Pediatric Toxicology Update

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Disclosure Statement

- In the past 12 months, I have had no relevant financial relationships with the manufacturer(s) of any commercial product(s) and/or provider(s) of commercial services discussed in this CME activity.
- I do not intend to discuss an unapproved/investigative use of a commercial drug/product/device in my presentation.

Goals

- Updates: Toxicology in the News
Case

- 10 month old with vomiting, tachycardia, grunting respirations, ataxia

E-Cigarettes

- 6 billion dollar global market
- Electronic cigarettes, battery-operated
- Aerosol that is inhaled by the user
- Deliver nicotine, flavor, and other chemicals
E-Cigarettes

- ENDS: Electronic Nicotine Delivery Systems
  - E-devices
  - E-pens
  - Hookah pens
  - Vape-pens
- Flavorings, Propylene glycol, glycerin
  - Diacetyl - popcorn lung (bronchiolitis obliterans)
- “Safer than cigarettes”?

E-Cigarettes

- More than 3 million middle/high schoolers use e-cigarettes
  - 16% of high school and 5.3% of middle school students current users of e-cigarettes
  - E-cigarette use among middle and high school students tripled from 2013 to 2014
  - 81% of youth e-cigarette users cited the appealing flavors as the primary reason for use.

E-Cigarettes

- FDA ruling
- Child Nicotine Poisoning Prevention Act

E-Cigarettes

• Vape shops

E-Cigarettes, Poison Center data

• Half of reported exposures are in children < 6.
• This cap is not childproof!
E-Cigarettes

How much nicotine?

- 3 mL liquid nicotine/chamber.
- Nicotine 6-100 mg per mL.
- Sold in up to 1 liter bottles.
- 1 e-cigarette can contain 18-72 mg of nicotine.
- 1 cigarette can contain 15-30 mg of nicotine.
- Toxic dose 1-13 mg/kg nicotine.
Nicotine toxicity

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<th>Exposure Quantity (mL)</th>
<th>Nicotine Concentration (mg/mL)</th>
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<tr>
<td>0</td>
<td>0 mg/mL*</td>
</tr>
<tr>
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<tr>
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<td>1.5</td>
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<tr>
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<tr>
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<td>120</td>
</tr>
</tbody>
</table>

- Unlikely to cause symptoms
- Low exposure: GI symptoms possible
- Potentially lethal exposure
- Multiple times potentially lethal dose

For a 10 kg child

*Label may not accurately reflect nicotine quantity

Summary

- E-Cigarette liquid
  - Small amount can be toxic
  - Delicious flavors
  - Not childproof
  - Can cause vomiting, ataxia, seizures
Case

- 13 month old put in his crib, given a bottle of Suboxone as a rattle
- Mom checked on him and found the bottle open.
  - Some pills had spilled out, one was wet.
  - She took the bottle, gave him some milk.

Case

- Next morning, found him unconscious
- Called 911
- Pronounced dead at the hospital.
Case

Baby Boy Dies; Was Given Pills as a Toy

The New York Times

A 13-week-old boy died after he apparently swallowed pills from a bottle of prescription drugs that his parents had given him to play with as a rattle, the authorities said on Friday.

On the second floor of the parents’ apartment, 3201 Seward Park South, in Seattle, the boy died in the living room, according to a law enforcement official.

The boy, whose name was not released, was born to the parents, who are in their 30s and 40s, and his mother, 32, gave him a bottle of Suboxone that belonged to Mr. Parent, an official said. The medication is used to treat people who are addicted to illegal or prescription opioid drugs.

A short time later, Ms. Parent realized the bottle was open, and she knew the child had taken the pills. She was trying to get him to sleep, a law enforcement official said.

Suboxone

- What is Suboxone?
Opioids: Suboxone

- Suboxone is Buprenorphine + Naloxone
- Buprenorphine is a new synthetic opioid
- Sublingual pill, film
- 1 dose can cause symptoms in a toddler
- Why the Naloxone?
- Naloxone in formulation to discourage IV abuse
  - PO Naloxone is not protective!

Opioid Toxidrome

1. Respiratory depression
2. Miosis
3. Hypotension
4. Hepatic injury from sustained high or hypoxia
5. Myoglobinuric renal failure
6. Rhabdomyolysis
7. Abnormal or hypertensive blood stress
8. Compartment syndrome
9. Hypothermia
10. Possible presence of one or more flakky patches

Opioids: Antidote

- Naloxone
Opioids: Suboxone (Buprenorphine)

- Treatment
  - Naloxone IV push
    - Dose is 0.1 mg/kg
    - IV drip if needed
  - Long acting drug, outlasts Naloxone
  - Admit for 24 hour observation

- Synthetic opioid
  - Toxicology screen will likely be negative
  - May need large doses of Naloxone

Opioids: Methadone

- Toddler dies after mom feeds her meth to offset methadone ingestion, police say

Opioid abuse: An epidemic

Rates of prescription painkiller sales, deaths and substance abuse treatment admissions (1999-2010)
Opioid abuse: An epidemic

- Over 259 million opioid prescriptions were written in 2012
- 1.9 million Americans are addicted to opioid painkillers
- The U.S. is 4.6 percent of the world’s population, consumes 81 percent of the world supply of oxycodone
- 4.3 million adolescents and adults reported non-medical use of prescription opioids in 2014
- 4 out of 5 heroin users started on prescription opioids
Opioid abuse

Opioids: Fentanyl

- Fentanyl, a synthetic opioid, is 50 times more potent than heroin and 100 times more potent than morphine.
- DEA health advisory in March 2015 after documenting a surge of fentanyl drug seizures and deaths.
  - Chicago: 74 deaths/72 hours

Opioids: Long acting hydrocodone
Opioids: Naloxone

- Nasal or IM
- State by state rules for prescribers, pharmacies

Opioid abuse: Acetaminophen toxicity

- Hydrocodone + acetaminophen
  - Vicodin
  - Lortab
  - Norco
- Oxycodone + acetaminophen
  - Percocet
  - Oxycet
- Tylenol + codeine
- New FDA limit: 325 mg acetaminophen/pill
- More FDA controls proposed
Opioids: What can we do?

• Prescribe responsibly!
  • Does your patient really need an opioid?
  • For how long?
• Talk with patients and their parents about safely using, storing and disposing of prescription meds.
• Support use of state prescription drug monitoring programs
• Support increased access to substance abuse treatment

Summary: Opioids

• Epidemic, affecting every age
• Not always detectable on drug screens
• Often outlasts antidote
• Consider Acetaminophen toxicity
Recreational and medical marijuana

Marijuana

Marijuana pediatric exposure

- Denver, Colorado
  - Medical marijuana decriminalized 2009
- Case series
  - Kids < age 12 with unintentional marijuana exposure
  - Exposure to baked goods, grandparents' medical marijuana
Marijuana-pediatric exposure

- Ataxia
- Somnolence,
- CNS Depression
- Seizure like activity or hyperkinetic activity
- Apnea/Bradyapnea
- Prolonged Symptoms

http://cpj.sagepub.com/content/early/2015/06/03/0009922815589912.full.pdf+html
Marijuana pediatric exposure

**Marijuana**
- More potent than 40 years ago
- 8-12% THC

**Edibles**
- More THC
- Longer time to peak
- Longer lasting effects

**Marijuana**
- Wide variety of edible products
- Increased availability leads to increase in unintentional poisonings
Marijuana

• Case

Marijuana

Man who plunged from Denver balcony ate 6x recommended amount of pot cookie

By Elena Verdugo

The Denver Post

Updated 9:16 p.m. MST February 5, 2021

A college student who jumped from the 14th-story balcony of a Denver apartment building in January ate an amount of marijuana edibles that far exceeded the recommended serving size, authorities said.

Loren Nussbaum, a 19-year-old student at Northwest College in Powell, Wyo., died last month in a hospital in Colorado Springs after the marijuana-laced cookies he ate caused him to suffer an acute drug reaction, leading up to his wrong-way crash and death.

Marijuana

Man Pleads Insanity to Killing Wife After Eating Weed Candy

By Lauren Ohnesorge

The Denver Post

Updated 6:02 p.m. MST March 25, 2021

A Denver man who was accused of murdering his wife after eating weed candy is expected to plead insanity at his trial, according to court documents.
Summary

Marijuana

- Consider marijuana exposure in differential diagnosis for patients with unexplained symptoms
- Education of parents, caregivers
- Child-resistant packaging
- Poison center involvement