highway Traffic Safety Administration, “Advanced Roadside Impaired Driving Enforcement: Participant Guide”, https://www.nhtsa.gov/sites/nhtsa.gov/files/2023-04/15941-2023_ARIDE_Participant_Guide-tag.pdf

Methylenedioxymethamphetamine (MDMA), Methamphetamine, and Ketamine stand out in this list due to their prevalence in recreational drug use.⁸

Table 2: Drugs Involved in Crashes Which had No Contributing Circumstances Recorded

Drug Names		
Alprazolam ¹	Etizolam ⁰	Methamphetamine ¹
Amphetamine ¹	Fentanyl ¹	Midazolam ¹
Buprenorphine ¹	Flualprazolam ⁰	Oxycodone ¹
Bupropion ²	Fluoxetine ²	Phentermine ²
Carisoprodol ¹	Hydrocodone ¹	Quetiapine ¹
Citalopram ²	Ketamine ¹	Sevoflurane ¹
Clonazepam ¹	Lidocaine ²	THC ¹
Dextromethorphan ¹	MDA ⁰	Topiramate ¹
Diazepam ¹	MDMA ⁰	Trazodone ¹
Diphenhydramine ¹	Meprobamate ¹	Venlafaxine ²
Doxylamine ¹	Methadone ¹	Zolpidem ¹
Nordiazepam ¹		

See Appendix C for table which includes metabolites. Meprobamate is a metabolite of Carisoprodol but can also be prescribed as a sedative on its own.⁹ All data is from TRIP and is a subsample generated from WSDOT crash data and WSP Toxicology data covering the years 2012-2020. 0: non-prescription impairing drugs, 1: prescription/hospital/over-the-counter impairing drugs, 2- prescription or other with variable impairment effects

Table 2 shows prescription or other drugs with unclear impairment effects (Group 2) covering 17.6% of drug-related crashes with no contributing circumstance. These are from drugs that may have side effects that impair a person’s cognitive ability, mainly composed of selective serotonin reuptake inhibitors (SSRI). The group of SSRIs is not known for creating a dopamine response as they are intended to manage a person’s serotonin levels but may indicate SSRI withdrawal syndrome or other side effects attributed.¹⁰ Mismatching records related to drugs are a longstanding concern in crash records. The issue is not only about recording drug involvement but the level of involvement crashes. TRIP can

⁸ Drug Enforcement Agency U.S. Department of Justice, “Drugs of Abuse A DEA Resource Guide”, 2020, https://www.dea.gov/sites/default/files/2020-04/Drugs%20of%20Abuse%202020-Web%20Version-508%20compliant-4-24-20_0.pdf

⁹ Conermann T, Christian D. Carisoprodol. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing, 2023 Jan-. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK553077/>; updated November, 14 2022.

¹⁰ Sansone RA, Sansone LA. “Driving on antidepressants: cruising for a crash?” Psychiatry. 2009 Sep;6(9):13-6. PMID: 19855856; PMCID: PMC2766284. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2766284/>

Sharbaf-Shoar N, Fariba KA, Padhy RK. “Citalopram” 2021 Dec 11. In: National Institute of Health: National Library of Medicine. 2021 Dec 11. <https://www.ncbi.nlm.nih.gov/books/NBK482222/>

Hetland A, Carr DB. Medications and impaired driving. Ann Pharmacother. 2014 Apr;48(4):494-506. doi: 10.1177/1060028014520882. Epub 2014 Jan 28. PMID: 24473486; PMCID: PMC3965581.



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provide a way to bridge this gap by identifying mismatched data where drug records do not make it into the crash data to incorporate the detail of toxicology records.

Table 3: Percent of Drugs in Table 2 by Group

Drug Group	Percent
Group 0- Non-prescription Impairing Drugs	11.7%
Group 1- Prescription/hospital/over-the-counter Impairing Drugs	70.5%
Group 2- Prescription or Other drugs with Variable Impairment Effects	17.6%

Note: Groups are from Table 2.

Limitations

It is important to note the limitations of the linkage between toxicology records and DOT records. When a toxicology record is found to link to a crash record it means there is a very high probability that the toxicology record is related to a crash. A toxicology record that does not link to a crash means that the record is more than likely just related to a driving offense. All records which can be linked have a unique TRIP ID for a driver. An additional condition is to have matching dates for a crash (DOT) and offense (WSP) to be considered linked. Medical professionals do not record the injury data from DOT so there are general reliability issues outside of the broadness of the categories. The linkage TRIP uses generates IDs used as the main linking component from a probabilistic matching algorithm with some deterministic processes used for quality assurance. This means that not every record will be exactly matched but there is a high level of confidence in the matching process.

Next Steps

TRIP shows potential to bridge gaps in substance-related crash records as a pathway to provide new insights into how substances impact public health and safety outcomes in Washington. The linkage between crash data and other TRIP datasets provides a way to improve data quality through data flags or the verification of similar types of data like drugs and alcohol. Increasing the level of detail through the TRIP linkage will provide crash information such as what drugs and their quantity. TRIP provides the ability for Washington to have a persistent way of increasing information available to evaluate drug-related crashes by creating annual data feeds for anyone interested in Washington traffic safety.

Appendix A: Contributing Circumstance Categories for Crashes

Under Influence of Alcohol

Under Influence of Drugs

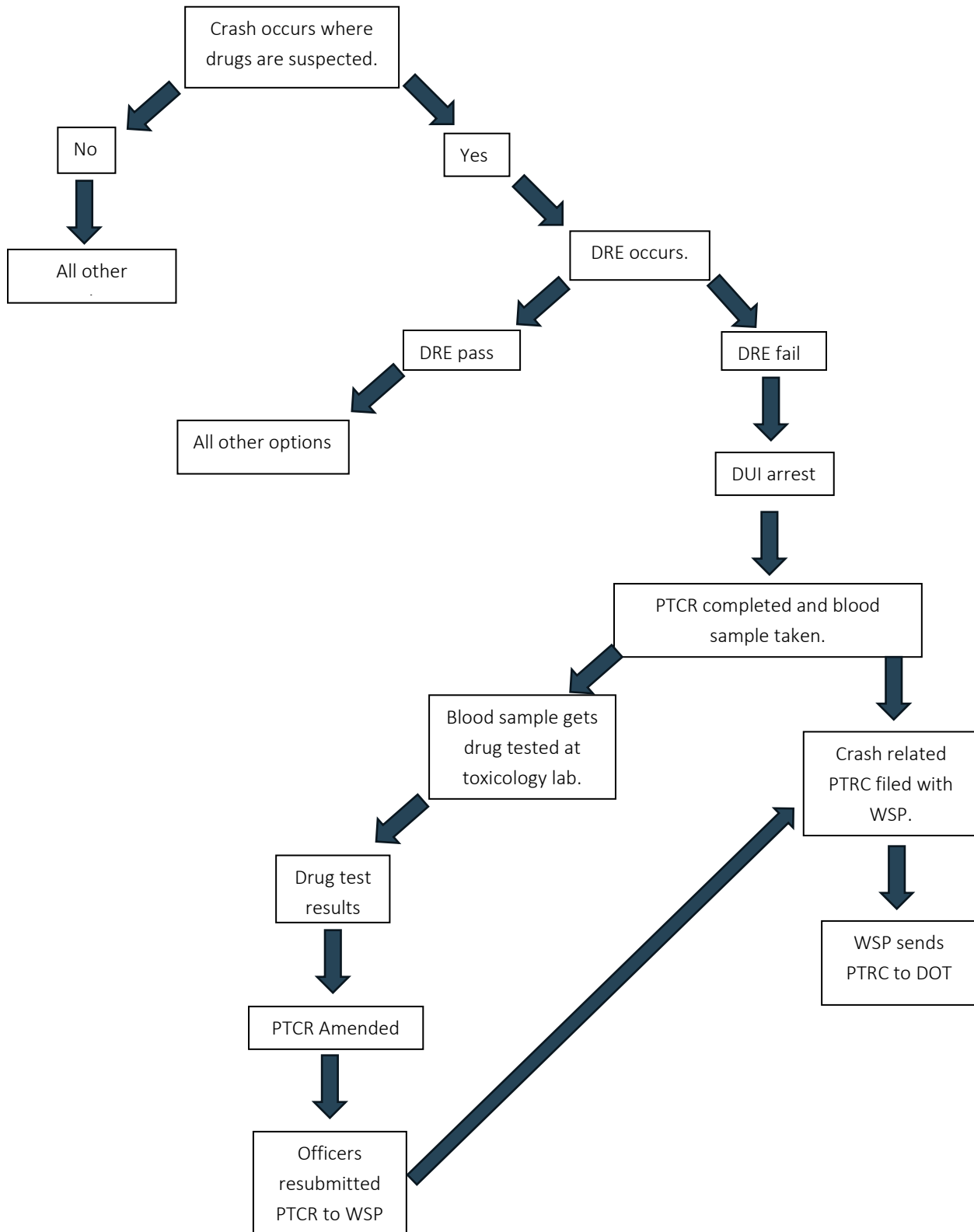
Exceeding Stated Speed Limit
 Exceeding Reasonable Safe Speed
 Did Not Grant RW to Vehicle
 Improper Passing
 Follow Too Closely
 Over Center Line
 Failing to Signal
 Improper Turn/Merge
 Disregard Stop and Go Light
 Disregard Stop Sign - Flashing Red
 Disregard Yield Sign - Flashing Yellow
 Apparently Asleep or Fatigued
 Improper Parking Location
 Operating Defective Equipment
 Other Contributing Circ Not Listed
 None
 Improper Signal
 Improper U-Turn
 Light Violation: No Lights/Fail to Dim
 Did Not Grant R/W to Non-Motorist
 Inattention
 Improper Backing
 Disregard Flagger / Officer
 Apparently Ill
 Apparently Fatigued

Had Taken Medication

Non-Motorist on Wrong Side of Road
 Hitchhiking
 Failure to Use Xwalk
 Operating Handheld Cell Phone
 Operating Hands-Free Cell Phone
 Operating Other Electronic Devices (computer, navigation, etc.)
 Driver Adjusting Audio or Entertainment System
 Smoking
 Eating or Drinking
 Reading or Writing
 Grooming
 Driver Interacting with Passengers, Animals or Objects Inside Vehicle
 Other Driver Distractions Inside Vehicle
 Distractions Outside Vehicle
 Unknown Distraction
 Driver Not Distracted
 Lost in Thought / Day Dreaming
 Distracted by Other Occupant
 Distracted by Adjusting Vehicle Controls
 Other Distractions
 Disregard Traffic Sign and Signals
 Apparently Emotional (Depressed, Angry, Disturbed, etc.)
 Physically Impaired
 Racing
 Operating Recklessly or Aggressively
 Overcorrecting / Oversteering

All options from Police Traffic Collision Reports for contributing circumstance recording options and are from WSDOT data. Bolded categories are used to determine substance related records.

Appendix B: Drug Recording Process Decision Tree





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Appendix C: Drugs and Metabolites

Alprazolam	Doxylamine	Midazolam	Zolpidem
Amphetamine	Etizolam	norbuprenorphine*	
Benzoyllecgonine*	Fentanyl	Nordiazepam*	
Buprenorphine	Flualprazolam	Norfluoxetine*	
Bupropion	Fluoxetine	Oxycodone	
Bupropion metabolite*	Hydrocodone	Phentermine	
Carboxy-THC*	Ketamine	Quetiapine	
Carisoprodol	Lidocaine	Sevoflurane	
Citalopram	MDA	THC	
Clonazepam	MDMA	Topiramate	
Dextromethorphan	Meprobamate	Topiramate breakdown*	
Diazepam	Methadone	Trazodone	
Diphenhydramine	Methamphetamine	Venlafaxine	

* Designates a metabolite or by product of drugs breaking down. All data is from TRIP and is a subsample generated from WSDOT crash data and WSP Toxicology data covering the years 2012-2020. Expanded from Table 2 to include metabolite records which are not also prescribable.
