Legal Does Not Mean Safe: The Risks of Legalizing Recreational Marijuana

By

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Objectives:

At the end of the program, the attendee will be able to:

- Compare the reported benefits of cannabis legalization with reported dangers and pitfalls

- Describe common disease processes that are increasing in frequency with cannabis legalization

- List the major public health concerns associated with legal recreational cannabis use

- Discuss the effect of legal cannabis use on ED visits and hospitalizations
The **history of cannabis** and its usage by humans dates back to at least the third millennium BC in written history, and possibly further back by archaeological evidence. For millennia, the plant has been valued for its use for fiber and rope, as food and medicine, and for its psychoactive properties for religious and recreational use.
Background on Cannabis Use

The earliest restrictions on cannabis were reported in the Islamic world by the 14th century. In the 19th century, it began to be restricted in colonial countries, often associated with racial and class stresses. In the middle of the 20th century, international coordination led to sweeping restrictions on cannabis throughout most of the globe.
DON'T GAMBLE WITH MARIJUANA

IN NEVADA:

POSSESSION  20 YEARS
SALE   LIFE!
Entering the 21st century, some nations began to change their approaches to cannabis, with measures taken to decriminalize cannabis; the Netherlands became the first nation to legalize cannabis followed quickly by Uruguay, Canada, and some states in the U.S.
Today’s Landscape

The recreational use of cannabis is now legal in 11 states (Alaska, California, Colorado, Illinois, Maine, Massachusetts, Michigan, Nevada, Oregon, Vermont, and Washington), the District of Columbia, the Northern Mariana Islands, and Guam.

Another 16 states and the U.S. Virgin Islands have decriminalized cannabis. Commercial distribution of cannabis is allowed in all jurisdictions where cannabis has been legalized, except Vermont and the District of Columbia.
But why is this happening?

- "Victimless" crime?
- "Harmless" drug?
- "Medicinal" effects – reduce "hassle" and cost?
- When in doubt, "follow the money!"
Recreational marijuana taxes

Sales and excise taxes

- Washington: 37%
- Colorado: 30%
- Nevada: 25%
- Oregon: 17%
- Massachusetts: 17%
- Michigan: 16%
- California: 15%
- Maine: 10%
- Alaska: 0%

Cultivation tax per ounce
- California: $9.25
- Maine: $20.94
- Alaska: $50

Sales and excise taxes paid by retailers and customers, except in Nevada, where 15% of the excise tax is paid on sales by growers. Local taxes are not shown. Cultivation taxes are paid by growers.

Source: Times reporting
But what do the Feds think?

The use, sale, and possession of cannabis over 0.3% THC in the United States, despite state laws, is illegal under Federal law. As a Schedule I drug under the federal Controlled Substances Act of 1970, cannabis over 0.3% THC (legal term “marijuana”) is considered to have "no accepted medical use" and have a high potential for abuse and physical or psychological dependence. Cannabis use is illegal for any reason, with the exception of FDA-approved research programs.

Marijuana!
Hey, at least it's not crack!
Marijuana – What is it?

- Dry, shredded mix of leaves, flowers, stems, and seeds from the *Cannabis Sativa* or the *Cannabis indica* plants
- Common subspecies of the hemp plant which is common throughout the world
- Contains over 400 chemical compounds
# How is Marijuana Used?*

<table>
<thead>
<tr>
<th>SMOKED</th>
<th>VAPORIZED</th>
<th>EATEN/DRUNK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smoked in a pipe, bowl, cigarette</td>
<td>Inhaled through machine that converts active compounds into inhalable form</td>
<td>Consumed as ingredient in baked goods, candies, sodas</td>
</tr>
<tr>
<td>Rapid effects</td>
<td>Rapid effects</td>
<td>Takes time to reach brain, so effects are delayed</td>
</tr>
<tr>
<td>Burning marijuana releases toxins that can cause pulmonary problems</td>
<td>Does not release toxins that cause pulmonary problems</td>
<td>Does not release toxins that cause pulmonary problems</td>
</tr>
</tbody>
</table>

*Pacific Southwest Addiction Technology Transfer Center & UCLA Integrated Substance Abuse Programs*
“It’s not your Dad’s pot anymore...”

- THC content in the 1960s-1980s averaged 3-4%
- THC content now is 15-30% (inhaled)
  - Colorado average after legalization was 18.7%
- “Edibles” often have 60-80% THC!
  - Slower onset of hours instead of minutes can lead to higher total ingestion and higher risk of acute toxicity

Sources: “Average THC Strength Over Time: A 50-Year Look at Marijuana Potency”, WayofLeaf, March 2020
TODAY’S MARIJUANA HAS MORE THC

Concentrated products, commonly known as dabs or waxes, are widely available and contain high doses of THC, the ingredient that causes euphoria and intoxication.
Other Forms of Marijuana:

- **Hashish**
  - Compressed resin of cannabis plant
  - More concentrated and potent than marijuana plant

- **Hash Oil ("Wax")**
  - Psychoactive chemicals extracted from cannabis plant with butane
  - Three to four times as potent as marijuana plant

- **Synthetic Marijuana ("Spice", "K2")**
  - Herbal and chemical mixtures that produce experiences similar to marijuana; also associated with seizures
  - The five most common active chemicals in synthetic marijuana are now illegal in the U.S.

*Source: National Institute on Drug Abuse (NIH)*
Cannabis: What Does It Do?

- Contains over 60 cannabinoids: main active chemical is Δ-9-tetrahydrocannabinol (THC)

- Stimulates “high” by triggering receptors in parts of brain that influence pleasure, memory, thinking, concentration, coordination

- THC’s molecular structure is similar to that of neurotransmitters that affect cannabinoid receptors (affect pain, appetite, vomiting reflex)

- Effects generally last 1-4 hours

Source: NIDA
## Cannabis: Immediate Effects

<table>
<thead>
<tr>
<th>Altered Mood</th>
<th>Reduced Anxiety</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cognitive Impairment (Attention, Judgment)</td>
<td>Sedation/Drowsiness</td>
</tr>
<tr>
<td>Altered Perception</td>
<td>Sensory Intensification</td>
</tr>
<tr>
<td>Impaired coordination/balance</td>
<td>Increased heart rate</td>
</tr>
<tr>
<td>Hunger</td>
<td>Hallucinations (in large doses)</td>
</tr>
</tbody>
</table>

Effects can vary by strains

- **Sativa**: More euphoria, stress relief
- **Indica**: Relaxation, physical (especially pain) relief
- **Sativa** and **Indica** often combined, leading to variable effects

Source: National Institute on Drug Abuse (NIH)
Linking Increased Marijuana Use With Adverse Health Outcomes...

“It’s all about the data...”
If you see me coughing that’s just Marijuanavirus... y’all safe 🤝😂
Adverse Effects

• Behavioral and mental health

• Respiratory

• Cardiovascular

• GI

• Pregnancy

• Unintended pediatric exposure

Sources: (1) National Survey on Drug Use and Health (NSDUH), 2018
(2) CDC, Marijuana and Public Health: Data and Statistics
CAN YOU SPOT THE POT?

MARIJUANA CANDY. TRICK OR TREAT?

SMARTCOLORADO.ORG
Adverse Effects

• Respiratory
  – One marijuana cigarette = 4-10 tobacco cigarettes
  – Increased risk for bronchitis, COPD, lung CA

• Cardiovascular
  – Raises BP and HR (HR up to 100% increase with acute toxicity)
  – Increase risk of acute MI – 4.8x in first hour after use

• GI
  – Cannabinoid Hyperemesis Syndrome
    • Associated with gastritis and often misdiagnosed
    • Craving for hot showers or hot baths
    • Treatment is cessation of marijuana

Sources: (1) CDC, Marijuana and Public Health: Data and Statistics
(2) Substance Abuse and Mental Health Services Administration
2500 lung illnesses & 54 deaths primarily caused by vaping marijuana

Source: Centers for Disease Control and Prevention

Paid for by the Coalition for a Better Wallingford, CBWLFD.org
Adverse Effects - Pregnancy

- Associated with low birth weight and possibly pre-term labor and miscarriage
- 2.3 x risk of stillbirth
- Motor, social, cognitive disorders; ADHD?

Sources: (1) National Survey on Drug Use and Health (NSDUH), 2018
(2) CDC, Marijuana and Public Health: Data and Statistics
AVOID USING CANNABIS WHILE PREGNANT OR BREAST FEEDING

Developing babies could be harmed. Natural does not mean safe.
Behavioral and Mental Health

• Psychosis
  – Acute psychosis
  – 2 x risk of schizophrenia in teens and young adults

• "Amotivational Syndrome"

• Negative impact on learning and memory

• Drop in IQ score (does not improve off of marijuana)

Sources: (1) National Survey on Drug Use and Health (NSDUH), 2018
(2) CDC, Marijuana and Public Health: Data and Statistics
Marijuana has harmful effects to the brain which can be PERMANENT

Source: The US Department of Health and Human Services

Paid for by the Coalition for a Better Wallingford, CBWLFD.org
Linking Legalization of Marijuana With Increased Use...

“It’s all about the data...”
Show me the numbers...

- Over 43 million U.S. citizens use marijuana in the last year (13% of 12-17 year olds and 35% of 18-25 year olds)

- Cannabis use is highest in the West with the “early adopters”

- For 2000-2016, daily and near-daily use represented 75% of all use

- Total cannabis use rose from 1.4 billion days in 2000 to >3.5 billion days in 2016

Sources: (1) National Survey on Drug Use and Health (NSDUH), 2018
(2) CDC, Marijuana and Public Health: Data and Statistics
Show me the numbers...

• In States that legalized marijuana since 2009, use “in the past year” more than doubled between 2008 and 2018

• First time use and use “in the past month” nearly doubled

• Rate of increase is highest in 12-17 year olds and 18-25 year olds

Source: National Survey on Drug Use and Health:
Comparison of 2008-2009 and 2017-2018 Population Percentages
(50 States and the District of Columbia)
In a national survey, the number of pregnant women who used cannabis in the past month doubled between 2002 and 2017.
Show me the numbers...

- **ED visits are highest in the South**

- **ED visits across the country for marijuana related illness have been growing at a consistent 7% per annum for a decade**

- **ED visits in the West have grown 26% since legalization began with the highest percentage growth in children 12-17 years old**

Sources: (1) National Survey on Drug Use and Health (NSDUH), 2018
(2) CDC, Marijuana and Public Health: Data and Statistics
The Colorado Experience...

• Colorado hospitalizations related to marijuana use doubled after legalization (age 9 and older)

• ED visits for marijuana exposure related illness nearly nearly doubled in Colorado after legalization

• Cyclic vomiting related to marijuana (“Cannabinoid Hyperemesis Syndrome”) more than doubled after legalization

• Pediatric ED visits for unintentional exposure skyrocketed
  – The problem with edibles...

After legalization:

• **ED visits attributable to inhaled cannabis were more likely to be for cannabinoid hyperemesis syndrome (18.0% vs. 8.4%)**

• **ED visits attributable to edible cannabis were more likely to be due to acute psychiatric symptoms (18.0% vs. 10.9%), intoxication (48% vs. 28%), and cardiovascular symptoms (8.0% vs. 3.1%)**

• **Edible products accounted for 10.7% of cannabis-attributable visits between 2014 and 2016 but represented only 0.32% of total cannabis sales in Colorado (climbing rapidly now)**


Linking Increased Marijuana Use With Public Health...

What about driving?
THC and driving... under the influence

• Research studies have shown negative effects of marijuana on drivers, including an increase in lane weaving, poor reaction time, and altered attention to the road.

• In 2018, 20.5 million people aged 16 or older drove under the influence of alcohol in the past year and 12.6 million drove under the influence of THC.

• Drivers with THC in their blood were roughly twice as likely to be responsible for a deadly crash or be killed than drivers who hadn't used drugs or alcohol.

Sources: National Institute on Drug Abuse (NIDA): “Drugged-driving”
Marijuana-related traffic deaths have doubled since legalization.
THC and driving... under the influence

- THC induced accidents, fatalities, and DUI arrests are likely underreported
  
  - The blur of the “polysubstance” category

- Nevada DUI fatalities: 28% alcohol related and 16% THC related BUT...

- In Nevada, 46% of traffic deaths related to “substances” were “multiple” (majority included THC)

Sources: National Institute on Drug Abuse (NIDA): “Drugged-driving”
Nevada Department of Public Safety
<table>
<thead>
<tr>
<th>COUNTY</th>
<th>2017 Alcohol</th>
<th>2017 Marijuana</th>
<th>2017 Other Drug</th>
<th>2017 Poly-Substance</th>
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<td>CARSON</td>
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<td>0</td>
<td>1</td>
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<tr>
<td>CHURCHILL</td>
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<td>CLARK</td>
<td>32</td>
<td>22</td>
<td>6</td>
<td>60</td>
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<td>DOUGLAS</td>
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<td>ELKO</td>
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<tr>
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<td>4</td>
<td>12</td>
</tr>
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<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>TOTAL</td>
<td>50</td>
<td>29</td>
<td>17</td>
<td>82</td>
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</table>
Summary

• Marijuana use in the United States is accelerating at a rapid pace with legalization – especially in teens and young adults

• The potency of marijuana (THC content) is 6x to 25x higher than in the 1960s-1980s

• ”Edibles” are a particular risk for acute toxicity and unintentional pediatric exposure

• Multiple personal and public health risks associated with marijuana use have been identified and are increasing dramatically in frequency – especially Cannabinoid Hyperemesis Syndrome, Psychosis, and impaired driving fatalities (underreported)

• Lawmakers and public policy leaders need to recognize these issues when considering the claims that marijuana is a “harmless” and “victimless” substance
Selected References


• Drug Topics: Marijuana, National Institute on Drug Abuse (NIH), 2020.


• Substance Abuse and Mental Health Services Administration. (2017). Key substance use and mental health indicators in the United States: Results from the 2016 National Survey on Drug Use and Healthexternal icon. Rockville, MD: Center for Behavioral Health Statistics and Quality, Substance Abuse and Mental Health Services Administration.


• [https://www.cdc.gov/marijuana/health-effects.html](https://www.cdc.gov/marijuana/health-effects.html)

• [https://wayofleaf.com/blog/average-thc-content-over-the-years](https://wayofleaf.com/blog/average-thc-content-over-the-years)
Primum Non Nocere
Hippocrates (ca. 460-ca.377 B.C.).

"...all the care that will help, and none that won’t."
Don Berwick (2002)