Marijuana Impaired Drivers in Montana

Rebecca Sturdevant, MSN, APRN, BC, COHN-S, C-SAPA
Rebecca Sturdevant, MSN

- RN 32 yr, APRN prescriptive authority 17 yr
- Lived on Mexican border, CA & TX, 20 yr
- Immigration detention facility 2½ yr
- Occupational Health 17 yr
- Employer Substance Abuse Programs 17 yr
- FMCSA Education WIPT* March 07-Present
- Borkenstein Drugs & Human Performance
- MADD & Montana Common Sense Coalition

*Working Integrated Product Team
• No reimbursement from manufacturers of products displayed or described in this presentation

• No reimbursement from marijuana growers or any organization devoted to either pro or anti marijuana issues.

• I’m not being paid by anyone to be here.

• Marijuana has no FDA approved indications, so I will only be discussing “off-label” uses.

• My special interest is impairment
Is Marijuana Medicine?
Marketing Marijuana

- You have a condition which may benefit from drugs (name the symptom)
- Marijuana is better than pharmaceuticals
  - “Natural”, “Organic”, “Safer”, “No one died”
- Testimonials
  - “I feel good”, “Better”, “Cheaper”
- If you don’t like to smoke
  - Vaporizers, tinctures, edibles, topicals
“Cures”

Coca-Cola Syrup and Extract

For Soda Water and other Carbonated Beverages.

This “Intellectual Beverage” and Temperance Drink contains the valuable Tonic and Nerve Stimulant properties of the Coca plant and Cola (or Kola) nuts, and makes not only a delicious, exhilarating, refreshing and invigorating Beverage, (dispensed from the soda water fountain or in other carbonated beverages), but a valuable Brain Tonic, and a cure for all nervous affections — SICK HEAD-ACHES, NEURALGIA, HYSTERIA, MELANCHOLY, &c.

The peculiar flavor of COCA-COLA delights every palate; it is dispensed from the soda fountain in same manner as any of the fruit syrups.

J. S. Pemberton,
Chemist,
Sole Proprietor, Atlanta, Ga.

Tincture Cannabis, N.

16 Fl. Oz.

Cannabis, N.

Alcohol, 20 per cent.

Average Drop: 1/20 of a Dram.

P.O.

Heroin

Cocaine Toothache Drops

Instantaneous Cure! Price 15 Cents. Prepared by the Lloyd Manufacturing Co.

For sale by all Druggists.
Food & Drug Administration

- Created in 1938 for public safety
- Validate marketing claims (efficacy)
- Verify safety of product
- Measure purity and label accuracy

- Alcohol and tobacco regulated by ATF
- Marijuana is schedule 1
Reminder: Marijuana is Illegal

• Federal Law 21 USC 812(b)(1) Schedule 1
  – Three criteria for placement in Schedule 1:
    • High potential for abuse
    • No currently accepted medical use in treatment in the US
    • Lack of accepted safety for use under medical supervision

• Food and Drug Administration [FDA] press release April 20, 2006
  – No sound scientific studies support medical use of marijuana for treatment
  – No animal or human data support the safety or efficacy of marijuana for general medical use

• NOT legal to prescribe
Medical Research

Digitalis purpurea

Digoxin
Medical Research

Cannabis sativa
Cannabis indica

Schedule I

Schedule III
- Trade Name: Marinol
  Controlled Ingredients: dronabinol, 1.5 mg
- Trade Name: Marinol
  Controlled Ingredients: dronabinol, 5 mg
- Trade Name: Marinol
  Controlled Ingredients: dronabinol, 10 mg
Marinol®

• Dronabinol [synthetic THC]  
  2.5, 5, 10 mg oral capsules

• Peak plasma levels 0.5-4 hours; 1-8 ng/ml

• Indicated for intractable nausea with cancer chemotherapy and anorexia in AIDS

• Cautions: CNS; cardiac; seizure; pregnancy
Cesamet®

• Nabilone [synthetic cannabinoid]
  1 mg oral capsules; 1-2 bid-tid

• Peak plasma levels 2 hours; 2-10 ng/ml

• Indicated for intractable nausea with cancer chemotherapy

• Cautions: CNS; cardiac; pregnancy
WARNINGS

• The effects of Cesamet may persist for a variable and unpredictable period of time following its oral administration. Adverse psychiatric reactions can persist for 48 to 72 hours following cessation of treatment.
• Cesamet has the potential to affect the CNS, which might manifest itself in dizziness, drowsiness, euphoria “high”, ataxia, anxiety, disorientation, depression, hallucinations and psychosis.
• Cesamet can cause tachycardia and orthostatic hypotension.
• Because of individual variation in response and tolerance to the effects of Cesamet, patients should remain under supervision of a responsible adult especially during initial use of Cesamet and during dose adjustments.
• Patients receiving treatment with Cesamet should be specifically warned not to drive, Operate machinery, or engage in any hazardous activity while receiving Cesamet.
• Cesamet should not be taken with alcohol, sedatives, hypnotics, or other psychoactive substances because these substances can potentiate the central nervous system effects of nabilone.
Sativex®

- THC 27 mg/ml and CBD 25 mg/ml
- Buccal spray [5-12 sprays/day]
  - 4 sprays is 10 mg CBD +10.8 mg THC
- Peak plasma levels 2-4 hours; 5-10 ng/ml
- Indicated for MS and cancer pain
- Canada now; FDA trials started in US
- Cautions: CNS; cardiac; seizure; pregnancy
Sativex is contraindicated in patients:
- With hypersensitivity to cannabinoids or to any of the excipients.
- With any known or suspected history or family history of schizophrenia, or other psychotic illness; history of severe personality disorder or other significant psychiatric disorder other than depression associated with their underlying condition.
- Who are breast feeding (in view of the considerable levels of cannabinoids likely in maternal breast milk and the potential adverse developmental effects in infants).
Medical Indications for Cannabinoids (Prescription)

- Multiple Sclerosis pain and spasms
- Cancer pain
- Intractable nausea with cancer chemotherapy
- Anorexia in AIDS

Most of these patients are too sick to drive!
(a) cancer, glaucoma, positive status for human immunodeficiency virus, or acquired immune deficiency syndrome when the condition or disease results in symptoms that seriously and adversely affect the patient's health status;
(b) cachexia or wasting syndrome;
(c) severe chronic pain that is persistent pain of severe intensity that significantly interferes with daily activities as documented by the patient's treating physician and by:
   (i) objective proof of the etiology of the pain, including relevant and necessary diagnostic tests that may include but are not limited to the results of an x-ray, computerized tomography scan, or magnetic resonance imaging; or
   (ii) confirmation of that diagnosis from a second physician who is independent of the treating physician and who conducts a physical examination;
(d) intractable nausea or vomiting;
(e) epilepsy or an intractable seizure disorder;
(f) multiple sclerosis;
(g) Crohn's disease;
(h) painful peripheral neuropathy;
(i) a central nervous system disorder resulting in chronic, painful spasticity or muscle spasms;
(j) admittance into hospice care in accordance with rules adopted by the department; or
(k) any other medical condition or treatment for a medical condition approved by the legislature.
Marijuana Doctors

• Patients who pay cash
• No hassle from insurance companies
• No need for evaluation
  – no diagnostics or complex management
• No need for hospital privileges
  – no peer review or quality measures
• Patients love their doctor
• Patients become addicted—return for more
Healthcare Providers Should KNOW:

• Toxic effects
• Drug interactions
• Pharmacokinetics
• Impairing effects
Drug Interactions

- Opiates (narcotics)
  - Chronic pain patients using marijuana need less opiates to achieve similar pain relieving effects
  - Marijuana is more impairing than opiates and synergism with opiates increases impairment

- Olanzapine (antipsychotic)
  - Decreases euphoric effects of THC
Pharmacokinetics

Absorption
Smoking FAST
Eating SLOW

Volume of Distribution HUGE
Sticks to your fat

Metabolism →
Active byproducts

Elimination →
Very slow!!

Alcohol doesn’t stick
Goes in FAST
Comes out SLOW
Sticks to the brain
Brain level can be high with low blood level

Pickled in POT
Occasional vs Heavy Marijuana Use

<table>
<thead>
<tr>
<th>THC</th>
<th>Occasional</th>
<th>Heavy</th>
<th>Heavy Placebo</th>
</tr>
</thead>
<tbody>
<tr>
<td>C 0 h</td>
<td>0</td>
<td>4.1 ± 3.4</td>
<td>3.5 ± 3.2</td>
</tr>
<tr>
<td>C max</td>
<td>49.1 ± 24.9</td>
<td>120.9 ± 78.1</td>
<td>NA</td>
</tr>
<tr>
<td>C 8 h</td>
<td>&lt; LOQ</td>
<td>3.5 ± 2.9</td>
<td>3.3 ± 3.1</td>
</tr>
<tr>
<td>AUC 0-8 hr</td>
<td>35 ± 14</td>
<td>86 ± 54</td>
<td>28 ± 25</td>
</tr>
<tr>
<td>t½ β (h)</td>
<td>1.6 ± 0.2</td>
<td>3.0 ± 1.5</td>
<td>27.4 ± 9.7</td>
</tr>
</tbody>
</table>

Toennes, et.al., 2008, Comparison of Cannabinoid Pharmacokinetic Properties in Occasional and Heavy Users Smoking a Marijuana or Placebo Joint, J Anal Toxicology 32: 470-477.
Impairment from Drugs Studies

- Laboratory based [animal & human]
  - Physiologic [DSST, Critical tracking, Stop signal]
  - Cognitive [Wechsler, Tower of London]
Effects of THC -- Laboratory

• Significant effects found in THC levels:
  – 2-5 ng/ml -- Only Critical Tracking impaired
  – >5 ng/ml -- Stop signal & Tower of London

• Critical tracking effects compared to alcohol
  – First 2 hours equivalent to BAC > 0.10 mg/ml
  – 2-6 hours equivalent to BAC > 0.05 mg/ml

• Stop signal and Tower of London tests do not show impairment with BAC <0.06 mg/ml

Effects of THC -- Laboratory

- Critical Tracking & Divided attention task decrements in chronic users vs controls
- Still present 3 weeks after abstinence

Effects of THC—Driving tasks

• Simulated task [driving, machinery]
  – Cars on a test course [knock over the cones]
  – Computer based simulators
IF IT DOESN’T MAKE SENSE HERE, WHY DOES IT MAKE SENSE WHEN YOU DRIVE?

www.potanddriving.cpha.ca
Pot Smoking Pilots

- 11 pilots
- Simulator flights 0, 0.25, 4, 8, 24, 48 hr post MJ
  - 20 mg dose THC vs placebo joint without THC
- Significant effects at 24 hours, recovered at 48 hr
- “At 8 and 24 hours pilots reported no subjective experience of the drug’s effect, even though objective measures of performance showed decrements.”

Camera's field of view

Driver-monitoring camera

Detects the upper and lower eyelids, calculating how open the eyes are.
Strategical level
route speed criteria

manoeuvring level
feedback criteria

control level

City Driving Test
genral plans,
(long)

Car-Following Test
Controlled action pattern
(secs)

Road tracking Test
Automatic action pattern
(insecs)

environmental input

environmental input
<table>
<thead>
<tr>
<th>Control Road Tracking</th>
<th>Manoeuvring Car Following</th>
<th>Strategic City Driving</th>
</tr>
</thead>
<tbody>
<tr>
<td>THC 100</td>
<td>*</td>
<td>-</td>
</tr>
<tr>
<td>THC 200</td>
<td>*</td>
<td>-</td>
</tr>
<tr>
<td>ALC</td>
<td>*</td>
<td>-</td>
</tr>
<tr>
<td>THC 100 / ALC</td>
<td>*</td>
<td>-</td>
</tr>
<tr>
<td>THC 200 / ALC</td>
<td>*</td>
<td>*</td>
</tr>
</tbody>
</table>

*significant ALC = .04% BAC  THC 100 7.9(.08-17.2) THC 200 12.0(1.5-27.1) (ng/ml SERUM)
Effects of THC—Crash Studies

- Epidemiologic [statistical study of humans]
  - Drug use by driving population
  - Drug use involved in fatal crashes
  - Drugs found in fatal crash victims
  - Drug use found in DUI arrested suspects
Crash Studies Statistics

- Epidemiologic
  - Population crash/death/injury risk

Odds Ratio = \frac{\text{chances of event happening in one group}}{\text{chances of event happening in another group}}

Relative Risk = \frac{\text{probability of event happening in exposed group}}{\text{probability of event happening in control group}}

RR = 6.6 = \frac{\text{probability of driver + THC responsible for fatal crash}}{\text{probability of sober driver responsible for fatal crash}}
Relative Risk of Death

- Drivers killed in road crashes (3398)
- Blood specimens within 4 hours of crash
- Responsibility analysis based on 8 mitigating factors; only “culpable” drivers were included
- 29.1% had alcohol $\geq 0.05\%$ BAC
- 26.7% had psychoactive drugs
  - Cannabinoids 13.5%, Opioids 4.9%, Stimulants 4.1%, Benzodiazepines, 4.1%

### Relative Risk of Death

<table>
<thead>
<tr>
<th></th>
<th>Drivers</th>
<th>Odds Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drug &amp; Alcohol Free</td>
<td>1704 (50%)</td>
<td>1</td>
</tr>
<tr>
<td>THC only</td>
<td>58 (1.7%)</td>
<td>2.7</td>
</tr>
<tr>
<td>THC only (≥ 5ng/ml)</td>
<td>49(1.4%)</td>
<td>6.6</td>
</tr>
</tbody>
</table>

THC ≥ 5ng/ml odds ratio similar to drivers with BAC ≥ 0.15%
THC + BAC ≥ 0.05% odds ratio 2.8 times BAC ≥ 0.05% alone

6.6 Times Risk of Fatal Crash
Responsibility for Death

• 10,799 drivers involved in traffic fatalities in France 2001-2003; prospective study
• Blood specimen within 4 hours of crash
• THC cut off level 1 ng/ml
• Responsibility analysis

Biecheler, et.al., 2008, SAM Survey on “Drugs and Fatal Accidents”: Search of substances consumed and comparison between drivers involved under the influence of alcohol or cannabis. Traf Inj Prev 9:11-21
Responsibility for Death

<table>
<thead>
<tr>
<th></th>
<th>Alcohol &amp; drug free</th>
<th>THC ≥ 1 ng/ml</th>
<th>Alcohol ≥ 0.05%</th>
<th>Alcohol and THC</th>
</tr>
</thead>
<tbody>
<tr>
<td>All drivers</td>
<td>7886</td>
<td>391</td>
<td>1908</td>
<td>278</td>
</tr>
<tr>
<td>Known responsibility</td>
<td>7339</td>
<td>360</td>
<td>1823</td>
<td>272</td>
</tr>
<tr>
<td>Responsible</td>
<td>3996</td>
<td>252</td>
<td>1647</td>
<td>254</td>
</tr>
<tr>
<td>Not responsible</td>
<td>3343</td>
<td>108</td>
<td>176</td>
<td>18</td>
</tr>
<tr>
<td>Resp/not resp</td>
<td>1.2</td>
<td>2.3</td>
<td>9.4</td>
<td>14.1</td>
</tr>
</tbody>
</table>

Biecheler, et.al., 2008, SAM Survey on “Drugs and Fatal Accidents”: Search of substances consumed and comparison between drivers involved under the influence of alcohol or cannabis.  *Traf Inj Prev* 9:11-21
Marijuana Politics in Montana

- 2004 Initiative 148 Medical Marijuana Act 62%
- 2008 DHHS rules due to increased use
- 2009 Bills to expand MM tied in committee
- 2011 HB 161 Repeal Medical Marijuana vetoed
- 2011 DEA raids against growers/dealers
- 2011 SB 423 Montana Marijuana Act (limits)
- 2011 SB 42 Warrants for blood draws
- 2012 Initiative 124 to keep 423 passed 57%
- 2013 HB 168 Perse THC 5 ng/ml
April 2013    7285 patients    291 providers    195 physicians
Fatality Analysis Reporting System

- Select all Montana crashes
  - Select alcohol and drug fields
- Unable to establish culpability/responsibility
- Count numbers of crashes and number of fatalities where impaired driver involved
- Nearly 60% fatal crashes with DUI marijuana also had alcohol
Fatalities in Crashes with THC Impaired Driver

Medical Marijuana

FARS data (2012 estimated)
% Fatal Crashes with THC impaired Driver

Medical Marijuana

FARS data (2012 estimated)
Truck which crushed his car driver had BAC 0.16
On his way to a pharming party
Car which crushed his car driver had BAC 0.16 and THC 7 ng/ml
# Court Monitoring Flathead County

<table>
<thead>
<tr>
<th>Marijuana cases</th>
<th>196</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marijuana by report only</td>
<td>150</td>
</tr>
<tr>
<td>Marijuana + alcohol BAC</td>
<td>102</td>
</tr>
<tr>
<td>Marijuana + refusal</td>
<td>61</td>
</tr>
<tr>
<td>Crashes</td>
<td>73</td>
</tr>
<tr>
<td>Single Vehicle Crash</td>
<td>49</td>
</tr>
</tbody>
</table>

Special thanks for County Attorney Ed Corrigan for his support!
## Court Monitoring Flathead County

<table>
<thead>
<tr>
<th>Blood Specimen Data</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>THC in blood</td>
<td>46</td>
</tr>
<tr>
<td>Metabolites only</td>
<td>5</td>
</tr>
<tr>
<td>THC &lt; 5 ng/ml*</td>
<td>17</td>
</tr>
<tr>
<td>THC + other drugs</td>
<td>21</td>
</tr>
<tr>
<td>THC + alcohol</td>
<td>21</td>
</tr>
<tr>
<td>THC ONLY</td>
<td>10</td>
</tr>
</tbody>
</table>

When THC was < 5 only 2 specimens did NOT have alcohol or other drugs.
My Opinion

- Cannabinoids have benefit for patients with nausea/vomiting, and wasting (cachexia)
- Benefits in pain management not worth risk
- Significant risk of adverse effects
  - Particular concern in pregnancy and children
- Causes significant prolonged impairment
- Very dangerous when attempting to perform safety-sensitive tasks such as driving
- Healthcare providers who recommend or tolerate at risk for liability if harm from use
My recommendations

• A registered marijuana user should have driver’s license suspended and be required to notify employer of risk for impairment

• Registered suppliers and transporters subject to mandatory drug testing

• Healthcare providers and drug dealers required to disclose health risks to users

• Healthcare providers required to report diagnosis of chronic marijuana use to DMV

• THC per se statutes should be “level of detection” if present with alcohol or drugs