Auto crashes are on the rise in marijuana states

- Three states that have approved the sale of marijuana for recreational use have shown an increase in car accident claims.
- The number of vehicle collisions is 3 percent higher than what would have been if pot weren't legal, the study claims.

Phil LeBeau | @Lebeaucarnews
Published 12:01 AM ET Thu, 22 June 2017 Updated 9:13 AM ET Thu, 22 June 2017


Exclusive: Traffic fatalities linked to marijuana are up sharply in Colorado. Is legalization to blame? – 8/25/2017

Legal pot and car crashes: Yes, there's a link
By Ed Leefeldt MoneyWatch June 22, 2017, 12:01 AM
Overview

- Pharmacology
- *(Briefly cover some)* Driving Law issues
- Monitoring
- Fatal Crash Data
- Costs vs Revenue
- Conclusions
Do these drugs appear similar?

Ethanol = Alcohol
- water soluble

THC = delta-9 tetrahydrocannabinol
- fat soluble
Cannabinoids

- Mechanism of Action: anandamide-like (nervous/immune/neuroendocrine systems)
- Distribution: crosses blood brain barrier, fat, muscle
- Metabolism: THC half-life = 1.6 - 4 hour,  
  major metabolites: hydroxy-THC (11-OH-THC), carboxy-THC (COOH-THC)
- Elimination: 80-90% THC removed from blood in 1 - 2 hours  
  urine (40-70%), feces (30-60%)
- Side Effects: slow reaction time, increased HR/BP, lack of convergence, eyelid tremors, dry mouth, anxiety w/ chronic use
Driving Warning is Present on FDA-approved cannabinoids

dronabinol = Marinol® = THC

cannabidiol = Epidiolex® = CBD

Hazardous Activities

MARINOL can cause and may impair the mental and/or physical abilities required for the performance of hazardous tasks such as driving a motor vehicle or operating machinery. Concomitant use of other drugs that cause dizziness, confusion, sedation, or somnolence such as CNS depressants may increase this effect (e.g., barbiturates, benzodiazepines, ethanol, lithium, narcotics, buspirone, omepramol, antihistamines, tricyclic antidepressants, other anticholinergic...)

https://www.accessdata.fda.gov/drugsatfda_docs/label/2017/018651s029lbl.pdf
19347. (a) Prior to delivery or sale at a dispensary, medical cannabis products shall be labeled and in a tamper-evident package. Labels and packages of medical cannabis products shall meet the following requirements:

(1) Medical cannabis packages and labels shall not be made to be attractive to children.

(2) All medical cannabis product labels shall include the following information, prominently displayed and in a clear and legible font:

(A) Manufacture date and source.

(B) The statement “SCHEDULE I CONTROLLED SUBSTANCE.”

(C) The statement “KEEP OUT OF REACH OF CHILDREN AND ANIMALS” in bold print.

(D) The statement “FOR MEDICAL USE ONLY.”

(E) The statement “THE INTOXICATING EFFECTS OF THIS PRODUCT MAY BE DELAYED BY UP TO TWO HOURS.”

(F) The statement “THIS PRODUCT MAY IMPAIR THE ABILITY TO DRIVE OR OPERATE MACHINERY. PLEASE USE EXTREME CAUTION.”
NOTE: Unlike alcohol which has a standard (zero-order) elimination rate of 0.015 gm%/hr; marijuana does NOT have a consistent rate of elimination
### Time to First Phlebotomy by Charge & Responsible Agency in CO in 2012
(pre-SCOTUS *MO v. McNeely*)

<table>
<thead>
<tr>
<th>Issue</th>
<th>N</th>
<th>Mean (SD) hrs</th>
<th>Test Statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Charge</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vehicular homicide</td>
<td>23</td>
<td>2.66 (± 1.57)</td>
<td>t = 1.78</td>
</tr>
<tr>
<td>Vehicular assault</td>
<td>26</td>
<td>2.01 (± 0.97)</td>
<td>p = 0.08</td>
</tr>
<tr>
<td><strong>Responsible Agency</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CO State Patrol</td>
<td>19</td>
<td>2.90 (± 1.54)</td>
<td>t = 2.75</td>
</tr>
<tr>
<td>Local PD</td>
<td>28</td>
<td>1.91 (± 0.97)</td>
<td>p = 0.008</td>
</tr>
</tbody>
</table>

- Range: 0.83 – 8 hrs
- Median = 2 hrs
- Mean = 2.32 hrs (± 1.31 hrs)

---

Simulated driving evaluation – alcohol and THC
Cannabis Effects on Driving - Standard Deviations of Lateral Position (weaving) w/ and w/out Alcohol

- 18 adults cannabis smokers (≥1 time/3 mos, ≤3 days/wk), low dose alcohol +/- inhaled 500 mg of low dose (2.9% THC) or high dose (6.7% THC), tested driving attributes in simulated driving system at 55 mph and measure blood THC and BAC

- BAC 0.08% and 0.05% created the same SDLP as blood THC 13.1 and 8.2 mcg/L AT THE TIME OF DRIVING

- BAC 0.05% + blood THC 5 mcg/L = same SDLP as BAC 0.08%

<table>
<thead>
<tr>
<th>THC Blood level (ng/ml)</th>
<th>1.4 hr after consumption</th>
<th>2.3 hr after consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.9% THC</td>
<td>3.7</td>
<td>1.9</td>
</tr>
<tr>
<td>6.7% THC</td>
<td>4.6</td>
<td>2.6</td>
</tr>
</tbody>
</table>

Driving Study flaws

- Smoking marijuana (NOT standard % of products sold, edible use increasing, vaping BHO products climbing in youth)
  - Example: 0% vs 5.9% vs 13.4% THC
  - Or 2.9% vs 6.7% THC

- Assessment by driving simulator (need real-life distractors), SFST, iPad (cognitive/motor performance), blood/saliva/breath fluids (NOT the brain, where THC accumulates)

- No cross over (individual variance), chronicity of THC use as measured by …


Average THC Potency in 2015

- National
- WA
- CO

www.colorado.gov
Actual laws surrounding marijuana-positive driving
(1) A person is **guilty** of driving while under the influence of intoxicating liquor, **marijuana**, or any drug if the person drives a vehicle within this state:

(3a) And the person has, within two hours after driving, an **alcohol** concentration of 0.08 (gm%) or higher as shown by analysis of the person's breath or blood made under RCW 46.61.506; or

(3b) The person has, **within two hours after driving**, a **THC** concentration of **5.00 (ng/ml) or higher** as shown by analysis of the person's blood made under RCW 46.61.506;

4 (b) Analyses of **blood samples obtained more than two hours** after the alleged driving may be used as evidence that within two hours of the alleged driving, a person had a **THC** concentration of 5.00 (ng/ml) or more in violation of subsection (1)(b) of this section, and in any case in which the analysis shows a **THC concentration above 0.00** may be used as **evidence** that a person was under the influence of or affected by **marijuana** in violation of subsection (1)(c) or (d) of this section.
From Justice Sotomayor (representing the majority decision)

“The question presented here is whether the natural metabolism of alcohol in the bloodstream presents a per se exigency that justifies an exception to the Fourth Amendment’s warrant requirement for nonconsensual blood testing in all drunk-driving cases. We conclude that it does not, and we hold, consistent with general Fourth Amendment principles, that exigency in this context must be determined case by case based on the totality of the circumstances.”

Note:

- specific only for alcohol metabolism
- only addressing if blood is being drawn without consent (nonconsensual blood testing)
- if exigency exists – no need for a warrant
- exigency exists in all marijuana cases – due to rapid elimination of THC from blood
Breaking news (1/15/19) – Oral swab zero tolerance for Cannabis presence in drivers in Scotland which may start October 21, 2019.

“The plan would do away with the existing need to prove someone was driving in an impaired manner as a result of taking drugs”

“A similar crackdown came into force in England and Wales in 2015 where officers use a device called a 'drugalyser’ to check for cannabis and cocaine.

“The testing kit uses a mouth swab to check for the presence of drugs ...”

Blood THC levels are a good measure of high sensation

*(raise your hand if you believe this statement)*
“High” feeling after **Oral MJ** compared to THC plasma levels

![Graph showing subjective high vs. plasma THC levels](image)

**Figure 4.** Phase plots of subjective high vs. plasma THC levels after oral ingestion of 15 mg THC in a chocolate cookie from 0 to 360 minutes (estimated from figures by Hollister et al. 1981 with some extrapolated data). The maximum THC plasma concentration (5.7 ng/mL) was reached after 60 minutes, while the maximum subjective high (compare to Figure 3) was noted 2-4 hours after ingestion.
"High" feeling after IV, Inhaled, Oral - MJ

Figure 3. Time course of subjective effects following three modes of administration. Subjects rated their "high" on a 0 to 10 scale (estimated from figures of Hollister et al. 1981 and Ohlsson et al. 1980).
Law enforcement officers cannot detect marijuana presence and/or impairment

*(raise your hand if you believe this statement)*
DRE Examination Characteristics of Cannabis Impairment

- 302 toxicologically-confirmed THC ($\geq 1$ ng/ml) successfully identified by DRE

- For all performance characteristics to be above **96.7% prediction** of cannabis impairment - need to identify failure in **two or more** of the following SFST:
  1. have **3 or more** failures in Finger to Nose (FTN) test
  2. **eyelid tremors** during Modified Romberg balance (MRB) test
  3. **two or more** one leg stand (OLS) clues
  4. **two or more** walk and turn (WAT) clues

- Other common symptoms at clinical significance: incr HR, incr SBP, dilated pupil size.

- Other common symptoms did not reach clinical significance (but favorable for THC): pupil rebound dilation and lack of convergence

Nearly 5000 drivers suspected of DUID (11/1/10 – 11/30/12) in Orange County, California

SFST were sensitive to impairment by marijuana

NO correlation between performance of SFST and concentration of THC in whole-blood

Driving behaviors similar between marijuana and alcohol impairment

We should test for marijuana driving impairment for only 2-3 hours after consumption.

*(raise your hand if you believe this statement)*
Marijuana Use and Driving

Time to wait before driving

- 9. We found **SUBSTANTIAL** evidence that delaying driving for at least 6 hours after smoking less than 18 mg THC allows THC-induced impairment to resolve or nearly resolve *for users who use less-than-weekly*.

- 11. We found **SUBSTANTIAL** evidence that delaying driving at least 8 hours after oral ingestion of less than 18 mg THC allows THC-induced impairment to resolve or nearly resolve *for users who use less-than-weekly*.

https://drive.google.com/file/d/0B0tmPQ67k3NVQlFmY3VzZGVmdFk/view
How much is 18 mg THC?

- **Smoked**
  - Joint = 0.5 gm of marijuana
  - % THC in the marijuana = 12 – 23%
  - Typical joint = 60 – 115 mg THC

  **Examples**
  - You and 2.3 of your best friends each smoke 1/3.3 of a 12% THC joint

  **Or**
  - you and 5.4 of your best friends smoke 1/6.4 of a 23% THC joint

- **Edible (Oral)**
  - Standard serving size is 10 mg
  - MAXIMUM FDA allowed THC dose = 10 mg

  **Examples**
  - One gummy bear = 10 mg THC (1.8 gummy bears)
  - A Dank Grasshopper bar = 420 mg THC (eat only 1/23 of the bar)
  - Cookies/chocolates = 80 mg THC (eat only < 1/4 of the cookie)
  - Drink – Olala Ginseng Cola 100 mg/9 oz (drink only 48.6 ml – a little more than 3 Tbsp)
Chronic Marijuana users drive better than intermittent users

*(raise your hand if you believe this statement)*
Chronic MJ Users: Chronic brain impairment

- Memory impacted (12 hr abstinence), increased years use did worse, increased task complexity and demand had worse results – Solowij, JAMA 2002

- Tests of concept formation, planning or sequencing impaired - Crean, J Addic Med 2011

- Decision making and risk-taking still seen after 25 days abstinence – Whitlow, Drug Alc Depen 2004

- Significant attention and concentration deficits in 4 week to 2 years abstinence - Solowij, Life Sci 1995; Bolla, Neurol 2002

- Slower information processing – Kelleher, Addict Behav 2004

- PET scan show decreased CB1 receptor binding in basal ganglia, midbrain, cerebellum (motor impairment) – Hirvonen, Clin Pharm Ther 2015

- Chronic grey matter volume reduction in areas of brain responsible for emotional and affective processing – Nattistella, Neuropsych 2014

- Studies with “no chronic impairment” - too short of study period (lasting hours), using ineffective measurement tools (Stroop test).

Q: What tests are available other than blood?
Who: performing safety-sensitive functions

- School bus drivers, truck drivers, pilots, train engineers, subway operators, aircraft maintenance personnel, transit fire-armed security personnel, ship captains, and pipeline emergency response personnel among others

Drugs tested: marijuana, cocaine, amphetamines, phenylcycloclidine (PCP), opiates, alcohol

What: Required drug testing

- Alcohol – breath, saliva (positive = 0.04 alcohol concentration or higher)
- All other drugs – urine
  - Marijuana metabolites – THCA - (initial 50 ng/ml, confirmatory 15 ng/ml)
“Positive” urine ASSOCIATED with INCREASED risk of traffic crashes

- 1406 positive urine analysis in traffic accident (group 1)
- 1953 control population undergoing mandatory urine testing (group 2)
- Cut-off urine concentration for THC-COOH was 15 ng/ml (same as U.S. DOT)
- If positive for ANY other drug above 0.5 ng/ml in urine/blood – excluded the participant
- Positive THC-COOH: 116 in group 1 (8.2%), 16 in group 2 (0.8%)
- Odds ratio (OR = 10.88) displayed a HIGH association between presence of urine THC-COOH and traffic accidents (p<0.0001)
**Breath/Ooral Testing for Marijuana**

**Breathalyzer**
- Assess marijuana within a few hours after use, +/- alcohol
- WA State University, Hound Labs, etc.
- Tested with Law Enforcement

**Oral Swabs - saliva**
- Assess presence of multiple drugs (marijuana, cocaine, methamphetamine, PCP, MDMA, benzodiazepines, opiates)
- Drager, Alere, Test Country, etc.
- *Salas case* (in Bakersfield, CA) allowed positive oral swab of methamphetamine “hours” after incident to be used in court case (also found in blood drawn 3 hrs after the incident methamphetamine (100 ng/ml), alcohol (0.03%), marijuana (1.1 ng/ml))
- Results with a few minutes, some positive/negatives, some with values (Alere) – screen

Validity of Oral Swab Testing

- Blood and oral swab data from 2013 National Roadside Survey data – 4596 drivers

- 8.9% and 9.4% of the participants tested positive for THC in oral fluid and whole blood samples, respectively

- Oral fluid test for THC positivity showed a sensitivity of 79.4% (95% CI: 75.2%, 83.1%) and a specificity of 98.3% (95% CI: 97.9%, 98.7%)

- Oral fluid test is a highly valid method for detecting the presence of THC in the blood but can not be used to accurately measure the blood THC concentration
Trends seen in FARS database
44% of fatally-injured drivers with known results tested positive for drugs, up from 28% just 10 years prior.

- 38% tested positive for some form of marijuana
- 16% tested positive for opioids
- 4% tested positive for both marijuana and opioids
# Cannabis & DUI FARS Data

## (2015 and 2016 FARS Data)

<table>
<thead>
<tr>
<th>3 States</th>
<th>2015</th>
<th>2016</th>
<th>Change</th>
<th>2015</th>
<th>2016</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Rec States</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% Cannabis</td>
<td>% Cannabis</td>
<td>Up 2016/2015</td>
<td>% DUI</td>
<td>% DUI</td>
<td>Up 2016/2015</td>
<td></td>
</tr>
<tr>
<td>Colorado</td>
<td>22.2%</td>
<td>28.4%</td>
<td>yes</td>
<td>29.0%</td>
<td>29.7%</td>
<td>yes</td>
</tr>
<tr>
<td>Oregon</td>
<td>14.5%</td>
<td>22.6%</td>
<td>yes</td>
<td>33.8%</td>
<td>31.4%</td>
<td>no</td>
</tr>
<tr>
<td>Washington</td>
<td>23.3%</td>
<td>26.1%</td>
<td>yes</td>
<td>24.4%</td>
<td>29.1%</td>
<td>yes</td>
</tr>
<tr>
<td><strong>Rec C States</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20.0%</td>
<td>25.7%</td>
<td>up 3 of 3 incr 28.4%</td>
<td>29.1%</td>
<td>30.0%</td>
<td>up 2 of 3 incr 3.1%</td>
<td></td>
</tr>
<tr>
<td><strong>Med C States</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19.9%</td>
<td>24.6%</td>
<td>up 16 of 21 incr 23.9%</td>
<td>30.1%</td>
<td>30.1%</td>
<td>up 9 of 21 No incr</td>
<td></td>
</tr>
<tr>
<td><strong>NO C States .</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14.5%</td>
<td>15.8%</td>
<td>up 16 of 27 incr 9.0%</td>
<td>27.2%</td>
<td>27.2%</td>
<td>up 15 of 27 No incr</td>
<td></td>
</tr>
<tr>
<td><strong>All States</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16.8%</td>
<td>18.2%</td>
<td>up 35 of 51 incr 8.6%</td>
<td>27.4%</td>
<td>27.0%</td>
<td>up 26 of 51 Decr 1.2%</td>
<td></td>
</tr>
</tbody>
</table>

Craner and Drum, 2015 & 2016 FARS Database Analysis
## Speeding – Alcohol and/or MJ
### 2015 FARS Database

### WA State Speeding of Marijuana Drivers by DUI level, 2015 FARS Data

<table>
<thead>
<tr>
<th>Group</th>
<th>Not Speeding</th>
<th>Speeding</th>
<th>Total Drivers</th>
<th>Percent Speeding</th>
</tr>
</thead>
<tbody>
<tr>
<td>All WA Fatal Drivers</td>
<td>584</td>
<td>204</td>
<td>788</td>
<td>25.9%</td>
</tr>
<tr>
<td>Mj no BAC</td>
<td>41</td>
<td>12</td>
<td>55</td>
<td>47.4%</td>
</tr>
<tr>
<td>Mj and 0.08+ BAC</td>
<td>18</td>
<td>20</td>
<td>38</td>
<td>52.6%</td>
</tr>
<tr>
<td>All 0.08+ BAC Drivers</td>
<td>45</td>
<td>55</td>
<td>100</td>
<td>55.0%</td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th>Group</th>
<th>Percent Speeding by Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>% Marijuana Speeding</td>
<td>61.2%</td>
</tr>
<tr>
<td>% No Alcohol/Drug Speeding</td>
<td>30.6%</td>
</tr>
<tr>
<td>Overall % Drivers with Marijuana</td>
<td>2.3%</td>
</tr>
</tbody>
</table>

Craner and Drum, 2015 FARS Database Analysis
Marijuana

- Peak Fatality Hours – NO alcohol
  - 7 – 7:59 am – 104 deaths
  - 4 – 4:59 pm – 89 deaths
  - 5 – 5:59 pm – 98 deaths
  - 6 – 6:59 pm – 105 deaths
  - 7 – 7:59 pm – 105 deaths

- Peak Fatality Hours – with alcohol
  - 6 – 6:59 pm – 156 deaths
  - 7 – 7:59 pm – 158 deaths
  - 8 – 8:59 pm – 145 deaths
  - 9 – 9:59 pm – 156 deaths

Alcohol

- Peak Fatality Hours – NO drugs
  - 10 – 10:59 pm – 417 deaths
  - 11 – 11:59 pm – 474 deaths
  - 12 – 12:59 am – 519 deaths
  - 1 – 1:59 am – 547 deaths

Marijuana fatalities – occur BEFORE & AFTER work during rush hour traffic, maximum traffic

Alcohol-only fatalities – occur late at night AFTER bars close with minimal road traffic
Marijuana Positive

- Top 5 Fatality Hours
  10 – 10:59 pm – 193 deaths
  7 – 7:59 pm – 192 deaths
  11 – 11:59 pm – 189 deaths
  8 – 8:59 pm – 186 deaths
  5 – 5:59 pm – 182 deaths

Highest consecutive periods from **4 to 8:59 pm** = 27.4%
(also seen from **7 – 11:59 pm**)

Alcohol Positive

- Top 5 Fatality Hours
  2 – 2:59 am – 548 deaths
  12 – 12:59 am – 478 deaths
  10 – 10:59 pm – 452 deaths
  1 – 1:59 am – 444 deaths
  11 – 11:59 pm – 440 deaths

**Marijuana fatalities** – occur **AFTER work** during **rush hour traffic**, **maximum traffic**

**Alcohol fatalities** – occur late at night **AFTER bars close** with **minimal** road traffic
# Day of Week – 2015 FARS Data Analysis

## Day of Week for DUI Fatal Crashes, All Marijuana and Marijuana Not DUI, 2015 FARS Data

<table>
<thead>
<tr>
<th>Day of Week</th>
<th>DUI</th>
<th>All Mj</th>
<th>Mj not DUI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday</td>
<td>477</td>
<td>342</td>
<td>242</td>
</tr>
<tr>
<td>Tuesday</td>
<td>571</td>
<td>343</td>
<td>223</td>
</tr>
<tr>
<td>Wednesday</td>
<td>605</td>
<td>346</td>
<td>227</td>
</tr>
<tr>
<td>Thursday</td>
<td>718</td>
<td>340</td>
<td>219</td>
</tr>
<tr>
<td>Mon-Thurs</td>
<td>2371</td>
<td>1371</td>
<td>911</td>
</tr>
<tr>
<td>% Mon-Thurs</td>
<td>38.4%</td>
<td>49.3%</td>
<td>53.3%</td>
</tr>
<tr>
<td>Friday</td>
<td>1169</td>
<td>456</td>
<td>284</td>
</tr>
<tr>
<td>Saturday</td>
<td>1580</td>
<td>532</td>
<td>266</td>
</tr>
<tr>
<td>Sunday</td>
<td>1049</td>
<td>424</td>
<td>248</td>
</tr>
<tr>
<td>Fri - Sun</td>
<td>3798</td>
<td>1412</td>
<td>798</td>
</tr>
<tr>
<td>%Fri-Sun</td>
<td>61.6%</td>
<td>50.7%</td>
<td>46.7%</td>
</tr>
<tr>
<td>Total</td>
<td>6169</td>
<td>2783</td>
<td>1709</td>
</tr>
</tbody>
</table>

**MJ no DUI – NO statistically significance by day**

**DUI – higher incidence on weekends**

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2019 North American Cannabis Summit 39
Increased Driving Fatalities on April 20 aka “4/20”


- *Increased risk of fatality* after 4:20 pm to midnight *by 12%* compared to 1 week before and after April 20

- Increased risks seen with the following driver factors: < 20 yo, 21 – 30 yo, male, passenger vehicle, *more* in recent years (2004 – 2016), Monday-Thursday, 8 pm to Midnight, urban roadways

## Testing for Alcohol and Drugs in CA

### 2016 FARS Data

<table>
<thead>
<tr>
<th>DUI Group (BAC &gt; 0.08)</th>
<th># Drivers</th>
<th>Drug Group</th>
<th>2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>CA Fatal Crash Drivers</td>
<td>5020</td>
<td>CA Fatal Crash Drivers</td>
<td>5020</td>
</tr>
<tr>
<td>NOT Alcohol Tested</td>
<td>3866</td>
<td>NOT Drug Tested</td>
<td>4017</td>
</tr>
<tr>
<td>DUI Tested</td>
<td>1154</td>
<td>Drug Test Usable</td>
<td>1003</td>
</tr>
<tr>
<td>% Tested</td>
<td>23%</td>
<td>% Tested</td>
<td>25%</td>
</tr>
<tr>
<td>NOT DUI</td>
<td>842</td>
<td>NO Drugs Found</td>
<td>605</td>
</tr>
<tr>
<td>DUI</td>
<td>312</td>
<td>Drugs Found</td>
<td>398</td>
</tr>
<tr>
<td>% DUI</td>
<td>27%</td>
<td>% Drugs Found</td>
<td>39.7%</td>
</tr>
</tbody>
</table>

### Notes
- **2019 North American Cannabis Summit**
### Testing for Alcohol and Drugs in CA
#### 2016 FARS Data

<table>
<thead>
<tr>
<th>Category</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drug Test Usable</td>
<td>1003</td>
</tr>
<tr>
<td>Drugs Found</td>
<td>398</td>
</tr>
<tr>
<td>MJ Found</td>
<td>197</td>
</tr>
<tr>
<td>% MJ of Known Drugs</td>
<td>49.5%</td>
</tr>
<tr>
<td>% MJ of Total Tested</td>
<td>19.6%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Category</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>DUI Total Killed</td>
<td>353</td>
</tr>
<tr>
<td>MJ crash Total Killed</td>
<td>240</td>
</tr>
<tr>
<td>DUI Drivers Killed</td>
<td>213</td>
</tr>
<tr>
<td>MJ Drivers Killed</td>
<td>125</td>
</tr>
<tr>
<td>DUI Innocents Killed</td>
<td>140</td>
</tr>
<tr>
<td>MJ Innocents Killed</td>
<td>112</td>
</tr>
<tr>
<td>% Innocents Killed</td>
<td>39.70%</td>
</tr>
<tr>
<td>% Innocents Killed</td>
<td>47.30%</td>
</tr>
</tbody>
</table>

Innocents = Other drivers, pedestrians, passengers, bicyclists, etc.
### CA Fatalities Missed by NOT Testing Fatal Cases 2016 FARS Data

<table>
<thead>
<tr>
<th>Group</th>
<th>DUI Drivers Tested</th>
<th>Total Fatalities</th>
<th>% DUI Tested</th>
<th>Drivers Tested</th>
<th>% MJ Tested</th>
<th># Driver NOT tested</th>
<th>Drivers Tested</th>
<th>Total Fatalities</th>
</tr>
</thead>
<tbody>
<tr>
<td>DUI Drivers Tested</td>
<td>312</td>
<td>353</td>
<td>27%</td>
<td>196</td>
<td>19.5%</td>
<td>4017</td>
<td>196</td>
<td>240</td>
</tr>
<tr>
<td>% DUI Tested</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td># Driver NOT tested</td>
<td>3866</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>If NOT Tested is 1/2 of %</td>
<td>522</td>
<td>875</td>
<td>13.5%</td>
<td></td>
<td>9.1%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DUI Tested (13.5%)</td>
<td>more</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>If NOT Tested is 1/4 of %</td>
<td>261</td>
<td>614</td>
<td>6.75%</td>
<td></td>
<td>4.6%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DUI Tested (6.75%)</td>
<td>more (74% higher)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>If NOT Tested is 1/2 of %</td>
<td>382</td>
<td>622</td>
<td>9.1%</td>
<td></td>
<td>4.6%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MJ Tested (9.1%)</td>
<td>more</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>If NOT Tested is 1/4 of %</td>
<td>197</td>
<td>437</td>
<td>4.6%</td>
<td></td>
<td>4.6%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MJ Tested (4.6%)</td>
<td>more (82% higher)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Trend in % Fatal Crash Drivers
Marijuana + vs DUI, FARS data from 2012, 2015, 2017
Fatality Analysis Reporting System

Negatives:
- Inconsistencies (who’s tested, differs by state, many stop testing for drugs if alcohol present, limited drugs, different cutoffs, different body fluids)

Positives:
- Trends/risk factors can be seen (age, time of day, potential agents)

It is the BEST we have, for now, when will it be improved?
- Need consistency
Q: What are COSTS to society compared to marijuana taxation revenue?
Economic Cost of Vehicle Accidents Resulting in Fatalities – U.S. DOT 2010

- 32,999 fatalities, 3.9 million injured, 24 million vehicles damaged in U.S. in 2010

- Each fatality resulted in ave discounted lifetime cost = $1.4 million (in 2018 dollars - approx $1.6 M/life lost)

- Economic cost of all 2010 crashes = $242 billion
  
  Property Damage – 31%  Medical – 10%  Legal – 5%
  Market Prod – 24%  Household Prod – 8%  Workplace – 2%
  Congestion – 12%  Insurance – 8%

CA Marijuana tax revenue ... still down

State Marijuana Taxes Pick Up but Still Far Off Target

<table>
<thead>
<tr>
<th>Qtr</th>
<th>Cultivation Tax (% change from previous qtr)</th>
<th>Excise Tax (% change from previous qtr)</th>
<th>Sales Tax (% change from previous qtr)</th>
<th>Total (% change from previous qtr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$1.6 M</td>
<td>$32 M</td>
<td>$27.3</td>
<td>$60.9 M</td>
</tr>
<tr>
<td>2</td>
<td>$4.7 M (2.9 fold incr)</td>
<td>$42.3 M (1.3 fold incr)</td>
<td>$33.2 M (1.2 fold incr)</td>
<td>$80.2 M (1.3 fold incr)</td>
</tr>
<tr>
<td>3</td>
<td>$12 M (2.5 fold incr)</td>
<td>$52.4 M (1.2 fold incr)</td>
<td>$28.7 M (14% decr)</td>
<td>$93.1 M (1.16 fold incr)</td>
</tr>
</tbody>
</table>

After 3 qtrs in CA (2018):

- $234.2 M total cannabis tax
- Cost per death (273 deaths over 3 qtrs - at 1 death/day) = $436 M

(Total tax accounts for only 53% of the costs from marijuana-positive driving deaths ....)

Cannabis and Driving

- Law Enforcement CAN detect marijuana presence
  - SFST have been used for decades in determining impairment

- Per se blood laws INeffective for drug impairment
  - poor correlation
  - inconsistent testing/time delays
  - “impaired blood drugs levels” NOT same (additive & synergistic effects) when combined

- THC content sold (flower - 20% THC, concentrates – 75%, max 2,000 mg allowed in California (FDA 10 mg) ) is well above that being tested in studies

- Simulated driving studies not real world – (distractions present like real world, doses tested, length of testing time, chronic users, measurements)
The 21-year-old driver who was formally charged last June for a crash that killed 13 members of the First Baptist Church of New Braunfels, Texas, lost control of his truck due to use of marijuana combined with his misuse of prescription medication, the National Transportation Safety Board said this week.

"The pick-up truck driver in this crash made terrible choices with tragic consequences," NTSB Chairman Robert L. Sumwalt said in a news release. "But the rising tide of drug-impaired driving did not begin with the accident."

Thank You

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