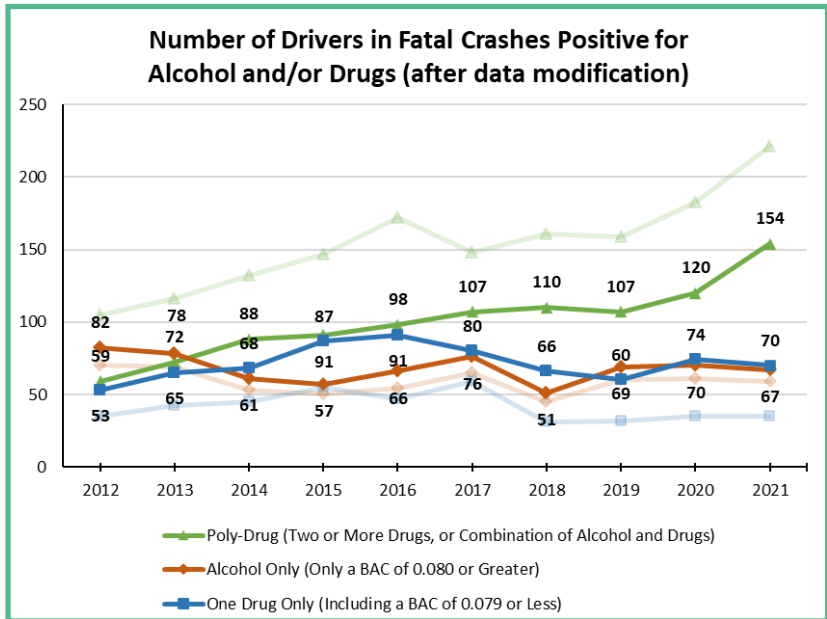
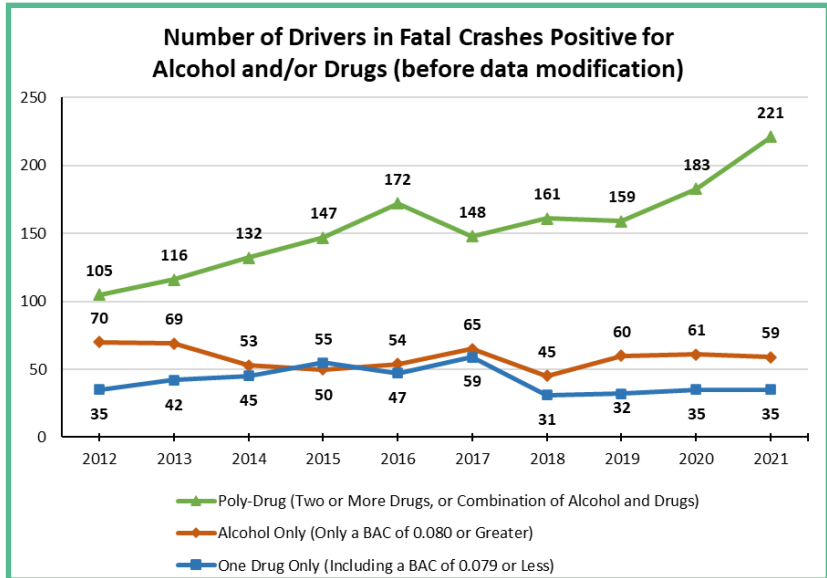




Drug-Positive Driver Data Update—Methods

In October 2023, the Washington Traffic Safety Commission (WTSC) implemented new updates to drug-positive driver data in our Coded Fatal Crash (CFC) files. The WTSC retroactively implemented these updates to data since 2012. As a result of the new data updates, existing drug-positive driver data changed. These updates to the data were implemented to provide more accurate information pertaining to impairment. The methods and reasoning for these updates are described in the pages that follow. For a complete description of the new data updates, please see our full report: [Re-Evaluating the Prevalence of Poly-Drug Driving in Washington](#).

The change in the data over time is shown in the charts to the right among drivers involved in fatal crashes. The first chart above shows the number of drivers involved in fatal crashes that were positive for alcohol and/or drugs over time prior to the data updates. The second chart below shows how these numbers changed after implementing the data updates. Each chart shows three different impairment categories: one drug only (including a blood alcohol content of 0.079 or less), alcohol only (including a blood alcohol content of 0.08 or greater), and poly-drug (two or more drugs, or a combination of alcohol and one or more drugs). These categories are mutually exclusive.



In 2021, prior to the data updates, there were 221 poly-drug positive drivers involved in fatal crashes. After implementing the data updates, this number changed to 154, representing a 30% change in the number of poly-drug positive drivers. The number of drivers involved in fatal crashes that were positive for only alcohol changed slightly from 59 to 67 — a 14% change. Lastly, the number of drivers involved in fatal crashes that were positive for one drug only changed from 35 to 70. Poly-drug remained the most prevalent impairment category among drivers involved in fatal crashes, but the prevalence of one-drug positive only drivers rose to the second most prevalent impairment category. Alcohol only impairment among drivers involved in fatal crashes changed slightly after implementing the data updates.



Drug-Positive Driver Data Update—Methods

Methods

1. Remove non-impairing and unrelated substances.
2. Remove non-active metabolites when the parent drug is absent.
3. Remove non-impairing pharmaceutical drugs when alcohol is not present.
4. Match parent drugs with their metabolites.
5. Remove toxicology screening results when confirmatory results are present.

1. Remove non-impairing and unrelated substances.

We removed 20 substances (see Appendix) that were deemed to be non-impairing — meaning that they do not affect one’s ability to operate a motor vehicle — or were unrelated to the events of the crash. Examples of non-impairing substances include acetaminophen (e.g., Tylenol), ibuprofen (e.g., Advil), caffeine, nicotine and cotinine. Examples of unrelated substances include carboxyhemoglobin, which is present in cases of vehicle fires and CO₂ inhalation, or midazolam (e.g., Versed), which is a sedative administered by emergency medical services (EMS) personnel. The tables below show how removing non-impairing substances can change a person that was positive for three drugs to being positive for zero drugs.

<u>BEFORE</u>			
	<u>Result 1</u>	<u>Result 2</u>	<u>Result 3</u>
Person 01	Caffeine	Ibuprofen	Nicotine

<u>AFTER</u>			
	<u>Result 1</u>	<u>Result 2</u>	<u>Result 3</u>
Person 01			

2. Remove non-active metabolites when the parent drug is absent.

When a drug is consumed the body quickly begins to metabolize it, producing either active or non-active metabolites. Non-active metabolites do not have impairing effects on the body. For example, delta-9 THC, the major psychoactive component of cannabis, is metabolized into carboxy-THC, which is a non-active metabolite. A person can test positive for the parent drug alone, a combination of the parent drug and metabolite, or the metabolite alone. We removed six different non-active metabolites (see Appendix) when the parent drug was absent from the toxicology results. As shown in the tables below, if a person tested positive for carboxy-THC alone, it would be removed and that person would no longer be positive for any drugs.

<u>BEFORE</u>			
	<u>Result 1</u>	<u>Result 2</u>	<u>Result 3</u>
Person 01	Carboxy-THC		

<u>AFTER</u>			
	<u>Result 1</u>	<u>Result 2</u>	<u>Result 3</u>
Person 01			

3. Remove non-impairing pharmaceutical drugs when alcohol is not present.

We removed 18 pharmaceutical drugs (see Appendix) that were deemed to be non-impairing, but only if alcohol was not present. Pharmaceutical drugs can interact with alcohol to enhance the effects of the drugs or result in other impairing qualities that might otherwise be absent if the drug were taken without alcohol and as prescribed by a doctor. A few types of pharmaceutical drugs we removed included anticoagulants, anticonvulsants, antihypertensives, and antipsychotics — drugs that may be needed for people maintain their health and carry out day-to-day functions, such as driving. The tables on the following page show two examples: the first set of tables show that two non-impairing pharmaceutical drugs were removed because alcohol was not present, and the second set of tables show that the non-impairing drug was *not* removed because alcohol was present.



Drug-Positive Driver Data Update—Methods

<u>BEFORE</u>			
	Result 1	Result 2	Result 3
Person 01	Warfarin	Risperidone	

<u>AFTER</u>			
	Result 1	Result 2	Result 3
Person 01			

<u>BEFORE</u>			
	Result 1	Result 2	Result 3
Person 02	Warfarin	Alcohol	

<u>AFTER</u>			
	Result 1	Result 2	Result 3
Person 02	Warfarin	Alcohol	

4. Match parent drugs with their metabolites.

In circumstances where both the parent drug and metabolite were present, we combined them together to form a parent/metabolite compound. In total, we created 39 parent/metabolite compounds (see Appendix). The tables that follow show that before updating the data, a person that tested positive for delta-9 THC and carboxy-THC were shown as being positive for two drugs when in fact only one drug had been consumed. This results in an overcount of the number of drugs in a person’s system and the number of people who are poly-drug positive. After we matched the parent drug with its metabolite, the example below now shows the person as being positive for only one parent/metabolite compound.

<u>BEFORE</u>		
	Result 1	Result 2
Person 01	Delta-9 THC	Carboxy-THC

<u>AFTER</u>		
	Result 1	Result 2
Person 01	Delta-9 THC/Carboxy-THC	

5. Remove toxicology screening results when confirmatory results are present.

In toxicology testing, a screening test can be performed to determine whether or not a type of drug is present in the blood sample. A confirmatory test can then be performed to determine the specific drug and its level or concentration in the blood. Six screening results (see Appendix) appeared periodically throughout the data such as benzodiazepines, cannabinoids, or opiates. We removed these screening results in circumstances where confirmatory results were also present. For example, the tables below show a person that had a positive screening result for cannabinoids, but also a positive confirmatory result for delta-9 THC. This person would be shown as being positive for two drugs, when in fact they only had one drug in their system. Here, we would remove the screening result to show that this person was positive for only one drug.

<u>BEFORE</u>			
	Result 1	Result 2	Result 3
Person 02	Cannabinoids	Delta-9 THC	

<u>AFTER</u>			
	Result 1	Result 2	Result 3
Person 02	Delta-9 THC		

The data updates will provide better quality data pertaining to impairment. The steps listed above will prevent overcounting drugs and metabolites when only one drug was consumed, remove drugs and substances that do not have impairing effects on people’s abilities to drive, and eliminate double counting screening and confirmatory test results as multiple drugs. Impairment data is challenging and constantly evolving. With updated impairment data, we will be better informed as to the common drugs and drug combinations involved in fatal crashes which can guide program decisions to combat impaired driving and save lives.



Appendix

List of Non-impairing or Unrelated Substances Removed

acetaminophen	amantadine	benzene	caffeine	carboxyhemoglobin
etomidate	glucose	ibuprofen	ketones	laudanosine
levamisole	midazolam	naloxone	nicotine/cotinine	quinine
salicylate	tadalafil	theobromine	trimethoprim	yohimbine

List of Non-Active Metabolites Removed when Parent Drug was Absent

benzoylecgonine	carboxy-THC	desmethyloperamide
ecgonine methyl ester	norfentanyl	ritalinic acid

List of Non-Impairing Pharmaceutical Drugs Removed when Alcohol was Absent

dextromorphan	diltiazem	glipizide
levetiracetam	metformin	nifedipine
olanzapine	phenytoin	primidone
pseudoephedrine	norpseudoephedrine	quetiapine
risperidone	9-hydroxyrisperidone	verapamil
norverapamil	warfarin	zonisamide

List of Screening Results Removed when Confirmatory Results were Present

amphetamines	barbiturates	benzodiazepines
cannabinoids	opiates	tricyclic antidepressants

List of Parent-Metabolite Compounds

amitriptyline / nortriptyline	alprazolam / alprazolam metabolite	buprenorphine / norbuprenorphine
bupropion / bupropion metabolite	delta-9 THC / 11-hydroxy delta-9 THC	delta-9 THC / carboxy-THC
delta-9 THC / carboxy-THC / 11-hydroxy delta-9 THC	chlordiazepoxide / nordiazepam	citalopram / desmethylcitalopram
citalopram / norcitalopram	clonazepam / 7-aminoclonazepam	cocaine / benzoylecgonine
cocaine / benzoylecgonine / cocaethylene	cocaine / benzoylecgonine / ecgonine methyl ester	cocaine / benzoylecgonine / ecgonine methyl ester / cocaethylene
codeine / morphine	diazepam / nordiazepam	doxepin / desmethyldoxepin
fentanyl / norfentanyl	fluoxetine / norfluoxetine	hydrocodone / dihydrocodeine



Appendix

List of Parent-Metabolite Compounds (continued)

hydrocodone / hydromorphone	hydrocodone / dihydrocodeine / hydromorphone	isopropanol / acetone
ketamine / norketamine	lidocaine / monoethylglycinexylidide	methadone / eddp
methamphetamine / amphetamine	oxycodone / oxymorphone	propoxyphene / norpropoxyphene
pseudoephedrine / norpseudoephedrine	risperidone / 9-hydroxyrisperidone	sertraline / desmethylsertraline
sertraline / norsesertraline	topiramate / topiramate metabolite	tramadol / o-desmethyltramadol
venlafaxine / norvenlafaxine	venlafaxine /	verapamil / norverapamil

List of All Drugs Included

10-hydroxycarbazepine	diazepam	methylphenidate/ritalinic acid
11-hydroxy delta 9 thc	diazepam/nordiazepam	metoprolol
4-anpp	difluoroethane	mirtazapine
6-acetylmorphine	diphenhydramine	mitragynine
6-monoacetylmorphine	doxepin/desmethyldoxepin	morphine
7-aminoclonazepam	doxylamine	norbuprenorphine
acetyl fentanyl	duloxetine	nordiazepam
alprazolam	ephedrine	norketamine
alprazolam/alpha hydroxyalprazolam	fentanyl	norsesertraline
alprazolam/alprazolam metabolite	fentanyl/norfentanyl	nortriptyline
amitriptyline	flualprazolam	o-desmethylvenlafaxine
amitriptyline/nortriptyline	flubromazolam	olanzapine
amlodipine	fluoxetine	opiates
amphetamine	fluoxetine/norfluoxetine	oxazepam
aripiprazole	gabapentin	oxycodone
baclofen	hydrocodone	oxycodone/oxymorphone
benzodiazepines	hydrocodone/dihydrocodeine	paroxetine
buprenorphine/norbuprenorphine	hydrocodone/dihydrocodeine/ hydromorphone	phencyclidine
bupropion	hydrocodone/hydromorphone	phenobarbital
bupropion/hydroxybupropion	hydromorphone	phentermine



Appendix

List of All Drugs Included (continued)

butalbital	hydroxybupropion	phenylpropanolamine
cannabinoids	hydroxyzine	primidone/plenylethylmalonamide
carbamazepine	imipramine	promethazine
carisoprodol	isopropanol	risperidone/9-hydroxyrisperidone
cetirizine	ketamine	sertraline/desmethylsertraline
chlordiazepoxide/nordiazepam	ketamine/norketamine	sertraline/norsertraline
chlorpheniramine	lamotrigine	sevoflurane
citalopram	levetiracetam	synthetic cannabinoid
clonazepam	lidocaine	temazepam
clonazepam/7-aminoclonazepam	lorazepam	delta-9 THC/11-hydroxy delta-9 THC
clonidine	lsd	delta-9 THC/carboxy-THC
cocaethylene	mcpp	delta-9 THC/carboxy-THC/11-hydroxy delta-9 THC
cocaine/benzoylecgonine	mdma	topiramate
cocaine/benzoylecgonine/ cocaethylene	meperidine	topiramate/topiramate metabolite
codeine	meprobamate	tramadol
codeine/morphine	methadone	tramadol/o-desmethyltramadol
cyanide	methadone/eddp	trazodone
cyclobenzaprine	methamphetamine	venlafaxine
delta-9 THC	methamphetamine/amphetamine	venlafaxine/o-desmethylvenlafaxine
desalkylflurazepam	methanol	xylazine
desipramine	methocarbamol	zolpidem
desmethylsertraline	methylphenidate	