Leslie Grady McAhren, MPH, MFA
June 13, 2018
Ask - Anything

This webinar is a resource for you, your employer & the employees you encounter in daily practice

Ask tons of questions

Feel free to interject a question at any point
Current Marijuana Use by Industry and Occupation — Colorado, 2014–2015

Roberta Smith, MSPH¹; Katelyn E. Hall, MPH¹; Paul Ekkind, DrPH²; Mike Van Dyke, PhD¹
Morbidity and Mortality Weekly Report (MMWR) Summary

- Colorado Department of Public Health and Environment (CDPHE, 2017) showed one in eight adult state residents aged ≥18 years currently used cannabis in 2014 (13.6%) and 2015 (13.4%) note: age of sales in CO = 21

- During 2014 and 2015, 14.6% of 10,169 Colorado workers surveyed reported current cannabis use, with the highest reported prevalence among workers in the Accommodation and Food Services industry (30.1%) and Food Preparation and Serving (32.2%) occupations.
Limitations on Morbidity and Mortality Weekly Report

- The unadjusted prevalence of marijuana use among adults employed in Food Preparation and Serving occupations was 32.2%, the age-adjusted prevalence was 19.1%. The Arts, Entertainment, and Recreation industry, might have a large proportion of younger workers.

- Cannabis or hashish use defined as at least 1 day in the past 30 days.
  - Yet, an employee who uses cannabis everyday versus one that uses only once a month might present different considerations for impairment in a workplace.
Best Practices from Morbidity and Mortality Weekly Report

- **Motor vehicle crashes** are the leading cause of work-related deaths in the United States (Bureau of Labor Statistics. Fatal occupational injuries by industry and event or exposure, 2016).

- **Safety-sensitive industries** that have higher prevalence of self-reported cannabis use could consider evaluating current drug testing programs, drug panels used for pre-employment screening, and testing frequencies, and develop policies regarding tolerance of drug use.
TERMINOLOGY

Should I say cannabis or marijuana?

• “Cannabis” is the preferred term
• Canada spells it with an ”H” (marihuana)
• The term Marijuana is an Anti-Mexican slur linked to the Marijuana Tax Act (1937)
• The botanical term is fine - in Europe they use the name “herbal cannabis”
ACTIVE INGREDIENT(S) IN WHOLE PLANT CANNABIS

- delta-9-tetrahydrocannabinol (THC) is the main psychoactive ingredient in cannabis

- Plus:
  - 60-70 other cannabinoids (known as phytocannabinoids i.e. THC, CBD, CBN, CBC, CBG, etc....)
  - 120 terpenoids (i.e. pinene, myrcene, linalool and limonene)
  - 21 flavonoids
  - 11 plant sterols (in the seed)
  - 22 fatty acids
• **2.5% of the world’s population** consumes cannabis (annual prevalence, WHO, 2016)
  • 0.2% consume cocaine
  • 0.2% consume opiates

• **9.5% of Americans** use cannabis (NIH)
  • North America reports a much higher usage rate (WHO, 2016)

• **13.6% percent of Colorado adults** use cannabis
  • (Monitoring Health Concerns Related to Marijuana in Colorado: 2016 report)
EPIDEMIOLOGY: CANNABIS USE

- **2.5% of the world’s population** consumes cannabis (annual prevalence, WHO, 2016)
  - 0.2% consume cocaine
  - 0.2% consume opiates

- **9.5% of Americans** use cannabis (NIH)
  - **North America** reports a much higher usage rate (WHO, 2016)
  - Eight states, including Colorado, have legalized recreational cannabis use among persons aged ≥21 years. *Cannabis use and occupational injury is of public health concern.*

- **13.6% percent of Colorado adults** use cannabis (CDPHE 2016 report)
PREVALENCE AMONG U.S. ADULTS

- Americans who reported using cannabis in the past year more than doubled between 2001-2002 and 2012-2013

- 30% of users meet criteria for cannabis use disorder
  - Compared to opioid-use disorder where 35% meet DSM V criteria for (Boscarino, 2011)
• **8.3% of adults** used cannabis in the past month (approximately 22.2 million people) (SAMHSA, 2015)

• **19.8% of people aged 18 to 25 used cannabis** in the past month
  - Cannabis use is most prevalent among people aged 18 to 25
  - Prevalence of use is higher among men (17.2%) than among women (11.3%)
  - By race/ethnicity prevalence of current cannabis is relatively uniform: highest among non-Hispanic whites (15.3%), followed by Hispanics (15.1%) and non-Hispanic blacks (14.5%)

• **7.0% of people aged 12 to 17** reported cannabis use in the past month
CHILDREN + CANNABIS + CARS

• Kids should delay cannabis use until adulthood: after age 18, or even after 21 (Canada's Lower-Risk Cannabis Use Guidelines, 2017)

• There is strong evidence that cannabis can affect the developing brain (crystallized intelligence – not IQ)

• Some argue for age 25 as the legal limit for cannabis sales

• This age limit links neuromaturation with public policy (Johnson et al., 2009)

• Currently, underage DUIC is a zero-tolerance (positive) test
U.S. Preventive Services Task Force (USPSTF): THERE IS INSUFFICIENT EVIDENCE ASSESSING BENEFITS AND HARMS OF CANNABIS SCREENING

Go to Table 1 for a description of the USPSTF grades and Table 2 for a description of the USPSTF classification of levels of certainty regarding net benefit.

CDC GUIDELINES REFERENCE THE NATIONAL ACADEMY OF SCIENCES GUIDANCE DOCUMENT:

- **SOME EVIDENCE** has linked recent cannabis use to an **INCREASED RISK FOR MOTOR VEHICLE CRASHES** (Asbridge, 2012)

- **Motor vehicle crashes are the leading cause of death among 10-24 year olds**
  - The Federal Bureau of Investigation (FBI) reports more than **1.1 million driving under the influence (DUI) arrests** in 2013
  - Cannabis users have demographic characteristics that are similar to those of other groups with a high crash risk including **youth, males, and those with a high prevalence of drugged and drunk driving** (Bergeron and Paquette, 2014; Richer and Bergeron, 2009)
CDC GUIDELINES: IMPACT ON DRIVING

1. Slowed reaction time + slowed decision-making

2. Impaired coordination, distorted perception, difficulty problem solving

3. Combining alcohol with cannabis creates a greater risk than either substance alone (Rogeberg and Elvik, 2016)
1. It is unclear whether cannabis use actually increases the risk of car crashes
   • Missing accurate roadside test (field sobriety test/”cannabis breathalyzer”)
   • Cannabis will remain in a user’s system for days or weeks after consumption

2. Drivers are not always tested for drug use
   • BAC is enough evidence for a driving-while-impaired charge
   • Alcohol and/or multiple drugs make it hard to know which substance contributed to the crash
THE HEALTH EFFECTS OF CANNABIS AND CANNABINOIDS: THE CURRENT STATE OF EVIDENCE AND RECOMMENDATIONS FOR RESEARCH

ACCORDING TO THE NATIONAL ACADEMY OF SCIENCES

• We need more research to understand the effects of cannabis use on the incidence and severity of motor vehicle crashes

• There have been a total of six systematic reviews of fair or good quality that summarize DUIC and MVCs.
  • Unfortunately, some studies use driving simulations as opposed to real world scenarios

• Risks associated with DUIC underscore the need for rapid, noninvasive methods of assessing acute cannabis intoxication
ACUTE INTOXICATION TESTING: LINEAR VS. NONLINEAR METABOLISM

• Alcohol is metabolized in a linear fashion
  • Blood alcohol concentration (BAC) can be easily calculated

• Metabolism of **THC is dramatically non-linear** (Huestis et al. 1992; Toennes et al. 2008).
  • Cannabis is fat soluble
  • Almost impossible to pinpoint the exact time of consumption
# Proliferation of Inadequate Testing

<table>
<thead>
<tr>
<th>Type of Test</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Urine Analysis</strong>&lt;sup&gt;3&lt;/sup&gt;</td>
<td>- cheapest and most common form of drug test</td>
<td>- limits of detection/not very sensitive&lt;sup&gt;3&lt;/sup&gt;</td>
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<tr>
<td></td>
<td></td>
<td>- subject to attempts at adulteration (creatinine) and substitution&lt;sup&gt;1, 15&lt;/sup&gt;</td>
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<tr>
<td><strong>Hair Analysis</strong>&lt;sup&gt;8&lt;/sup&gt;</td>
<td>- non-invasive</td>
<td>- in the case of a positive ELISA hair test, a confirmatory analysis is needed (this is true for all tests)</td>
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<td>- no false negative results</td>
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<td>- easy to administer and process</td>
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<td></td>
<td>- GC-MS confirmation can be realized with the same preparation medium used for the screening test</td>
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<tr>
<td><strong>Blood Plasma Concentration</strong>&lt;sup&gt;3&lt;/sup&gt;</td>
<td>- very sensitive</td>
<td>- invasive</td>
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<td></td>
<td></td>
<td>- added time delay for blood draw</td>
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<tr>
<td><strong>Oral Fluid Analysis</strong>&lt;sup&gt;3&lt;/sup&gt;</td>
<td>(Salivette®)</td>
<td>- oral fluid testing is not comparable in accuracy to urine on-site testing</td>
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<td></td>
<td>- considered the main alternative to blood plasma to document recent use of medicines or drugs of abuse</td>
<td>- subject to choice of collection protocol</td>
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<td></td>
<td>- results appear earlier than in sweat testing</td>
<td>- decrease in salivary flow after cannabis smoking</td>
</tr>
<tr>
<td></td>
<td>- THC generally quantifiable for 48 hrs. CBD and CBN detectable at admission only.&lt;sup&gt;11&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td><strong>Sweat Analysis</strong>&lt;sup&gt;3, 7, 9, 14&lt;/sup&gt;</td>
<td>- less invasive than blood testing</td>
<td>- THC is not water soluble and the amount of THC in sweat is low and requires very sensitive analytical methods</td>
</tr>
<tr>
<td>(Drugwipes ®)</td>
<td>- may have some applications in driving under the influence because police find the test easy to use&lt;sup&gt;3&lt;/sup&gt;</td>
<td>- sweat test has a longer delay in the appearance of drugs compared to other tests</td>
</tr>
<tr>
<td>(PharmChek®)</td>
<td></td>
<td>- not suitable for field sobriety because daily cannabis users will have a positive sweat patch in the first week after ceasing drug use&lt;sup&gt;7&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- skin may be susceptible to external contamination&lt;sup&gt;7&lt;/sup&gt;,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- a positive test is only an indication of recent use and is not necessarily related to a positive plasma result</td>
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<tr>
<td></td>
<td></td>
<td>- may be best for use in treatment or criminal justice applications rather than employment</td>
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<tr>
<td></td>
<td></td>
<td>- very few studies on THC excretion in sweat for this reason some metabolites are missed in sweat testing</td>
</tr>
</tbody>
</table>
METHODS OF INGESTION & different levels of impairment

• Resolution of impairment
  • Wait 6 hours after smoking cannabis (35 mg or less THC) before driving, biking, or performing other safety-sensitive activities
  • Wait 8 hours after eating or drinking cannabis (18 mg THC or less) before driving, biking, or performing other safety-sensitive activities

• Secondhand cannabis exposure evidence shows that passive exposure under usual conditions would not test above standard cutoffs for workplace urine test or driving impairment blood test (Berthet, 2016)
  • DOT Drug Testing
    • Initial Test Cutoff Concentration (50 ng/ml)
    • Confirmatory Test Cutoff Concentration (15 ng/ml)
HOW DO STATE LAWS IMPACT ATTITUDES AROUND DUIC?

• Good News
  • In CO, it is **illegal to use cannabis in a vehicle**
  • open container law applies to cannabis (C.R.S. § 42-4-1305.5)

• Bad News
  • In CO, single-serving edible cannabis product should not contain more than 10 mg of THC
    • However, retail sales of **cookies and brownies** – are **generally understood to be single-serving products** – and **contain as much as 100 mg THC (or 10 servings)** (Colorado Code of Regulations. Department of Revenue. Marijuana Enforcement Division. Retail Marijuana Rules. 1 CCR 212-2 R604 (C5) (2))

• Nuanced News
  • In both CO and WA
    • **blood that contains 5 ng/ml THC considered to be under the influence** and is **guilty of DUIC**
ATTITUDES ABOUT DRIVING WHILE HIGH: CO AND WA

- 23.9% self-report driving within 1 hour of using cannabis at least 5 times in the past month

- 43.6% of respondents self-report driving while under the influence of cannabis once in a given year (where n = 865) (Davis, 2016)
# INTERNATIONAL* LAWS ON DUIC

## Table 1
Overview of DUIC laws and relevant evaluations.

<table>
<thead>
<tr>
<th>Type of Law</th>
<th>Example Jurisdictions</th>
<th>Published Evaluations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Zero tolerance</strong></td>
<td>Any evidence of cannabis use preceding driving (e.g., any detection of THC or THC-COOH in the driver's body) is an offence</td>
<td>Sweden: A-Holmgren et al. (2008); C-Jones (2005)</td>
</tr>
<tr>
<td><strong>Behavioural impairment</strong></td>
<td>Evidence of behavioural impairment (e.g., assessed by standardized field sobriety tests or DRE exam) is an offence</td>
<td>Canada: C-Cook et al. (in press); C-Solomon and Chamberlain (2014); B, C-Stoduto et al. (2014)</td>
</tr>
<tr>
<td><strong>Per se (non-zero)</strong></td>
<td>Evidence of the presence of THC and/or THC-COOH in bodily fluid over a specified threshold is an offence</td>
<td>Denmark: C-Steenoft et al. (2010); Norway: C-Vindenes et al. (2014); U.S.: A-Anderson and Rees (2015)</td>
</tr>
<tr>
<td><strong>Hybrid/two-tier</strong></td>
<td>Jurisdictions that have a combination of zero-tolerance, behavioural impairment, and/or per se laws in determining an offence, or where two or more levels of an offence are defined where one could be triggered by behavioural impairment and the other by exceeding a per se level, or where tiered offences involving different per se levels are defined</td>
<td>Australia: C-Boorman and Owens (2009); C-Davey et al. (2014)</td>
</tr>
</tbody>
</table>

SOURCE: WATSON, 2016
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<td>Zero tolerance</td>
<td>Sweden, Slovenia, Arizona</td>
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<tr>
<td>Behavioural impairment</td>
<td>Canada, Hungary, Spain</td>
<td></td>
</tr>
<tr>
<td>Per se (non-zero)</td>
<td>Denmark (1.0 μg/L in blood); Norway (1.3 μg/L in blood); also specified THC levels comparable to BAC; Washington (5.0 μg/L in blood)</td>
<td>Denmark: C-Steenoft et al. (2010); Eberhardt et al. (2014); Van Rees (2015)</td>
</tr>
<tr>
<td>Hybrid/two-tier</td>
<td>Australia, Belgium, Germany</td>
<td>Published: C-Davey et al. (2014)</td>
</tr>
</tbody>
</table>

Issues with non-specific testing. Cannabis stays in the bloodstream/adipose tissue for 30-45 days.

Expensive and subjective. Not always admissible in courts.

Most nuanced legal system; also most able to capture the complexity of medical and rec. cannabis use.

In alignment with DOT and Occupational medicine conventions. Does not always account for medical patients.

**SOURCE:** WATSON, 2016
MEDICAL USE AND MVCs: CONFLICTING + FASCINATING RESEARCH

• Some research suggests that policies that legalize cannabis for medical use have been associated with a decrease in the incidence of MVC.

• An ecological study found a net reduction in traffic crashes associated with the introduction of laws for medical cannabis use.

CHEMO- OR IMMUNOPROPHYLAXIS RECOMMENDATIONS

- CBD can modulate the CB1 (THC) receptor via an allosteric mechanism (Laprairie et al., 2015)
  - *Think Antabuse®* (disulfiram)
    - Without the extremely unpleasant reaction

- Cautionary tale
  - Acomplia (rimonabant) = failed management of obesity
    - Selective inhibitor of the CB1 endocannabinoid receptor

- Therapeutic agents targeting cannabinoid receptors and endocannabinoids are expected to become available in the future (ex. Epidiolex — pending FDA approval — first drug derived from the cannabis plant)

Schedule 1 Status is Confusing – For Everyone

**Recommending cannabis** is ok under state law

ogden, cole 1, cole, and Rohrabacher-Farr Amendment

Physicians may issue a recommendation, attestation, or authorization for a patient to obtain and use cannabis (Conant v. Walters)

**Prescribing cannabis** remains illegal under federal law

MC has not been subject to the U.S. Food and Drug Administration’s evaluation and approval process

MC has been classified in federal law as a Schedule 1 substance under the **Controlled Substance Act** (21 U.S.C. § 812)
WHAT PHYSICIANS MUST KNOW ABOUT DUIC: EVIDENCE-BASED RESPONSES

• NO MIXING
  • Using alcohol and cannabis together increases impairment and risk of a motor vehicle crash
    • more than using either substance alone
      (Behavioral Health Trends in the United States: Results from the 2014 National Survey on Drug Use and Health, 2015)

• NO ACUTE INTOXICATION TEST
  • DUIC’s are more likely to be detected by distinctive features than by driving faults.

• NO CAUSAL RELATIONSHIP
  • A causal relationship between cannabis smoking and impaired driving or the risk of accident involvement has not been convincingly demonstrated...yet. (Harthung, 2016)
1º PREVENTION FOR EMPLOYERS: PREVENT INJURY

- ALTER UNSAFE BEHAVIORS

  - Legal Consequences/Legislation
    - You can get a DUIC anytime you use cannabis and drive

  - Public health policies
    - Promote regulations that require child-resistant packaging
      - Reduce incidence of accidental cannabis ingestion

  - Education
    - Do not allow employees to ride in a car if the driver is under the influence of cannabis
    - Make a plan to address ride safety with employees
    - When young people get jobs and starts to drive, let them know that if they use cannabis and drive, they can get a DUIC or lose their license.
2º PREVENTION FOR ADULTS: **REDUCE THE IMPACT**

- PROVIDE GUIDANCE

  - EDs nationwide have to respond to accidental ingestion
    - Pediatric events
    - Cyclic vomiting syndrome
    - Inadvertent edible consumption (ex. perceived stroke)

  - No accurate secondary prevention (screening)
    - There is no field sobriety test
    - **This needs to be improved immediately**
Halloween: Kids and Accidental Ingestion
3º PREVENTION FOR MRO’S: EX POST FACTO

• **BE AN ADVOCATE** for patients with chronic diseases
  • If a patient has a medical cannabis ID card, document this fact in a letter for use in court hearings
  • Much of the published data is on naïve users – not medical patients
  • Field sobriety tests are fraught with issues
  • Treat MC patients in a similar fashion as you would patients on opiates

• **BE KNOWLEDGEABLE about safety**
  • Be more successful by targeting safety perceptions related to cannabis rather than knowledge of laws (Watson, 2016)
  • Discuss workplace issues and cannabis workplace policies
    • 21% of the workforce lives in a state where recreational use is legal
    • 62% of the workforce lives in a state where medical use of cannabis is legal
  • Patients must not be impaired at work
  • Patients must safely commute to and from work

• Make a plan to PREVENT FUTURE DUICS
  • Recommend 6-8 hrs “wheels up time” – use an airplane metaphor (AFI 11-202v3)
  • Avoid DUIC’s on patient’s permanent legal record
COMMUNITY-BASED PREVENTIVE RECOMMENDATIONS

Canada's Lower-Risk Cannabis Use Guidelines (LRCUG)

1. Delay using cannabis until adulthood

2. Don't drive or operate heavy machinery under the influence of cannabis
   • Do not drive for at least six hours after smoking
   • Be especially cautious if cannabis and alcohol is combined

3. Don't use synthetic cannabinoids
   • Products such as K2 and Spice should be avoided

4. Avoid cannabis altogether if there is a family history of mental illness
2 WHEEL DRIVE: EFFECTS OF CANNABIS ON A BICYCLE RIDE

- Total prevalence is considered to be 1.9% for the countries of the EU
- In CO, you can get a DUIC if you use cannabis before riding a bike or scooter (Colorado retail marijuana Report, 2016)
- Yet, no defined THC concentration leads to an inability to ride a bicycle (Hartung, 2016)
  - Subjects showed only slight distinctive features when cycling under the influence of cannabis
    - Including persons with THC concentrations above 100 ng/ml

**Citations:**
### SOME qualifying conditions eligible for the MCP in New Mexico*

<table>
<thead>
<tr>
<th>Condition</th>
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<tbody>
<tr>
<td>1. Cancer</td>
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<td>2. Glaucoma</td>
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<tr>
<td>3. Multiple Sclerosis</td>
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<tr>
<td>4. Epilepsy</td>
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<tr>
<td>5. Spinal Cord Damage with Intractable Spasticity</td>
</tr>
<tr>
<td>6. HIV/AIDS</td>
</tr>
<tr>
<td>7. Painful peripheral neuropathy</td>
</tr>
<tr>
<td>8. Intractable nausea/vomiting</td>
</tr>
<tr>
<td>9. Severe anorexia/cachexia</td>
</tr>
<tr>
<td>10. Hepatitis C infection currently receiving antiviral treatment</td>
</tr>
<tr>
<td>11. Crohn's disease</td>
</tr>
<tr>
<td>12. Post-Traumatic Stress Disorder</td>
</tr>
<tr>
<td>13. Amyotrophic Lateral Sclerosis</td>
</tr>
<tr>
<td>14. Severe Chronic Pain</td>
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<tr>
<td>15. Hospice Care</td>
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<tr>
<td>16. Inflammatory autoimmune-mediated arthritis</td>
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<tr>
<td>17. Cervical dystonia</td>
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<tr>
<td>18. Parkinson’s disease</td>
</tr>
<tr>
<td>19. Huntington’s disease</td>
</tr>
<tr>
<td>20. Ulcerative colitis</td>
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</tbody>
</table>

*I can provide citations for any of these conditions if you need more info*
“Marilyn”
68-year-old female
Metastatic breast cancer
Should she be prescribed MC to help alleviate her symptoms?
- Why?
- Why not?
- Who should recommend it?
- How would you go about it?

NEJM Findings

Majority of votes were from North America
1063 voters from US/Mexico/Canada

Physicians cited “responsibility as caregivers to alleviate suffering”

Others pointed out known dangers of prescription narcotics

Others supported patient choice

Others discussed whether mc belongs within the purview of physicians

Other discussed whether the substance should be legalized to allow patients to decide for themselves
Overall;

A majority of clinicians (76%) would recommend the use of medical cannabis to “Marilyn” and other patients in certain circumstances

This is despite the fact that medical cannabis is illegal in some of the polled states and countries
FINAL CONCLUSIONS

1. A causal relationship between cannabis smoking and impaired driving has not been convincingly demonstrated (Harthung, 2016)
   • Yet, National Academy of Sciences notes: “Cannabis use prior to driving increases the risk of being involved in a motor vehicle accident.”

2. THC concentrations and BAC are hard to compare due to the different metabolism pathways

3. Use of single studies or studies that use only one indicator to evaluate the impact of DUIC countermeasures can be misleading (Watson, 2016)
SPECIAL THANKS TO

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Using Weed in Public is Illegal (Colorado)
Using Weed in Public is Illegal (Colorado)
Thank you

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REFERENCES


- Colorado Retail Marijuana. Colorado retail marijuana, 2016


REFERENCES


