Marijuana and Pediatrics

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August, 2015
Disclosure

The Pediatric Environmental Health Specialty Units exist across all the Federal regions in the United States and serve to protect the environmental health of children. The PEHSUs typically bring together pediatricians, occupational medicine providers, toxicologists, nurses, and other disciplines such as industrial hygienists to provide an evidence-based approach to children with environmental concerns. Poison Centers often provide call center services and toxicology expertise. The current PEHSU program is divided into East and West groupings with PEHSU-East administrated by the American Academy of Pediatrics (AAP) and PEHSU-West administrated under the American College of Medical Toxicologists (ACMT). Funding for the program is based in the Agency for Toxic Substances and Disease Registry (ATSDR) within the Centers for Disease Control. Each PEHSU must be an academic center, have 24-hour Hotline access, and have capacity to provide medical services as needed.

Disclaimer: This presentation was supported by the American College of Medical Toxicology (ACMT) and funded (in part) by the cooperative agreement award number 1 U61TS000238-01 from the Agency for Toxic Substances and Disease Registry (ATSDR).

Acknowledgement: The U.S. Environmental Protection Agency (EPA) supports the PEHSU by providing partial funding to ATSDR under Inter-Agency Agreement number DW-75-92301301-9. Neither EPA nor ATSDR endorse the purchase of any commercial products or services mentioned in PEHSU publications.

- CDPHE Med MJ Grant RFA acceptance
- CDPHE committees:
  - Retail advisory
  - Edible work group
  - Educational campaign
Objectives

- At the end of the presentation, the participant will be able to:
  - Recognize the differences in the pharmacokinetics of marijuana via inhalation and ingestion
  - Describe the dangers of marijuana exposures in children
  - Identify measures that may prevent pediatric marijuana exposures
Pharmacokinetics of Marijuana
Cannabis

- Cannabis
  - Sativa, Indica, Ruderalis
- Many known cannabinoids
  - Cannabinol, cannabidiol
  - Delta 9 tetrahydrocannabinol (THC)
- Smoke, Vaporize, Ingest, Topical
- Various terms:
  - Pot Grass, dope, MJ, mary jane, doobie, hooch, weed, hash, reefers, ganja,
Various Forms of Cannabis

- **Marijuana**: dried plant matter that is smoked
- **Hashish**: dried plant resin that is either smoked or mixed in edibles
- **Hash oil**: liquid thick oil, usually smoked or mixed in edibles.
- **Shatters/budders/waxes**: concentrated wax/paste, usually smoked
Extraction Methods

- Various solvents
  - Butane, hexane, IPA, ETOH, cooking/plant oils
- Solvents then removed
- Product purified
- Directly used, or mixed with butter, margarine, oil
Twirling Hippy Confections, LLC
www.TWIRLINGHIPPY.com
2145 West Evans Ave. Denver, CO 80223

MIP # 404-00030
Batch #_______

APPLE CRISP

Medical Use Only • Keep Away from Children and Pets
275 Mg THC @ 95% bioactive. 55% Sativa/45% Indica. (an "at home" edible.)
2-8 doses - Consult Your Caregiver for Personalized Dosage - Colorado Law Prohibits Re-Sale or Sharing

Warning: This product is POTENT and is only intended for responsible consumption. So you gotta take it HOME to bake it up fresh and hot!

Ingredients: Organic Apples, Gluten Free Oats, Cane Sugar, Pecans, Almonds, Cannabis Infused Coconut Oil, Spices.

Enjoy by 4/20

Keep Frozen until use.

This Product Made in Facility that Handles Wheat, Dairy, Eggs, Peanuts, Tree Nuts & Soy

Cooking Instructions: Turn oven to 375 degrees, loosen corners of crisp cover, leaving the cover in place. Put frozen crisp directly into oven. Set timer for 30 minutes, remove cover from crisp to ensure toasty topping, and cook an additional 15 minutes uncovered. Serve & Enjoy a deliciously medicated fresh hot heart healthy treat! *Gluten Free, Vegan.

This Product is Infused with Medical Marijuana and was Produced without Regulatory Oversight for Health, Safety or Efficacy and there may be Health Risks Associated with the Consumption of the Product.
Pathophysiology

- 2 G-protein linked receptors
  - Inhibit adenylyl cyclase and stimulate potassium conductance
- CB1
  - Basal ganglia, substantia nigra, cerebellum, hippocampus, cerebral cortex
  - Presynaptic, inhibits release of Ach, L-glutamate, GABA, NE, DE, 5-hydroxytryptamine
- CB2
  - Peripherally in immune system tissues: splenic macrophages, B lymphocytes, peripheral nerve terminals, and vas deferens
  - Regulation of immune responses and inflammatory reactions
- Endogenous cannabinoid receptor ligands
  - Anandamine, palmitoylethanolamide
Kinetics

• Absorption
  • Inhalation, onset of psychoactive effects within minutes (peak conc 3-10 min)
  • Ingestion, unpredictable, onset 1-3 hours (unstable in gastric pH and first pass metabolism), peak 2-4 hours

• Distribution
  • Vd 2.5-3.5 l/kg
  • Lipid soluble

• Metabolism
  • CYP 2C9 and 3A4

• Elimination
  • ½ life IV/inh 1-57 hrs,
  • Urine and fecal
Fig. 5. Mean plasma concentrations of $\Delta^9$-tetrahydrocannabinol (THC), 11-hydroxy-THC (11-OH-THC) and 11-nor-9-carboxy-THC (THC-COOH) of six subjects during and after smoking a cannabis cigarette containing about 34mg of THC.\textsuperscript{[35]}
Fig. 6. Mean plasma concentrations of Δ⁹-tetrahydrocannabinol (THC), 11-hydroxy-THC (11-OH-THC) and 11-nor-9-carboxy-THC (THC-COOH) of six cancer patients after ingestion of one oral dose of THC 15mg (estimated from single graphs for each patient of Frytak et al.,[46] with permission). The plasma courses of THC showed considerable interindividual variation (see figure 8 for the individual courses of THC plasma concentrations of three patients).
Fig. 10. Time course of subjective effects following three modes of administration of Δ⁹-tetrahydrocannabinol. A rating of the degree of ‘high’ was made by subjects on a 0–10 scale. [37,39]
Symptoms

- Desired: relaxation, well being, increased appetite
- Adverse effects: dysphoria, fear, and panic reactions, vomiting.
- Objective signs: tachycardia, hypertension, lethargy, sedation, slowed reaction times, postural hypotension, slurred speech, ataxia
Supportive Care

Respiratory Support

Benzodiazepines

Capsaicin Cream

Antipsychotics
Confirmatory testing?

- Standard Urine Drug Assay
  - EIA
  - THC cutoff
  - False Positives
  - May not represent acute ingestion (except in children)
  - Difficult to interpret and relate to level of intoxication
  - ? Second hand smoke
Colorado Hospital Visits

Marijuana-Related Emergency Room Visits

<table>
<thead>
<tr>
<th>Year</th>
<th>Visits</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011</td>
<td>8,198</td>
</tr>
<tr>
<td>2012</td>
<td>9,982</td>
</tr>
<tr>
<td>2013</td>
<td>12,888</td>
</tr>
</tbody>
</table>

SOURCE: Colorado Hospital Association, Emergency Department Visit Dataset. Statistics prepared by the Health Statistics and Evaluation Branch, Colorado Department of Public Health and Environment (CDPHE)
Colorado Hospital Visits

Hospitalizations Related to Marijuana

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of Hospitalizations</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>2,541</td>
</tr>
<tr>
<td>2001</td>
<td>2,863</td>
</tr>
<tr>
<td>2002</td>
<td>3,161</td>
</tr>
<tr>
<td>2003</td>
<td>3,399</td>
</tr>
<tr>
<td>2004</td>
<td>3,881</td>
</tr>
<tr>
<td>2005</td>
<td>4,148</td>
</tr>
<tr>
<td>2006</td>
<td>4,388</td>
</tr>
<tr>
<td>2007</td>
<td>3,901</td>
</tr>
<tr>
<td>2008</td>
<td>4,411</td>
</tr>
<tr>
<td>2009</td>
<td>4,698</td>
</tr>
<tr>
<td>2010</td>
<td>6,021</td>
</tr>
<tr>
<td>2011</td>
<td>6,310</td>
</tr>
<tr>
<td>2012</td>
<td>6,720</td>
</tr>
<tr>
<td>2013</td>
<td>8,078</td>
</tr>
</tbody>
</table>

SOURCE: Colorado Hospital Association, Emergency Department Visit Dataset. Statistics prepared by the Health Statistics and Evaluation Branch, Colorado Department of Public Health and Environment (CDPHE)
Colorado Hospital Visits

Average Marijuana-Related Hospitalizations
Pre- and Post-Medical Marijuana Commercialization Year (2009)

2005-2008: 4,094
2010-2013: 6,782
(66% increase)

SOURCE: Colorado Hospital Association, Emergency Department Visit Dataset. Statistics prepared by the Health Statistics and Evaluation Branch, Colorado Department of Public Health and Environment (CDPHE)
Knowledge Check

Which of the following is a disadvantage of the standard urine drug assay?

a) False negatives
b) Sample contamination
c) Difficult to interpret and relate to level of intoxication
d) Difficult to obtain from children
Unintentional Pediatric Exposures
Brief Communication

A case series of marijuana exposures in pediatric patients less than 5 years of age

George Sam Wang\textsuperscript{a,*}, Sandeep K. Narang\textsuperscript{b}, Kathryn Wells\textsuperscript{c}, Ryan Chuang\textsuperscript{d}

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\textsuperscript{b} Division of Child Abuse and Neglect, University of Texas Health Sciences Center at San Antonio, San Antonio, TX, USA
\textsuperscript{c} Community Health Services, Denver Health Hospital, Denver, CO, USA
\textsuperscript{d} Rocky Mountain Drug and Poison Center, Denver Health Hospital, Denver, CO, USA
Table 1
5 patients with marijuana exposures.

<table>
<thead>
<tr>
<th>Case</th>
<th>Age</th>
<th>Gender</th>
<th>Presenting symptoms</th>
<th>Presence of medical marijuana card</th>
<th>Ancillary tests</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3 year</td>
<td>Male</td>
<td>Somnolence, bradycardia</td>
<td>Yes</td>
<td>EKG, CBC, CMP, lactate, VBG, coagulation studies, LP, CXR, CTH, Urine Tox Screen</td>
</tr>
<tr>
<td>2</td>
<td>2 year</td>
<td>Male</td>
<td>Lethargy</td>
<td>No</td>
<td>CBC, CMP, UA, CXR, CTH, Urine Tox Screen</td>
</tr>
<tr>
<td>3</td>
<td>10 month</td>
<td>Male</td>
<td>Sleepiness</td>
<td>Yes</td>
<td>CBC, CMP, amylase/lipase, AXR, CTH, C-spine X-rays, Urine Tox Screen</td>
</tr>
<tr>
<td>4</td>
<td>19 month</td>
<td>Male</td>
<td>Sleepiness</td>
<td>Yes</td>
<td>Glucose, CTH, Urine Tox Screen</td>
</tr>
<tr>
<td>5</td>
<td>4 year</td>
<td>Male</td>
<td>Lethargy</td>
<td>Yes</td>
<td>CBC, BMP, EKG, Urine Tox Screen</td>
</tr>
</tbody>
</table>
Original Investigation

Pediatric Marijuana Exposures in a Medical Marijuana State

George Sam Wang, MD; Genie Roosevelt, MD, MPH; Kennon Heard, MD

IMPORTANCE An increasing number of states are decriminalizing the use of medical marijuana, and the effect on the pediatric population has not been evaluated.

OBJECTIVE To compare the proportion of marijuana ingestions by young children who sought care at a children's hospital in Colorado before and after modification of drug enforcement laws in October 2009 regarding medical marijuana possession.

DESIGN Retrospective cohort study from January 1, 2005, through December 31, 2011.

SETTING Tertiary-care children's hospital emergency department in Colorado.

PARTICIPANTS A total of 1378 patients younger than 12 years evaluated for unintentional ingestions: 790 patients before September 30, 2009, and 588 patients after October 1, 2009.

MAIN EXPOSURE Marijuana ingestion.

MAIN OUTCOMES AND MEASURES Marijuana exposure visits, marijuana source, symptoms, and patient disposition.

RESULTS The proportion of ingestion visits in patients younger than 12 years (age range, 8 months to 12 years) that were related to marijuana exposure increased after September 30, 2009, from 0 of 790 (0%; 95% CI, 0%-0.6%) to 14 of 588 (2.4%; 95% CI, 1.4%-4.0%) (P < .001). Nine patients had lethargy, 1 had ataxia, and 1 had respiratory insufficiency. Eight patients were admitted, 2 to the intensive care unit. Eight of the 14 cases involved medical marijuana, and 7 of these exposures were from food products.

CONCLUSIONS AND RELEVANCE We found a new appearance of unintentional marijuana ingestions by young children after modification of drug enforcement laws for marijuana possession in Colorado. The consequences of unintentional marijuana exposure in children should be part of the ongoing debate on legalizing marijuana.
CDPHE Marijuana Registry

![Chart showing trends in new patient applications and patients possessing valid registry cards over time.]

- **New Patient Applications**
- **Patients Who Possess Valid Registry Cards**

The chart illustrates a steady increase in both new patient applications and patients possessing valid registry cards from January 2009 to November 2011.
Table 1. Demographics of Patients Seen in the Children's Hospital Emergency Department for Ingestions

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of patients</td>
<td>790</td>
<td>588</td>
</tr>
<tr>
<td>Age, median (IQR), y</td>
<td>2.6 (1.6-3.0)</td>
<td>2.3 (1.5-3.6)</td>
</tr>
<tr>
<td>Male sex</td>
<td>449 (56.8)</td>
<td>334 (56.8)</td>
</tr>
<tr>
<td>Types of ingestions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acetaminophen</td>
<td>90 (11.3)</td>
<td>48 (8.2)</td>
</tr>
<tr>
<td>Antihistamine</td>
<td>43 (5.4)</td>
<td>32 (5.4)</td>
</tr>
<tr>
<td>Antidepressant</td>
<td>23 (2.9)</td>
<td>14 (2.3)</td>
</tr>
<tr>
<td>Antitussive</td>
<td>18 (2.2)</td>
<td>14 (2.3)</td>
</tr>
<tr>
<td>Marijuana exposures</td>
<td>0</td>
<td>14 (2.3)</td>
</tr>
</tbody>
</table>

Abbreviation: IQR, interquartile range.

a Values are given as number (percentage) unless otherwise noted.
<table>
<thead>
<tr>
<th>Case No./Sex/Age</th>
<th>Symptoms</th>
<th>Ancillary Tests</th>
<th>Disposition</th>
<th>Source of Marijuana</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/M/8 mo</td>
<td>Lethargy, rigidity</td>
<td>CMP, CBC, UA, Utox</td>
<td>Observation</td>
<td>Unknown</td>
</tr>
<tr>
<td>2/M/10 mo</td>
<td>Fussiness, somnolence</td>
<td>CMP, CBC, UA, amylase/lipase, Utox, CT head, c-spine x-rays, abdominal x-rays</td>
<td>Observation</td>
<td>POC medical marijuana</td>
</tr>
<tr>
<td>3/F/10 mo</td>
<td>Lethargy, hypoxic</td>
<td>CMP, CBC, UA, RSV, Utox, CT head, CXR</td>
<td>Admission</td>
<td>Unknown</td>
</tr>
<tr>
<td>4/M/1 y</td>
<td>Lethargy</td>
<td>BMP, CBC, Utox, CT head</td>
<td>Admission</td>
<td>POC with medical marijuana cigarette</td>
</tr>
<tr>
<td>5/M/2 y</td>
<td>Lethargy</td>
<td>UA, CMP, CBC, APAP/ASA levels, EKG, Utox, CT head, CXR</td>
<td>Admission</td>
<td>Babysitter with marijuana</td>
</tr>
<tr>
<td>6/M/2 y</td>
<td>Ataxia</td>
<td>CMP, CBC, UA, Utox, CT head, LP</td>
<td>Admission</td>
<td>Unknown</td>
</tr>
<tr>
<td>7/F/3 y</td>
<td>Lethargy</td>
<td>APAP/ASA levels, Utox, charcoal</td>
<td>Admission</td>
<td>FOC medical marijuana cookie</td>
</tr>
<tr>
<td>8/F/3 y</td>
<td>Lethargy</td>
<td>BMP, CBC, UA, Utox, CT head, CXR, LP</td>
<td>Admission</td>
<td>Family friend’s medical marijuana cookie</td>
</tr>
<tr>
<td>9/M/3 y</td>
<td>Lethargy</td>
<td>BMP, CBC, APAP/ASA levels, valproic acid levels, Utox, CTH, VBG</td>
<td>Admission to PICU</td>
<td>GFOC medical marijuana cookie</td>
</tr>
<tr>
<td>10/F/3 y</td>
<td>Lethargy</td>
<td>Utox</td>
<td>Observation</td>
<td>FOC medical marijuana candy</td>
</tr>
<tr>
<td>11/M/4 y</td>
<td>Lethargy</td>
<td>UA, BMP, CBC, APAP/ASA levels, EKG, Utox</td>
<td>Observation</td>
<td>GMOC medical marijuana cookie</td>
</tr>
<tr>
<td>12/M/5 y</td>
<td>Respiratory insufficiency</td>
<td>CMP, CBC, APAP/ASA levels, EKG, Utox, CT head, VBG</td>
<td>Admission to PICU</td>
<td>GFOC marijuana</td>
</tr>
<tr>
<td>13/F/7 y</td>
<td>Asymptomatic</td>
<td>Utox</td>
<td>Discharge</td>
<td>GFOC medical marijuana cookie</td>
</tr>
<tr>
<td>14/M/12 y</td>
<td>Dizziness</td>
<td>BMP, CBC, EKG, Utox, rapid strep test</td>
<td>Observation</td>
<td>Marijuana cake</td>
</tr>
</tbody>
</table>
Association of Unintentional Pediatric Exposures With Decriminalization of Marijuana in the United States

George S. Wang, MD; Genie Roosevelt, MD, MPH; Marie-Claire Le Lait, MS; Erin M. Martinez, MS; Becki Bucher-Bartelson, PhD; Alvin C. Bronstein, MD; Kennon Heard, MD

**Study objective:** We compare state trends in unintentional pediatric marijuana exposures, as measured by call volume to US poison centers, by state marijuana legislation status.

**Methods:** A retrospective review of the American Association of Poison Control Centers National Poison Data System was performed from January 1, 2005, to December 31, 2011. States were classified as nonlegal if they have not passed legislation, transitional if they enacted legislation between 2005 and 2011, and decriminalized if laws passed before 2005. Our hypotheses were that decriminalized and transitional states would experience a significant increase in call volume, with more symptomatic exposures and more health care admissions than nonlegal states.

**Results:** There were 985 unintentional marijuana exposures reported from 2005 through 2011 in children aged 9 years and younger: 496 in nonlegal states, 93 in transitional states, and 396 in decriminalized states. There was a slight male predominance, and the median age ranged from 1.5 to 2.0 years. Clinical effects varied, with neurologic effects the most frequent. More exposures in decriminalized states required health care evaluation and had moderate to major clinical effects and critical care admissions compared with exposures from nonlegal states. The call rate in nonlegal states to poison centers did not change from 2005 to 2011. The call rate in decriminalized states increased by 30.3% calls per year, and transitional states had a trend toward an increase of 11.5% per year.

**Conclusion:** Although the number of pediatric exposures to marijuana reported to the National Poison Data System was low, the rate of exposure increased from 2005 to 2011 in states that had passed marijuana legislation. [Ann Emerg Med. 2014;6:1-6.]

Please see page XX for the Editor’s Capsule Summary of this article.
US Pediatric Exposures

- 985 unintentional exposures
- Median age 1.7 (52%M)
- 60-74% seen in health care facility
- 78% reported ingestion
- 20-37% Drowsiness/Lethargy
- 10 patients with respiratory depression, bradycardia, or hypotension
- Most symptoms lasted 2-24 hrs
- No deaths
Decriminalized States

- More patients evaluated in health care facility (OR 1.9; 1.5, 1.6)
- More patients with major/mod effects (OR 2.1; 1.4, 3.1)
- Admission to critical care units (OR 3.4; 1.8, 6.5)
Figure 2. Comparison of unintentional marijuana exposure rates between nonlegal, transitional, and decriminalized states.
Marijuana Exposure Among Children Younger Than Six Years in the United States

Bridget Onders, BS¹,², Marcel J. Casavant, MD³,⁴, Henry A. Spiller, MS, D.ABAT³,⁴, Thiphalak Chounthirath, MS¹, and Gary A. Smith, MD, DrPH¹,⁴,⁵
Figure 1. Annual number and rate of marijuana exposures among children younger than 6 years (National Poison Data System 2000-2013).

Figure 2. Annual rate of marijuana exposures among children younger than 6 years by marijuana legalization status of state (National Poison Data System 2000-2013).
Poison Center Calls per 10,000 Calls for Patients 0-5 years

- CO calls
- US Calls


Values: 0, 2, 4, 6, 8, 10, 12, 14, 16, 18
Children

- Ataxia
- Somnolence,
- CNS Depression
- Seizure like activity or hyperkinetic activity
- Apnea/Bradypnea
- Prolonged Symptoms
No matter how tempting, do not eat any cookies or brownies left out for you in Colorado or Washington!
nugtella
Hazelnut spread with Medical Marijuana

nutella
Marijuana Edibles Lawsuit

NEW TONIGHT
MARIJUANA EDIBLES MAKER BEING SUED BY HERSHEY
HERSHEY SAYS PRODUCTS LOOK TOO MUCH ALIKE
Hershey settles lawsuit with Colorado pot retailer

Sep 29, 2014, 11:21am MDT

L. Wayne Hicks
Associate Editor-
Denver Business Journal
Email | LinkedIn | Google+ |
Cultural Attache blog

The Hershey Co. has ended its litigation against a Colorado company that sold marijuana-infused candies that it alleged had a similar name and look to its own products.

Hershey sued to stop a Colorado company from selling this marijuana-infused candy.
Knowledge Check

Which of the following is not a side effect of marijuana exposure seen in children?

a) Somnolence
b) CNS Depression
c) Excessive laughter
d) Seizure like activity or hyperkinetic activity
Prevention of Pediatric Exposures
Child-Resistant Packaging

- 1950’s: Safety cap for Aspirin

- 1960’s: Palm-N-Turn Vial
Introduction of the Palm-N-Turn cap was associated with large declines in childhood poisoning from medication in two large population studies:

- **A decline of 95% at Madigan General Hospital in 1968 – 1970** (Scherz R, NEJM, 285:1361-2; 1971)

- **A decline of 91% in Essex County, Ontario in 1967-1972** (Breault, Clin Toxicol 7:91-95; 1974)

Requires child-resistant packaging for household products that present a risk of “serious injury or illness to children under five” who may drink, eat or handle the contents.

Applies to numerous household chemicals, cosmetics, and medications, including most prescription drugs in oral dosage form, and all controlled drugs.

Under CPSC rules, the efficacy and acceptability of child-resistant packaging is established by structured testing in children age 42 to 51 months, and in senior adults.

- No more than 20 percent of 200 children can open the container within 10 minutes.

- 90 percent of 100 adults age 50 to 70 be able to open and properly close the package within 5 minutes.
Current Regulations

- Recreational
  - Each individual packaged edible retail product, even if comprised of multiple servings $\leq 100$ mg THC
  - May not be designed to appeal to children (specifically targets individuals $< 21$ yo, including but not limited to cartoon or similar images)
  - Statement whether the container is child-resistant
  - Must leave with exit package that is child-resistant (meet PPPA/CPCS standards)
  - Warnings: “keep out of reach of children”
  - No mass market campaigns

- Medical
  - Recent legislation matches recreational regulations
Edibles
Edibles Requirements

- "Multiple-Serving Edible Retail Marijuana Product"
  - an Edible Retail Marijuana Product unit for sale to consumers containing more than 10mg of active THC and no more than 100mg of active THC.

- Retail Marijuana Products Manufacturing Facilities:
  - must ensure that each single Standardized Serving Of Marijuana of a Multiple-Serving Edible Retail Marijuana Product is physically demarked in a way that enables a reasonable person to intuitively determine how much of the product constitutes a single serving of active THC.
  - Each demarked Standardized Serving Of Marijuana must be easily separable in order to allow an average person 21 years of age and over to physically separate, with minimal effort, individual servings of the product.
  - If a “Product” is of the type that is impracticable to clearly demark each Standardized Serving Of Marijuana or to make each Standardized Serving Of Marijuana easily separable, then the product must contain no more than 10 mg of active THC per unit of sale, and the Retail Marijuana Products Manufacturing Facility must ensure that the product complies with subparagraph (B)(2)(a) of rule R 1004.5.
Other Recent Legislation

- **HB-1361**: Limits purchasers of retail marijuana to the equivalent of up to 1-oz dry, loose-leaf MJ per transaction. (Previously it was ambiguous whether "marijuana" meant only the loose-leaf plant or, e.g., 1-oz of THC concentrate, about a 90-fold difference in the amount of THC being sold.)

- **HB-1366**: The Dept of Revenue has until 1/1/16 to make sure edible products themselves (not just their packages) are "clearly identifiable" as marijuana products, in contrast to non-infused candy products; in many cases, these items now look exactly alike. (The more specific wording of "colored, stamped, shaped or otherwise marked" as containing THC was removed).
Colorado Department of Public Health and Environment (CDPHE)
Marijuana: Education and youth prevention resources for community agencies

Back to retail marijuana public health information

Fact sheets and guidance

- Youth and Marijuana: overview of youth marijuana use in Colorado and the health or legal consequences of use.
- Tips for Parents: for families and guardians to learn more about protecting children and youth from marijuana and talking to them about marijuana.
Marijuana and Adolescents
Epidemiology

Use
% who used in last 12 months

Risk
% seeing "great risk" in using regularly
Source. The Monitoring the Future study, the University of Michigan.
Past-Year Use of Various Drugs by 12th Graders (Percent)

- **Marijuana/Hashish**: 36.4%
- **Synthetic Marijuana**: 7.9%
- **Adderall**: 7.4%
- **Vicodin**: 5.3%
- **Cough Medicine**: 5.0%
- **Tranquilizers**: 4.6%
- **Hallucinogens**: 4.5%
- **Sedatives***: 4.8%
- **Salvia**: 3.4%
- **OxyContin**: 3.6%
- **MDMA (Ecstasy)**: 4.0%
- **Inhalants**: 2.5%
- **Cocaine (any form)**: 2.6%
- **Ritalin**: 2.3%

**SOURCE**: University of Michigan, 2013 Monitoring the Futures Study
Figure 3. Trends in Perception of Great Risk from Smoking Marijuana Once or Twice a Week and Past Month Marijuana Use among Adolescents Aged 12 to 17: 2002 to 2011

+ Difference between estimate and estimate for 2011 is statistically significant at the .05 level.

Source: SAMHSA, Center for Behavioral Health Statistics and Quality, National Surveys on Drug Use and Health (NSDUHs), 2002 to 2011 (revised March 2012).
Youth (ages 12 to 17 years) Past Month Marijuana Use, 2012

Colorado average for youth was 10.47 percent.

- In 2012, the Colorado average was 39 percent higher than the national average.
- Colorado was ranked 4th in the nation.
- In 2006, Colorado was ranked 14th in the nation for past month marijuana usage among youth.
Youth (Ages 12 to 17 Years)
Past Month Marijuana Use
National vs. Colorado

SOURCE: Data from SAMHSA.gov, National Survey on Drug Use and Health 2013
### Healthy Kids Colorado Survey

<table>
<thead>
<tr>
<th>Colorado High School Pot Use</th>
<th>2009</th>
<th>2011</th>
<th>2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>Past Month</td>
<td>25 percent</td>
<td>22 percent</td>
<td>20 percent</td>
</tr>
<tr>
<td>Ever</td>
<td>45 percent</td>
<td>39 percent</td>
<td>37 percent</td>
</tr>
</tbody>
</table>

*Healthy Kids Colorado Survey*

<table>
<thead>
<tr>
<th>National High School Pot Use</th>
<th>2009</th>
<th>2011</th>
<th>2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>Past Month</td>
<td>20.8 percent</td>
<td>23.1 percent</td>
<td>23.4 percent</td>
</tr>
<tr>
<td>Ever</td>
<td>36.8 percent</td>
<td>39.9 percent</td>
<td>40.7 percent</td>
</tr>
</tbody>
</table>

*Youth Risk Behavior Survey*
Figure 1. Marijuana Use among High School Students – U.S.* and Colorado**, 2005-2013

- **Colorado Ever Use**
- **National Ever use**
- **Colorado Past 30 Day Use**
- **National Past 30 Day Use**

Prevalence (%)

Year


*Data source: Youth Risk Behavioral Survey prevalence estimates.
** Data source: Healthy Kids Colorado Survey prevalence estimates.
***The 2007 estimates are unweighted and therefore no confidence intervals are calculated.
Figure 2. Marijuana Use among Students in Colorado 2005-2013

*Middle School current use only 2013. The 2007 estimates are unweighted and therefore no confidence intervals are available. Data source: YRBS data 2005 to 2009, HCKS data 2011, 2013*
Adolescent Use

- More likely to have impaired cognitive and academic abilities after 28 days of abstinence

- Lower IQ score after short term abstinence
  - Fried 2005

- Less likely to graduate high school and less likely to attain college degree
  - Fergusson 2003, 2008, Horwood 2010
Adolescent Use

- More likely to be addicted to other illicit drugs after adolescent

- Psychotic symptoms or disorders like schizophrenia

- Quitting have lower risks of negative cognitive and mental health outcomes
  - Swift 2012
Limited or Mixed Evidence

- **Limited**
  - Lower IQ after short abstinence
  - College achievement

- **Mixed**
  - Anxiety
  - Depression
  - Suicidal thoughts or attempts
Prenatal and Breastfeeding Exposure
• 10-week administration of survey
• 3,137 clients had an on-site WIC appointment at the TCHD primary or satellite WIC clinics.
• 1,749 were completed resulting in an overall 60.2% response rate.
  • 1,308 (74.8%) surveys were completed in English
  • 441 (25.2%) were completed in Spanish.
### Table 2. Proportion of WIC mothers by age who were ever, current, or past marijuana users

<table>
<thead>
<tr>
<th>Survey respondents - WIC mothers</th>
<th>Ever users(^1)</th>
<th>Current users(^1)</th>
<th>Past users(^1\s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>WIC mothers (\leq 30) years</td>
<td>12.0%</td>
<td>7.4%</td>
<td>4.6%</td>
</tr>
<tr>
<td>WIC mothers (&gt; 30) years</td>
<td>5.7%</td>
<td>4.0%</td>
<td>1.7%</td>
</tr>
</tbody>
</table>

\(^1\) Percent of WIC mothers in the age group

\(^1\s\) Statistically significant difference between older and younger WIC mothers

### Table 3. Timing of marijuana use during most recent pregnancy among ever, current, or past marijuana users

<table>
<thead>
<tr>
<th>Survey respondents - WIC mothers</th>
<th>Ever users(^1)</th>
<th>Current users(^1)</th>
<th>Past users(^1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Used marijuana during pregnancy</td>
<td>10.9%</td>
<td>35.8%</td>
<td>4.5%</td>
</tr>
<tr>
<td>Used marijuana since the baby was born</td>
<td>9.6%</td>
<td>41.1%</td>
<td>1.6%</td>
</tr>
<tr>
<td>Used marijuana while breastfeeding</td>
<td>3.0%</td>
<td>13.7%</td>
<td>&lt;1%</td>
</tr>
</tbody>
</table>

\(^1\) Percent of WIC mothers in the marijuana user group
### Table 4. Reason for marijuana use

<table>
<thead>
<tr>
<th>Survey respondents - WIC mothers</th>
<th>Ever users</th>
<th>Current users</th>
<th>Past users</th>
</tr>
</thead>
<tbody>
<tr>
<td>To help with depression/anxiety/stress</td>
<td>35%</td>
<td>63%</td>
<td>28%</td>
</tr>
<tr>
<td>To help with pain</td>
<td>29%</td>
<td>60%</td>
<td>21%</td>
</tr>
<tr>
<td>To help with nausea/vomiting</td>
<td>23%</td>
<td>48%</td>
<td>17%</td>
</tr>
<tr>
<td>For fun/recreation</td>
<td>59%</td>
<td>39%</td>
<td>65%</td>
</tr>
<tr>
<td>Other reason</td>
<td>16%</td>
<td>14%</td>
<td>16%</td>
</tr>
</tbody>
</table>

5 Other reasons (write in response) included: sleep, cancer, seizures, migraines, and increase appetite. A couple of direct quotes from respondents were:

“To help with nausea and vomiting in first trimester of pregnancy”

“All the reasons above and plus when I was pregnant, it helped me want to eat...
Breastfeeding

• Biological evidence shows that THC is present in the breast milk of women who use marijuana.

• Biological evidence shows that infants who drink breast milk containing THC absorb and metabolize the THC.
Effects of maternal use during pregnancy and breastfeeding

- Decreased IQ scores
  - Day 1994, Goldschmidt 2000

- Attention problems

- Decreased growth

- Decreased cognitive function and academic ability
Limited, Insufficient, or Mixed Evidence

- Limited
  - Stillbirth
  - SIDS
  - Depression
  - Delinquent behavior
  - VSD
- Insufficient
  - Psychosis
  - Future marijuana use
- Mixed
  - Preterm
  - LBW/SGA
  - Motor development
Respiratory Effects

- Same carcinogens in marijuana smoke as tobacco smoke
- Associated with chronic bronchitis with cough/wheeze/sputum
- Pre-malignant lesions in airways
  - Fligiel 1997.
- Acute use improves airflow, while heavy use increases airflow obstruction
- No data on second hand smoke risks
Insufficient or Mixed Evidence

- Insufficient
  - Emphysema
  - Respiratory infections

- Mixed
  - COPD
  - Lung cancer
Retail Marijuana Public Health Advisory Committee

We established the Retail Marijuana Public Health Advisory Committee per CRS 25-1.5-110. The committee meets regularly, and all meetings are open for public attendance and comment.

https://www.colorado.gov/pacific/cdphe/retail-marijuana-public-health-advisory-committee
Summary

- Marijuana comes in all forms
- Recreational use and unintentional exposures are increasing
- Burden on hospitals is increasing
- Lots of ongoing legislation
- Pediatric patients have more severe and prolonged symptoms
- Adolescent population vulnerable
- Prenatal and breastfeeding exposures
- LOTS we don’t know or understand
Questions?

George.Wang@childrenscolorado.org