Synthetic cannabinoids and cathinones

“Bath Salts” and “K2 or Spice”
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Poison Center Data

- Just the tip of the iceberg
- Almost exclusively cases that are ill enough to present to the hospital
- Are still alive
- And are brought to the hospital by someone else
- And the hospital has contacted the regional poison center (not mandatory)
Advantages to Poison Center data

- Data is available that covers all of the US population
- A large percentage of new or novel substances will be reported
- Data is available for review at a national or regional level nearly instantaneously.
What is a cannabinoid?

- A substance that has some structural similarities to Δ⁹- tetrahydrocannabinol – primary natural psychoactive substance in marijuana (Cannabis sativa)
- That binds to natural proteins – called cannabinoid receptors
- Those receptors are normally occupied by natural compounds known as endogenous cannabinoids
- Cannabinoid receptors are widely dispersed throughout the body and the brain
What do cannabinoids do?

- It depends
  - Involved in emotional responses
  - Involved in stress responses
  - May be involved in immune responses
  - May regulate the release of other internal chemicals in the brain
  - May be affected by the emotional state of the individual
Marijuana

- Most commonly used illicit drug worldwide
- Potency has risen since the 1990’s
- Dependency has risen
- 90% of those who seek treatment for marijuana dependency (on their own) do not remain abstinent
- Marijuana has a withdrawal syndrome
  - Irritability
  - Anxiety
  - Craving
  - Sleep disruptions
Marijuana

- Being recognized as a possible risk for psychosis
- Most users who are dependent on illicit substances experience psychosis during use of or withdrawal from the drug.
- In a prevalence study, 12% of those NOT dependent on the drug experienced psychotic symptoms
- And 80% of those severely dependent did
Which is the cause

- Does marijuana use cause psychosis?
- Or are those with psychotic tendencies more likely to use?

- Substances that act on the same receptors would be likely to cause similar effects
Synthetic cannabinoids

- Variety of popular names/brands – “herbal blends”
  - K2, spice, Cloud 9, Bliss, Black Mamba, Genie, Zohai
- Include a number of synthetic compounds that work on the cannabinoid receptors in the brain
  - JWH-018, JWH-019, JWH-073, JWH—081, JWH-200, JWH-250
  - HU-210, HU 211, CB-25, CB-52
  - WIN-55, 212-2
  - CP-47, 497, CP55,940
Synthetic cannabinoids

- Typically small bags of dried leaves
- Called incense or potpourri, sometimes marketed as “plant food”
- Packets marked as “Not for Human Consumption”
- Effects said to be similar to marijuana
- Smoked in joints or pipes, other methods include drinking tea and snorting
- First report in Europe, possibly as early as 2004
- First report in US was in March 2009
Case study 1

- A 22 year old woman with a history of bipolar disorder and ADHD smoked “K2” for the first time earlier in the day
- She suffered an anxiety attack
- She fell asleep, and awoke with left sided weakness and slurred speech
- CT demonstrated a bleed into the brain (stroke)
- Discharge to rehabilitation with permanent weakness
Case study 2

- 46 year old male
- Seized at home
- In transport to the ED, two more seizures occurred but the patient didn’t wake up.
- In the ED more seizures occurred, without waking.
- The patient had been smoking
- “Blackjack Wild, 1+grams potpourri, legal in all 50 states”
- He responded to treatment and his seizures resolved.
Case study 3

- 11 workers from a unit at a major hospital were brought to the ED.
- Brownies had been brought into work by a colleague, and had been eaten during lunch break.
- 30 – 60 minutes later they began to have memory impairment, inappropriate giggling, lightheadedness, dry mouth, difficulty focusing/blurring of the vision, and sluggishness.
- Two had tachycardia, and 4 had hypertension.
- The brownies had been “doctored” by an employee’s son, the substance was later analytically confirmed.
Case series

- 67 reports of pediatric exposures
  - Mean age was 17 (11 – 19)
  - 66% male
- Symptoms:
  - 28% lethargy
  - 25% anxiety and agitation
  - 21% nausea and vomiting
  - 16% confusion
  - 15% seizures
  - 13% chest pain
  - 9% hallucinations
Synthetic cannabinoids

- Health effects reported
  - Hallucinations
  - Paranoia
  - Psychosis
  - Anxiety
  - High blood pressure
  - Fast heart rate
  - Chest pain
  - Death

- Rare health effects
  - Stroke
  - Air in the chest (pneumomediastinum)
  - Atrial fibrillation
  - Status epilepticus (continuing seizures)
  - Kidney failure
  - Tissue breakdown (rhabdomyolysis)
Why would people do this?

- “It was over the counter, so I thought it was okay.”
- “They said it was cool.”
- “Everyone is doing it.”
- “I can get it at the convenience store, I don’t have to go to dark and scary places.”
- “I can get it over the internet.”
- “It’s not illegal”
- “It’s my business/life!”
6 drugs added to the Florida Controlled Substances List

Additional Substances added to Controlled Substances List

Average= 37 calls/month
Florida cases – cumulative rates
Caution: Utilization of FPICN is low!
Synthetic cathinones and other “designer” drugs

- These may have effects through two types of brain cells - dopamine and serotonin
- MDMA actually causes significant damage to the serotonin nerve cells
Synthetic cathinones

- Multiple names
  - (e.g. Atomic, Blaze, Cloud 9, Dream, Euphoria, Ivory Wave, Lady Bubbles, Moon Dust, Power Surge, Sextasy, Benzo Fury, Blue Silk, Zoom)
- Typically marketed as packets, labeled as bath salts and “Not for human consumption”
Synthetic cathinones

- Compounds are like MDMA “Ecstasy,” and cathinone:
  - 3,4 methylenedioxypyrovalerone (MDPV)
  - 3,4 methylenedioxy-N-methylcathinone (methylone)
  - 4-methylcathinone (mephedrone)
  - 4-methoxymethcathinone (methedrone)
  - 3-fluoromethcathinone
  - Methylethcathinone
  - 4-fluoromethcathinone (flephedrone)
  - Beta-keto N mehtylbenzodioxoylbutanamine (bk-MBDB, butylone)
Synthetic cathinones

- Compounds are structurally similar to khat, and ecstasy (MDMA)
- Used as a “legal” substitute for amphetamine or cocaine
- Most commonly they are snorted,
- Can be ingested and injected
- Study on psychotic symptoms (comparable class of amphetamines – 5.2% in non-dependent users- 100% of severely dependent users.)
Case 1

- A 43 year old man was found dead at the edge of a lake.
- His girlfriend reported that he was “acting weird” so she locked herself in a car, and found him the next morning.
- Earlier in the day, he had injected himself with glass cleaner purchased from a head shop.
- Security video showed him purchasing “hookah cleaner,” which the shop owner stated was MDPV.
- Autopsy showed no alcohol, but MDPV was detected in the blood (160 ng/mL).
Case 2

- EMS responded to the home of a 37 year old man after a neighbor called to report that he was seen naked and screaming.
- He was found not breathing and without a pulse.
- CPR was initiated, and he was taken to the hospital, where he could not be resuscitated.
- Drug paraphenalia was found at the scene. The wife informed the police that because his chronic pain was not relieved by tramadol, he injected himself with “Crystal Clean Hookah & Pipe Cleaner” from a head shop (340 ng/mL).
Case 3

- A 23 year old male with a prior psychiatric history was brought to an ED for bizarre behavior, suicidality and hallucinations.
- His history was of snorting a bath salt.
- Psychotic symptoms resolved with treatment.
- Urine, blood(serum) and the product were tested.
- The white powder had MDPV and flephedrone at nearly equal amounts (143 mcg & 142 mcg/mg)
- Serum  MDPV -  186 ng/mL, flephedrone - 346 ng/mL
- Urine  MDPV - 136 ng/mL, flephedrone – 257 ng/mL
Violent behavior is associated with these drugs

- Adult male shoots out windows of house while aiming at “strangers”
- Adult female, confused and agitated, leaves 2 year old child in middle of highway because child has “demons”
- Adult male jumps out of window to flee from non-existent “pursuers”
- Adult male breaks all windows in house and wanders barefoot through broken glass
Synthetic cathinones

- Health Effects
  - Deaths
  - Delusions and hallucinations
  - Paranoia
  - Psychosis
  - Anxiety
  - High blood pressure
  - Fast heart rate
  - Violence, homicidal and suicidal behaviors
SYNTHETIC CATHINONES BY MONTH 2010-2012

Average = 18 calls per

Additional substances placed on Schedule I - Controlled

Synthetic cathinones placed on Schedule I - Controlled

Emergency Ban
Florida cases – cumulative rates
The substances can still be found
Other “New” Stuff

- Phenylethylamines
  - Like mescaline
    - 2C-x, 2C-T-x (X=B,I,E,D,P), 2C-b-FLY
- Psychedelic amphetamines - Like amphetamine
  - DOB, DOC, DOM, DON, DOI, DOET Bromo-DragonFLY
- Cyclized amphetamines -like MDMA, amphetamine
  - 2-AI, MDAI, MDMAI, 2-AT, MDAT, MDMAT, MMAI
- Ergolines (Like LDS, LSA)
  - PRO-LAD, ETH-LAD
Other “New” Stuff

- Tryptamines – like psilocin, DMT, serotonin
  - 4’ substituted (psilocin)
    - 4-AcO-DMT, 4-AcO-DPT, 4-AcO-DET, 4-AcO-MPT, 4-AcO-DALT, 4-AcO-DIPT, 4-MES-DMT
  - 5’ substituted (psilocin, serotonin)
    - 5-MeO-DMT, 5-MeO-MIPT, 5-MeO-DIPT, 5-MeO-DALT, 5-MeO-MET, 5-MeO-DPT, 5-MeO-AMT, 5-MeO-AET
- Miscellaneous
  - NMT, DET, DPT, DALT, MPT, DIPT, AMT AET
Other “New” Stuff

- Piperazines
  - BZP, MBZP, DBZP, MDBZP, mCPP, PFPP, MeOPP, TFMPP
- Opiates
  - Alpha methyl fentanyl, 3 methyl-fentanyl, para-fluorofentanyl, MPPP, o-desmethyltramadol, 7-acetoxymitragynine
Challenges

• When a patient presents to the hospital, we never really know at that time what someone has been taken – even if we know the name of the product
• Substances are always changing
• Drugs used may or may not be in the product from one batch to the next. - Product names are not useful.
• Drug testing for the substances is not widely available, and not in clinically useful time frames
• We have no “antidotes”
Challenges

- We have a hard time getting a handle on the nature of the substances – what health effects are caused by which substance or mixture of substances.
- While substance use may go down after enforcement, once it is “out there” it can still be found (there is still a little LSD, Ecstacy, etc)
- Drugs of abuse are intertwined with psychoses – the comorbidity is extremely high
- Which is the cause and which is the effect?
If it makes you drool, it ain’t cool

Your brain is your most valuable possession. Some substances cause permanent damage or addiction. Protect your brain by avoiding drug abuse.

Poison Center · free · 24/7 · confidential
Questions?

POISON HELP
1-800-222-1222

florida's poison centers
Children's Medical Services