PRESENTS

CANNABIS FORUM

- Marijuana, the Basics and Beyond for the Health Care Provider - Karen Randall, D.O.
- Problems with High Potency THC from the Perspective of an Addiction Psychiatrist - Libby Stuyt, M.D.
- Legalized Cannabis in Colorado Emergency Departments - Brad Roberts, M.D.

Video and Power Point

THURSDAY, AUGUST 8, 2019

Watch the video of the event on Pueblo Department of Public Health and Environment's Facebook. Power Point presentations are included in this document.
THE CANNABIS BASICS

• There are 3 basic plant types – all are from the “cannabis sativa” plant
  – Cannabis indica
  – Cannabis sativa
  – Cannabis ruderalis
UNDERSTANDING THE BASICS

- The older and not modified plants of Cannabis sativa used to contain a ratio of CBD and THC.
- As the current day plants are modified to produce increased THC potency, the amount of CBD is decreased.
- It is thought that CBD may help regulate some of the psychoactive side effects of THC.
- There are hundreds of compounds in the cannabis plant itself.
- We have an “endocannabinoid receptor system”—this doesn’t mean we are supposed to have cannabinoids in our system, it was named because the molecule fit on that type of receptor.
- **There are limited receptors in the brainstem.**
**CANNABIS RUDERALIS**

- **CBD**
  - The newest craze on the market.
  - This is not typically psychoactive
  - There are some anti-inflammatory properties and it does cross the blood brain barrier
  - Hemp – is cannabis sativa, rudderalis, with a limited concentration of THC.
  - Products made from hemp seeds are virtually inactive.
  - HOWEVER, there is THC in virtually all CBD products
CBD

• Virtually no single agency follows or regulates the end products of CBD.
• MED – denies responsibility because it is “CBD”
• FDA – has recently issued warning statements about the false claims but has yet to significantly enforce them, so….
• We have CBD at almost every store in America- with NO regulations on content and no supervision/regulation on who purchases this product.
• American Veterinary Medical Society does not recommend and yet there are dog products for purchase everywhere. THC is toxic to dogs.
CBD SIDE EFFECTS

• CBD is metabolized via the liver
• There are a tremendous amount of drug interactions
• Some of the most important medications altered by CBD
  – Anticoagulants – Warfarin
  – Anti HIV medications
  – Seizure medications
  – Basically any medication altered/metabolized by the liver.

Bottom line – if you are at risk for being tested for drugs – don’t use CBD
Hemp for animal consumption? Study in 1990
CBD CURES?

• Arthritis? MS?
• Cancer? Migraines?
• Eczema? Schizophrenia?
• Obesity? Female sexual health?
• Mood? Memory?
• Huntington’s disease? Temperature?
• Alzheimer’s??????? Motor Control?
• Anxiety? Hunger?
• Bipolar?
• PTSD?
• Seizures: epidiolex - now available. Recommendations?
Cancer and CBD Oil
Understanding the Benefits of Cannabis and Medical Marijuana
Jane Fields

Anxiety and CBD Oil
Understanding the Benefits of Cannabis and Medical Marijuana
Jane Fields

Diabetes and CBD Oil
Understanding the Benefits of Cannabis and Medical Marijuana
Jane Fields

Ultimate Medical Marijuana Resource
2017 CBD Strain Guide
2nd Edition
Jane Fields

Crohn's Disease and CBD Oil
Understanding the Benefits of Cannabis and Medical Marijuana
Jane Fields
TOP “6 CBD CANCER CURE OILS”
CANNABIS SATIVA & CANNABIS INDICA

- Cannabis sativa – this strain produces product that stimulates a person
- Cannabis indica – this strain produces sedation, “in da couch”
- These both produce varieties of THC.
- THC is psychoactive.
THE “OLD” VS THE “NEW”

• In the Woodstock era, a typical joint contained 1-3 mg of THC, with a significant percentage of that joint having CBD.
• Most people shared a joint.
• Currently, THC is being manufactured in multiple products.
• Blunts or joints in Colorado typically contain 20 mg of THC
THINK BIG TOBACCO IS NOT INVOLVED?
DABS, WAX AND SHATTER

• These are THC concentrates
• Typically made as extracts from the cannabis sativa or indica plant using propane or butane
DAB, WAX AND SHATTER

• These are concentrates from a process that extracts THC from the cannabis plant.
• THC is extracted using propane or butane.
• The butane/propane is evaporated off
• Not all butane gets evaporated off though.
WHAT’S IN A DAB

• Dabs can be anywhere from 90 mg to 250 typically.
• Internet has videos of people consuming a several GRAM dab
• One 90 mg dab is equivalent to 45 Woodstock joints
“Bubbles”
“Rosin”
99% pure THC

THCa crystalline
100% pure
$120 per gram
MOON ROCKS – ALSO KNOWN AS CANNABIS CAVIAR, WEED CAVIAR, CAVIAR WEED

- Bud dipped in wax and wrapped with Kief shake
- Rolled in paper
HOW DO YOU CONSUME A DAB?
VAPING?

• What is being vaped?
  – Nicotine
  – Flavored substances
  – THC oil
DART VAPES

- Used for Marijuana concentrates or e-liquids
THC VS NICOTINE?
Marijuana inhalers............

Breathe easier or get high?

CAN YOU TELL THE DIFFERENCE?

© THCphotos.org
The Vape Hoodie
MARIJUANA INFUSED LIP BALM
21 MG THC
Marijuana Tampons
160 mg THC

‘Marijuana Tampon’ Might Be the End of Your Period Cramps

ACT on Drugs 2018
THC SUPPOSITORY
PERSONAL LUBRICANT
Colorado PDMP requires controlled substances that are prescribed to patients (opiates, sedatives, etc) to be recorded.

Yet, Colorado law does not include cannabis/marijuana products. If it is indeed a “prescribed” medication with known abuse potentials and potential for potentiating the effects of many drugs (opiates and sedatives) – then it should be treated as such and it should be in our PDMP.

Was told that it is schedule one so, by CO law not required.
Problems with our high potency THC from the perspective of an addiction psychiatrist

Libby Stuyt, MD
Presentation for the CANNABIS FORUM
Pueblo Department of Public Health and Environment
Pueblo, Colorado
August 8, 2019
The Biggest Problem: THC Content is Not Like It Used to Be…

- 1980 THC content was less than 2%
- 1997 - 4.5%
- 2006 - 8.5%
- 2015 - 20% or more

Average potency of marijuana flowers/buds in Colorado is now 17.1% THC while the average potency for concentrates is 62.1%. Potency rates of up to 95% have been recorded. Smartcolorado.org

- After the Dutch observed negative impacts from rising THC potencies, a team of health experts concluded that THC potencies above 15% should be considered a hard drug.

THC Content Over Last 20 Years

212% Increase

Mahmoud A. Elsohly (2014), Potency Monitoring Program, Supported by NIDA
<table>
<thead>
<tr>
<th>Strain</th>
<th>THC content</th>
<th>CBD content</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blue Dream</td>
<td>17-24%</td>
<td>0.1-0.2%</td>
</tr>
<tr>
<td>Sour Diesel</td>
<td>19-25%</td>
<td>0.1-0.3%</td>
</tr>
<tr>
<td>Girl Scout Cookie</td>
<td>17-28%</td>
<td>0.09-0.2%</td>
</tr>
<tr>
<td>Green Crack</td>
<td>13-21%</td>
<td>0-0.1%</td>
</tr>
<tr>
<td>OG Kush</td>
<td>19-26%</td>
<td>0-0.3%</td>
</tr>
<tr>
<td>Grand Daddy Purple</td>
<td>17-23%</td>
<td>0.1-0.1%</td>
</tr>
</tbody>
</table>
The higher the potency of the drug the more potential for addiction

- Nicotine – FDA now talking about reducing nicotine concentration in tobacco
- Alcohol – 3.2 beer versus Vodka
- Cocaine – coca leaf versus crack cocaine
- Opioids – codeine versus Oxycontin
- Cannabis – marijuana of the 60s-80s when THC was <2% versus current high potency THC 17-28% in the flower, 60-95% in the concentrates
## Top Drugs among 8th and 12th Graders, Past Year Use

### 8th Graders

<table>
<thead>
<tr>
<th>Drug</th>
<th>Illicit drugs</th>
<th>Pharmaceutical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marijuana/Hashish</td>
<td>11.7%</td>
<td></td>
</tr>
<tr>
<td>Inhalants</td>
<td>5.3%</td>
<td></td>
</tr>
<tr>
<td>Synthetic Marijuana</td>
<td>3.3%</td>
<td></td>
</tr>
<tr>
<td>Cough Medicine</td>
<td>2.0%</td>
<td></td>
</tr>
<tr>
<td>Tranquilizers</td>
<td>1.7%</td>
<td></td>
</tr>
<tr>
<td>Adderall</td>
<td>1.3%</td>
<td></td>
</tr>
<tr>
<td>Hallucinogens</td>
<td>1.3%</td>
<td></td>
</tr>
<tr>
<td>OxyContin</td>
<td>1.0%</td>
<td></td>
</tr>
<tr>
<td>Vicodin</td>
<td>1.0%</td>
<td></td>
</tr>
<tr>
<td>Cocaine (any form)</td>
<td>1.0%</td>
<td></td>
</tr>
<tr>
<td>MDMA (Ecstasy)</td>
<td>0.9%</td>
<td></td>
</tr>
<tr>
<td>Ritalin</td>
<td>0.9%</td>
<td></td>
</tr>
</tbody>
</table>

### 12th Graders

<table>
<thead>
<tr>
<th>Drug</th>
<th>Illicit drugs</th>
<th>Pharmaceutical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marijuana/Hashish</td>
<td>35.1%</td>
<td></td>
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<tr>
<td>Adderall</td>
<td>6.8%</td>
<td></td>
</tr>
<tr>
<td>Synthetic Marijuana</td>
<td>5.8%</td>
<td></td>
</tr>
<tr>
<td>Vicodin</td>
<td>4.8%</td>
<td></td>
</tr>
<tr>
<td>Tranquilizers</td>
<td>4.7%</td>
<td></td>
</tr>
<tr>
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<tr>
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<td>Hallucinogens</td>
<td>4.0%</td>
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<tr>
<td>Cocaine (any form)</td>
<td>2.6%</td>
<td></td>
</tr>
<tr>
<td>Inhalants</td>
<td>1.9%</td>
<td></td>
</tr>
<tr>
<td>Salvia</td>
<td>1.8%</td>
<td></td>
</tr>
<tr>
<td>Ritalin</td>
<td>1.8%</td>
<td></td>
</tr>
</tbody>
</table>

*Only 12th graders surveyed about sedatives use*

Source: University of Michigan, 2014 Monitoring the Future Study

Prevalence of Current Use among High School Students, Colorado 2015

- **Major findings**
  - In 2015, health statistics regions 7 (Pueblo County, 30.1%) and 9 (Dolores, San Juan, Montezuma, La Plata, and Archuleta) were the highest in marijuana use among high school students.

Drug use decreases when drugs are perceived as harmful, and vice versa.
Changes in cannabis potency and first-time admissions to drug treatment: a 16-year study in the Netherlands

Freeman TP et al. Psychological Medicine 2018

Fig. 1. Mean (95% CI) concentrations of δ-9-tetrahydrocannabinol (THC) in domestic herbal cannabis and first-time cannabis admissions to specialist drug treatment (per 100 000 inhabitants) from 2000 to 2015.
MJ Withdrawal Syndrome

- Increased anger
- Irritability
- Depression
- Restlessness
- Headache
- Loss of appetite
- Insomnia
- Severe cravings for marijuana
The Reward Pathway – All drugs of abuse release dopamine in this pathway, promoting learning
Learning from drug use

- Dopamine is a salience factor that signals the brain that this is a “good” behavior to learn and remember.
- Communication between the nucleus accumbens, amygdala, hippocampus and prefrontal motor cortex via glutamate begin to “hard wire” the behavior.
- However, not everyone becomes “addicted.”
Why Do They Become Addicted?

- Rewarding properties of addictive drugs - in the “reward pathway”
- Genetic factors - decrease in D2 receptors
- Prior sensitization by nicotine or other drugs as a child/adolescent
- Prior sensitization by stress/trauma/abuse
Natural Rewards Elevate Dopamine Levels

**FOOD**

Source: Di Chiara et al.

**SEX**

Source: Fiorino and Phillips
Effects of Drugs on Dopamine Levels

**AMPHETAMINE**
- **Accumbens**
- Graph showing % of Basal Release overTime After Amphetamine (0-5 hr).
- Graph includes DA, DOPAC, and HVA.

**MORPHINE**
- **Accumbens**
- Graph showing % of Basal Release over Time After Morphine (0-5 hr).
- Graph includes different doses (0.5, 1.0, 2.5, 10 mg/kg).

**NICOTINE**
- **Accumbens** and **Caudate**
- Graph showing % of Basal Release over Time After Nicotine (0-3 hr).

**THC/Marijuana**
- Graph showing Percent of basal dopamine output over Minutes after Δ^2-THC administration.
- Graph includes 0.30 mg/kg iv dose and 0.15 mg/kg iv dose in rats.

Source: Di Chiara and Imperato
RECOVERY OF BRAIN FUNCTION WITH PROLONGED ABSTINENCE

Healthy Control

METH Abuser
1 month abstinence

METH Abuser
14 months abstinence
Addictive Drugs and Stress Increase Sensitivity of DA Cells in Mice (Saal et al. Neuron 2003;37:577-582)
Hippocampus and Neurogenesis
All drugs of abuse negatively effect the Hippocampus, decrease neurogenesis and impair the ability to learn new things - this is true for alcohol, cocaine, methamphetamines, heroin, nicotine, THC
Learning tests
Normal Brain Development during Adolescence
- Neurotransmitter Development

- Lots of Dopamine and Glutamate - stimulatory neurotransmitters - “stepping on the gas” - go, go, go - learn, explore, do

- Decreased Serotonin and GABA - suppressive neurotransmitters - “stepping on the brake” located in the prefrontal motor cortex - the last part of the brain to fully develop

Behavioral Factors Relating to Substance Abuse in Adolescents

- ↑ neurobiological based tendencies for risk-taking with decreased suppressive and regulatory control
- lots of Go, go, go
- very little ability to put on the brakes
- ↓ in parental monitoring
- ↑ in peer affiliation
Acetylcholine - ACH

- Another important brain neurotransmitter - helps us focus and concentrate
- ACH innervation of the PFC reaches mature levels during adolescence - receptors = nAChRs
- Involved in promoting or preventing neuronal cell death - depending on developmental stage
- Nicotine works on these receptors and can mess up the fine tuning of the brain during adolescence
Nicotinic Cholinergic Neurons
Endocannabinoid Receptors

- Are all over the brain – receptors for **anandamides** - “supreme joy”
- CB1 receptors regulate the balance between excitatory and inhibitory neuronal activity
- Exposure to cannabis during adolescence disrupts glutamate which plays an important role in synaptic pruning in PFC – disrupting normal brain development
Concentrations of CB₁ receptors

- **Basal Ganglia**
  - Movement

- **Cerebral Cortex**
  - Higher cognitive function

- **Cerebellum**
  - Movement

- **Hypothalamus**
  - Appetite

- **Hippocampus**
  - Learning, memory, stress

- **Medulla**
  - Nausea/vomiting, chemoreceptor trigger zone (CTZ)

- **Spinal Cord**
  - Peripheral sensation including pain

References:
Synaptic Pruning

The next change after this synaptic growth spurt is a selective pruning which takes place.

In adolescence, most of this pruning is taking place in the frontal lobes.

The adolescent loses approximately 3 percent of the gray matter in the frontal lobes.
IQ and Brain Development Studies

- Prospective study New Zealand - 1,037 individuals followed for 20 years
- Neuropsych testing at 13 before initiation of cannabis and again at age 38
- IQ decrease by 8 points with early persistent teen use of cannabis
IQ and Brain Development Studies

- Prospective study of 648 children and exposure to cannabis in-utero
- Women interviewed about the amount and frequency of marijuana use at 4 and 7 months of pregnancy and delivery
- Children assessed with IQ test at age 6
- Examiners blinded to exposure
- In Utero exposure (light to moderate marijuana users, approx. 3x/week) has a significant negative effect on school-age intellectual development

Recommendations From Cannabis Dispensaries About First-Trimester Cannabis Use
Dickson B et al. Obstet Gynecol 2018;131:1031–8)

- Phone script - caller stated she was 8 weeks pregnant and experiencing morning sickness - “Are there any products that are recommended for morning sickness?”
- 400 dispensaries contacted in Colorado
- Nearly 70% of Colorado cannabis dispensaries contacted recommended cannabis products to treat nausea in the first trimester.
- Few dispensaries encouraged discussion with a health care provider without prompting.
- Example: “Technically, with you being pregnant, I do not think you are supposed to be consuming that, but if I were to suggest something, I suggest something high in THC.”
- Bud Tenders Practicing Medicine without a License
What Does it Mean to Have a Decreased IQ?

- First, loss of 8 points will bring an average (50%) IQ of 100 down to the 29%.
- Less likely to get the “ideal” job
- Less likely to get a good score on SAT
- Decreased overall satisfaction in life
- Less likely to go to college
- Less likely to get married
- Less likely to stay married
Marijuana and Mental Illness

- 3,239 Australian young adults were followed from birth to the age of 21
- Potential confounding factors were prospectively measured when the child was born and at 14 years.
- After controlling for confounding factors, those who started using cannabis before age 15 years and used it frequently at 21 years were more likely to report symptoms of anxiety and depression in early adulthood than those who did not use cannabis. (odds ratio 3.4; 95% CI 1.9-6.1).
- Independent of individual and family background or other drug use
Impact of marijuana legalization in Colorado on adolescent emergency and urgent care visits

- Adolescents 13-21 from 2005 – 2015
- Marijuana related visits jumped
  - 161 in 2005
  - 777 in 2015
- Behavioral health evaluations accounted for 67%
  - 84 in 2005
  - 500 in 2015
- 71% of those with diagnostic codes related to marijuana or a positive urine drug screen also diagnosed with mental illness – depression, mood disorder, anxiety
- Large portion also tested positive for alcohol, amphetamines and opiates
Risk of Psychosis

- Using cannabis at a young age (<15-18) increases the risk of developing a psychotic disorder
- Risk is dose dependent and increases with greater frequency of use and with higher potency THC
High Potency Cannabis associated with a tripled risk for Psychosis

- London - analyzed 780 people ages 18-65, 410 with first episode psychosis and 370 healthy controls
- High potency - THC >15% - 3X increased risk of psychosis
- Daily use - 5X increased risk
- Psychosis not associated with Hash <5% THC
Why Marijuana (THC) is not the answer for PTSD

- Similar as to why benzodiazepines are not the answer
- Temporary relief – numbing, disconnecting from the traumatic emotions
- Cognitive impairment, a-motivational syndrome, potential for psychosis or worsening psychosis from PTSD
- Addiction potential and vicious cycle
- False memories
Marijuana and Suicide

- Multiple studies have documented a relationship between cannabis use and suicidality – Buckner et al. Psych Res 2017;253:256-259 – tested the utility of the interpersonal-psychological theory of suicide

- Large longitudinal study in Australia and New Zealand of over 2000 adolescents and maximum frequency of marijuana use found almost 7X increase in suicide attempts in daily marijuana users compared with non-users – Silins E et al. The Lancet psychiatry Vol 1 September 2014
Correlation of Marijuana and Suicide

In fact veteran suicides have not decreased. Instead, they are up 32% since 2001, compared to a national increase of 23% during the same period – Congressional Hearing 4/27/17

Christine Miller, PhD
Cannabis use disorder and suicide attempts in Iraq/Afghanistan-era veterans

Kimbrel NA et al. J Psychiatric Research 2017:89;1-5

3233 veterans in cross-sectional, multi-site study by VA

Cannabis use disorder was significantly associated with both current suicidal ideation (p<0.0001) and lifetime history of suicide attempts (p<0.0001) compared to veterans with no lifetime history of cannabis use disorder.

The significance difference continued even after adjusting for sex, PTSD, depression, alcohol use disorder, non-cannabis drug use disorder, history of childhood sexual abuse and combat exposure.
Average Toxicology of Suicides Among Adolescents Ages 10 to 19 Years Old

Substance Type
Marijuana 16.03% 13.75% 13.33%
Alcohol 13.13% 12.03% 11.35%
Amphetamine 4.49% 3.76% 2.70%
Cocaine 1.92% 1.86% 2.35%
Opioid 3.37% 2.21% 4.02%
Antidepressant 3.13% 3.76% 3.86%

Percent of Suicides with Known Toxicology

SOURCE: Colorado Department of Public Health and Environment (CDPHE), Colorado Violent Death Reporting System

SOURCE: Colorado Violent Death Reporting System, Colorado Department of Public Health and Environment (CDPHE)
Solutions/Recommendations

- Educate, educate, educate, increase prevention efforts
- “medical” MJ should come from pharmacies and go through FDA testing as all Rx drugs
- Limit THC concentrations to <10%
- Increase funding and availability of treatment
- Increase research on CBD and lower doses of THC
- Strong ban on any advertising that appears to be directed toward youth - for all drugs including marijuana, tobacco and alcohol
Legalized Cannabis in Colorado Emergency Departments

A Cautionary Review of the Negative Health and Safety Effects

Brad Roberts, MD FACEP FAAEM
CRAFT YOUR HIGH

OUR PRODUCT LINES

Sesh  PANACEA  Oil
Review of Colorado Timeline

• Prior to 2000- illegal to possess or grow marijuana
• 2000-2009: Amendment 20 approved and medical marijuana is legalized, no regulated market
• 2010-2012: Medical marijuana is commercialized and regulated with licensed dispensaries, grow operations, and product manufacturers open in jurisdictions allowing these types of businesses. This corresponded with the Ogden Memorandum. The number of patients registered with CDPHE increased dramatically, from about 5,000 in 2009 to almost 119,000 in 2011.
• 2013: Amendment 64 takes effect
• 2014 to present: Recreational and medical marijuana fully regulated and commercialized. Licensed retail stores open January 1, 2014.
Following legalization use rates went up

Marijuana Use in the Past Month in Colorado, by Age Group

Marijuana Use in the Past Month in Kansas, by Age Group

Source: SAMHSA National Survey on Drug Use and Health: State Estimates
Cannabis potency has dramatically increased

- Current commercialized cannabis is near 20% Tetrahydrocannabinol
- In the 1980’s concentration was <2%. This 10-fold increase in potency does not include other formulations such as oils, waxes, and dabs which can reach 80-90% THC
Well established adverse health effects of cannabis use

- Psychosis
- Suicide
- Adverse effects on brain structure/function
  - Decreased decision making capacity, learning, memory, social interaction, IQ, increases in impulsivity, anxiety, depression, abnormalities in habits/routines
- Links to other substance abuse
  - Dependence/Withdrawal
- Cannabinoid hyperemesis syndrome
  - Poor respiratory and Cardiovascular outcomes
  - Low birth weight/growth restriction, preterm labor, developmental problems in baby if used during pregnancy
- Decreased ability to operate a motor vehicle
- Burn injuries in preparation of concentrates
- Still others... (pediatric exposures, contaminants/pesticides, epigenomics, ...)
Majority of visits with cannabis get a behavioral health evaluation

Number ED/UC visits with cannabis associated ICD codes or positive urine drug screens by adolescents aged ≥13 and < 21 by year to a tertiary care children’s hospital system in Colorado by year

Table 1
Percentage and prevalence of the top ten primary diagnoses of emergency department (ED) visits with marijuana-related billing codes\(^a\) compared to ED visits without marijuana-related billing codes in Colorado from 2011 through September 2015 (N = 7,432,254).\(^b\)

<table>
<thead>
<tr>
<th>Primary diagnosis categories</th>
<th>With marijuana-related codes</th>
<th>Without marijuana-related codes</th>
<th>Prevalence ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mental illness</td>
<td>17,802 (29.1)</td>
<td>432,161 (5.8)</td>
<td>5.03 (4.96–5.09)</td>
</tr>
<tr>
<td>Symptoms, signs, and ill-defined conditions and factors influencing health status</td>
<td>8472 (12.9)</td>
<td>1,083,907 (14.2)</td>
<td>0.93 (0.93–0.97)</td>
</tr>
<tr>
<td>Injury and poisoning</td>
<td>7032 (11.5)</td>
<td>1,473,427 (10.8)</td>
<td>0.58 (0.57–0.59)</td>
</tr>
<tr>
<td>Marijuana-associated codes(^b)</td>
<td>5087 (8.3)</td>
<td>0 (0.00)</td>
<td>–</td>
</tr>
<tr>
<td>Diseases of the nervous system and sense organs</td>
<td>4251 (7.0)</td>
<td>730,970 (9.0)</td>
<td>0.70 (0.68–0.72)</td>
</tr>
<tr>
<td>Diseases of the respiratory system</td>
<td>3508 (5.7)</td>
<td>1,003,357 (13.5)</td>
<td>0.43 (0.41–0.44)</td>
</tr>
<tr>
<td>Diseases of the digestive system</td>
<td>3333 (5.8)</td>
<td>459,355 (6.2)</td>
<td>0.94 (0.90–0.96)</td>
</tr>
<tr>
<td>Diseases of the circulatory system</td>
<td>2914 (4.8)</td>
<td>426,082 (5.7)</td>
<td>0.84 (0.80–0.88)</td>
</tr>
<tr>
<td>Diseases of the musculoskeletal system and connective tissue</td>
<td>2612 (4.3)</td>
<td>406,555 (6.7)</td>
<td>0.64 (0.61–0.66)</td>
</tr>
<tr>
<td>Diseases of the genitourinary system</td>
<td>1995 (3.3)</td>
<td>430,173 (5.8)</td>
<td>0.50 (0.53–0.58)</td>
</tr>
<tr>
<td>Unclassified codes and E codes</td>
<td>1075 (1.8)</td>
<td>62,688 (0.8)</td>
<td>2.09 (1.97–2.22)</td>
</tr>
</tbody>
</table>

\(^a\) Marijuana-related ICD-9-CM codes included 304.3, 305.2, 969.6, and E884.1 in any of the listed 30 diagnosis codes.

\(^b\) Marijuana-related ICD-9-CM codes included 304.3, 305.2, 969.6, and E884.1 in the primary diagnosis. These ED visits were excluded prevalence ratio calculations.

\(^c\) Data details: Colorado Hospital Association (CHA), 2015 data is January 1, 2015 through September 30, 2015. NA = data not available. An individual can be represented more than once in the data, therefore, the rate is hospitalizations or ED visits with marijuana-related billing codes per 100,000 hospitalizations or ED visits.
My personal psychosis cases...

- 22 yo M, no previous past medical/psychiatric history presents after reportedly trying to hang himself by a ceiling fan with his bedsheets in a motel.
- Manager found him, called 911, police/EMS brought him in.
- Stated was smoking weed ‘all day every day’ in his motel room and that he was seeing ghosts that told him to kill himself.
- No prior psychiatric history, no other medical problems, only relevant finding on urine drug screen (UDS) was positive for cannabis only.
My personal psychosis cases

• 18 yo M who was smoking marijuana was at an inspirational camp prior to getting ready to play college football on scholarship
• No other past medical/psychiatric history
• Rapidly left the conference in his car driving over 100 mph until relative caught up to him after car had a mechanical issue
• Brought in to PW ED speaking nonsensical, could not answer questions. After a week of inpatient psychiatric treatment, staff could still not get him to keep his clothes on
• Only positive on lab work was UDS positive for cannabis. (Family stated was also previously using magic mushrooms and dealing with anxiety issues)
My personal psychosis cases

• 33 yo F brought in by EMS on stretcher covered in blood. Found at Loaf and Jug naked except for a bath robe open in front (no underwear or bra). She had broken glass and was bleeding from a scalp laceration, severed a tendon to her great toe that was bleeding profusely

• Repeating the Lords Prayer, not responding to any external stimuli

• UDS positive for amphetamines and cannabis

• Previously had been seen in ED after police brought her in after she was throwing furniture off an overpass into oncoming traffic several months ago

• At that visit, UDS only positive for cannabis
My personal psychosis cases

• 16 yo M smoking marijuana brought in after he reportedly tried to sexually assault sibling, had then taken a utility knife and made numerous cuts up and down his arm. Took 48 stitches and well over another 50 steri strips to close the number of cuts

• Did not respond to any external stimuli, stared blankly ahead throughout the entirety of the repair

• No prior medical problems, no psychiatric history

• UDS only positive for cannabis
Numerous more...

- I had never seen cases like this before. Urine drug screens only positive for marijuana. No previous psychiatric history. Seems to span age ranges, gender, ethnicity, socioeconomic circumstances, other medical history. Unifying theme is that they all use marijuana.
“Am I just paranoid or am I just stoned?” - Greenday

• Large reviews including reviews by National Academies of Sciences, Engineering, and Medicine, World Health Organization, and Colorado Department of Public Health and Environment have all independently come to the same conclusion

• “There is substantial evidence of a statistical association between cannabis use and the development of schizophrenia or other psychoses, with the highest risk among the most frequent users.” (NASEM report)
Colorado kids and teens are dying at a rate higher than the U.S. average — and suicide is to blame

The state ranked poorly in health outcomes and mediocre overall in the latest national report on child well-being by the Annie E. Casey Foundation
Suicide is the number one cause of death in Colorado for individuals between the ages of 10 and 24.

Children’s Hospital Colorado has seen the number of patients who have attempted suicide soar 600 percent since 2009.
Statistically significant 77.5% increase in the proportion of suicide victims with toxicology positive for marijuana (an absolute difference of 5.5%) for which toxicology data was reported (Chi square 77.2884, p<0.0001). 2004-2009 compared with 2010-2015
Suicides with marijuana by year as percentage
Suicide and Cannabis Data

• Suicidal ideation OR of 1.43 for any cannabis use, OR of 2.53 for heavy cannabis use
• Suicide Attempts OR of 2.23 for any cannabis use, OR 3.20 for heavy cannabis use
• Suicide Completion OR of 2.56 for any cannabis use

Borges et. al. A literature review and meta-analyses of cannabis use and suicidality. J Affect Disord. 2016 May; 195():63-74. Main paper cited by the NASEM.
Links to other substance abuse

• NASEM, WHO, and CDPHE report all found evidence of a statistical association between cannabis use and the development of substance dependence and/or substance abuse disorder for substances including alcohol, tobacco, and other illicit drugs.

• Four separate discordant twin studies have found that the twin who used marijuana was more likely to use other substances even after controlling for environmental and genetic influences.
Links to other substance abuse

• After exposure to THC rats have an increased behavioral sensitization response to not only THC but also opiates and nicotine.

• These behavioral changes in rats correspond to neuronal activity changes in mesolimbic dopamine neurons in the ventral tegmental area and nucleus accumbens and that cross tolerance results with exposure to morphine, amphetamines, and cocaine.

• Repeat morphine self-administration has been shown to be significantly lower in CB₁ knockout mice (CB₁ receptors are among the most predominant G protein-coupled receptors in the brain and mediate most of the psychotropic effects of THC) and opiate withdrawal symptoms significantly less when the knockout mice are administered naloxone.
Drug poisoning/overdose deaths in Colorado by involvement of specific drug type: Colorado residents, 1999-2017

Source: Vital Statistics Program, Colorado Department of Public Health and Environment

Note: Drug categories are not mutually exclusive; a death involving more than one type of specific drug will be counted in each applicable category. “Fentanyl” is a subset of ‘prescription opioid’.
Cannabinoid Hyperemesis Syndrome (CHS)

• Symptoms of CHS include significant nausea, violent vomiting, and abdominal pain in the setting of chronic cannabis use. Cardinal diagnostic characteristics include regular cannabis use, cyclic nausea and vomiting, and compulsive hot baths or showers with resolution of symptoms after cessation of cannabis use.

• Following legalization, the prevalence of cyclic vomiting presentations to Denver Health and the University of Colorado Hospital increased 1.92 fold.

• These patients often are evaluated with multiple imaging studies, lab work, endoscopies, and admissions to the hospital as well as antiemetic treatment. These studies are often non-diagnostic and treatment often ineffective.

• This may also influence ED overcrowding.
Super-strong weed is making people vomit every morning and some are ‘scromiting’

Rob Waugh  Monday 11 Mar 2019 9:49 am

Weed smokers are waking up in the morning feeling nauseated and having violent fits of vomiting, a doctor has warned.

Some of the attacks of vomiting are so violent that users around the world are ‘scromiting’ - screaming while vomiting - and having to go to hospital.

It could be linked to super-strong weed, a Canadian doctor has warned.
“Show them this...”
One recent shift...

- Teenage pt running in middle of street through traffic reportedly waving metal rod at cars. Had reportedly assaulted other teenage male. Apprehended by police, extremely combative. Tackled, tazed. Being held down by 3 police officers, EMS arrives and gives 5 mg Haldol, 2 mg Versed, and 50 mg Benedryl IM. No response. They think he tells them he did “acid, chlamydia, and meth”. Pt states he was using MJ waxes to me. Punched police officer, spit on police officers and EMS personal. Arrives with 3 police officers, 5 EMS personnel, and 3 security staff to hold him down yelling incoherently. Given 10 mg IM Versed and finally calms down. UDS only positive for MJ. C-spine CT with pneumomediastinum. Hx hemophilia A. During hospital stay develops rhabdomyolysis. Very nice good family in waiting room unaware.

- Pt apprehended by police, pseudoseizure to escape arrest after shoplifting. UDS positive for opiate, meth, cannabis. Returned second time after trying to flee, tackled to the ground by police and brought back

- Pt w/laceration to L leg, dropped wine glass that broke and cut leg - drinks 10 beers daily and smokes cannabis daily

- Pt in bar fight, reported part of Arian brotherhood. Presented with odd episodes of unresponsiveness. Eventually intubated for airway protection. Positive for EtOH (relatively low level) and cannabis

- Pt w/ hx PTSD, OD on trazodone/Seroquel, trying to self treat PTSD from fireworks. UDS positive for amphetamines, cannabis

- Pt drank EtOH to unresponsive, only grunted to painful stimuli. Children taken in custody of police as nowhere else to go. Daily cannabis user.

- Pt w/ SI, life not worth living, plan to OD on pills. Hx cocaine use, snorting heroin, and cannabis use. UDS positive for amphetamines/opiates (neg cannabinoids)
• Pt at lake. States person approached her to sell her MJ products while she was at the lake. She states she refused and was punched multiple times in the face and kicked on the ground. Large eyebrow/forehead lac repaired. CT head/facial bones neg. Pt with hx of daily cannabis use.

• Pt presents with L knee pain. Crashed on motorcycle 2 days prior, no helmet/pads. Tried treating pain at home by smoking large amounts of marijuana without relief. X-rays with midline patella fracture. No UDS drawn, smokes 2 PPD cigarettes, smokes MJ multiple times per day

• Pt with undifferentiated abdominal pain, vomiting, diarrhea (labs normal, CT neg, stool studies neg). Hx diabetic ulcers not healing for last 7-8 months. Hx daily MJ use, states quit 3 months ago

• Pt w/ L scapular pain, chest pain, and chronic back pain. Smokes MJ daily, states for pain. Never had PT for back/shoulder.

• Teenage pt, R testicular pain, dx epididymitis. Smokes cigarettes, uses MJ 2-3 times per week, drinks EtOH occasionally.

• Pt punched through glass window, cut radial artery. Hypotensive, O- blood transfusion. Taken to OR for repair. EtOH- negative cannabis.
Next day...

• Pt presents after ‘bad trip’ seeing demons that he felt were going to kill him after wanting to try psychedelic mushrooms. “I saw they legalized them in Denver so I wanted to try them”. Daily cannabis user.


• Pt went to state hospital yelling on grounds he was ‘going to blow his brains out’. During eval, pt with blanket over head, will not interact. Later states uses meth and cannabis daily. UDS positive for amphetamines, cannabinoids. DC’d to detox.

• Pt presents for SI after argument with son. Homeless. Uses cannabis, EtOH, and methamphetamine daily. Denied SI later, DC’d. Returned less than 12 hours later after yelling at gas station. DC’d to detox.

• Pt involved in argument with friends. Punched in jaw, lip laceration. Running in traffic trying to get hit by cars for SI. UDS positive for cannabis, cocaine, EtOH.

• Pt with intractable N/V. Hx Hep C, IVDA. Multiple attempts at peripheral IV unsuccessful. Ultimately central line placed. No improvement. CT with antral wall thickening, EGD with gastroparesis findings, ulcer. Daily cannabis user.
Next day...

• Pt presents with sudden onset dizziness, headache. Dx BPPV. Smokes MJ daily

• Pt hx COPD, CHF called complaining of SOB. Seen at beginning of night and refused admission, left AMA. Returned early morning after staying in the waiting room. Hit nurses hand as she tried to place IV. Uses cannabis, methamphetamine, and heroin daily. Homeless. Accepted for admission but again left AMA again.

• Pt presents after threatening to use gun to kill himself to roommates. Intoxicated by alcohol, endorses daily cannabis use. Charging up to nurses and myself, ?to intimidate?
Next day...

- Pt presents for medical clearance for detox for meth dependence. UDS positive for amphetamines, cocaine, and cannabinoids
- Pt found sitting on side of curb with erratic uncoordinated movements by bystanders, not able to provide history. Blanket over head not responding. When blanket removed, pt flails widely around room, then lies back down and curls up in ball, does not respond further. UDS positive for amphetamines, cannabinoids. After 10 hours observation in ED patient wakes up and leaves, refuses case management assistance, refuses detox.
- Pt presents following intentional overdose on metformin, Abilify, benztropine, and lamotrigine in SI attempt. States uses cannabis occasionally on social history, UDS negative.
- Pt presents for auditory hallucinations, voices telling him to stab self and others with knives. States having visual hallucinations of ‘tiny trolls’ eating his legs. UDS only positive for cannabis, states daily cannabis use
- Pt with low back pain, R sided chest pain concerned lung collapsed, and concern poke from trash bag may have been a needle. Smokes 2 PPD cigarettes, smokes cannabis multiple times daily
- Pt with asthma exacerbation. Ran out of inhaler, not refilled. Smokes cigarettes and cannabis daily.
- Pt states picked up by car, raped, then forced to call boyfriend in other state who called police and then was brought for SANE evaluation. UDS positive only for cannabinoids.
A few things ‘extras’ noticed

• All or nearly all cannabis presentation patients have Medicaid or are uninsured
• Cannabis often co-occurring with other substance abuse
• Noted nearly 2/3 of patients seen drug related (including alcohol). Cannabis most common overall drug (more than alcohol, meth, and opiates). Last shift 10 of 15 patients drug/alcohol related.
• Estimated ED average cost around $5,000 (with labs, CT). Cost per night, single shift of substance use to primarily Medicaid/uncompensated care well over $50,000 (not even including inpatient and ICU stays, endoscopies, EMS/police cost, etc.)
What Questions Do You Have?
References:

References


References


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References