Ground Rules: Street Drugs — What the Field Needs to Know

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Disclosures

- None
Objectives

- Update on global trends and emerging drugs of abuse
- Review lesser known agents that are currently being abused
Substance Abuse & Mental Health

- 20.2 million adults have a substance abuse disorder
- 7.9 million have both a mental disorder and substance abuse disorder
- Substance abuse may mimic mental health disorders
- "substance-induced mental illness"

Center for Substance Abuse Treatment. Substance Abuse Treatment for Persons With Co-Occurring Disorders

SAMHSA's 2014 National Survey on Drug Use and Health
Classic Drugs of Abuse

- Sympathomimetics
  - Methamphetamine
  - Cocaine
  - PCP
- Opioids
  - Heroin
- Sedative-Hypnotics
- Marijuana
There are few intoxications that cannot be cured by time and an adequate dose of benzodiazepines.
What is Honey Oil?

- Highly Concentrated Tetrahydrocannabinol (THC)
- 2 active chemicals in *Cannabis Sativa* (Marijuana)
  - Cannabidiol (CBD) and DELTA-9 THC
- THC is psychoactive, CBD is not
- Approximate percentages of THC in abused Cannabinoids
  - Weed 5-12%
  - Hash 10-15%
  - Synthetics (K2, Spice) 12-15%*
  - Oil 80-98%
Chart 20. Potency Monitoring Program
Average THC Percent of DEA Submitted Samples
1995 - 2013

Source: Potency Monitoring Program
Chart 21. Potency Monitoring Program
Average THC Percent of all Submitted Hash Oil Samples
1995 - 2013

*recent sample 82%!

*Percentage likely to change as more samples are tested

Source: Potency Monitoring Program, Quarterly Report 124
How do you make it?

DO NOT DO THIS!!
IT IS REALLY DANGEROUS AND STUPID!!
It is also illegal in almost every state including California.
Solvent Extraction
Newer Solvents

- Hexane (established peripheral neurotoxin)
- CO$_2$ (supercritical pressure)
- NOx (various nitric oxides)
Methods Vary

OR
Primary Result
Purging the solvent
Bonus Step: Alcohol Wash

- Removes additional impurities (e.g. chlorophyll, solvents)
- Need high concentration of ethyl alcohol
Wax vs. Shatter
How it is used

STEP 3: Time to heat up your knives. Hold the ends over a gas stove for a few minutes until they are visibly hot. (If you don’t have a gas stove, a blowtorch will work too.)

STEP 4: The smoker should remove one of the knives and position it under the two-liter bottle, ready to smoke.

http://www.weedist.com/2013/09/hot-knives-original-diy-vaporizer/
Newer Methods of Use
Sparse information available currently

1 group of researchers surveyed volunteer users (n = 600) of butane hash oil

Most common reasons users preferred dabs

- Fewer hits to achieve desired effects
- Effects are stronger
- “High” is different

Other reasons

- Faster, more effective for pain relief, give a “cleaner” high, no ash by-products, novelty
- Users perceived flower cannabis as safer than hash oil
- Users experienced an increase in withdrawal and tolerance compared to flower cannabis
- Thus potentially more addicting than flower cannabis

Effects

- Common – anxiety and palpitations
  - May present similar to *sympathomimetic toxidrome*
- Recently reported – *psychosis*
  - 34yoM combat veteran with “profound psychosis” that resolved after HBO cessation
  - 17yoM and a 26yoM with no prior MH history presented with paranoia, disorganized thought process, and delusions of persecution that resolved after cessation of HBO


Effects

Seattle, WA
Walnut Creek, CA
Burns

- Recently published articles from UC Davis’ Division of Burn Surgery
  - 1 year (Sept 2011 – Sept 2012), retrospective descriptive study
    - 8 patients, age 17 – 33, 7 men and 1 woman
    - 16%-96% body surface area (BSA) burns
    - Average ICU stay 114 days
  - 7 year study (January 2007-2014), retrospective study
    - 101 patients, median age 30.5±10.6 years, 93% male
    - 3 deaths
    - Many with significant total body surface area burns


Treatment

- Time and an adequate dose of benzodiazepines
- An antipsychotic may be used for persistent psychosis
- Treat the burns
Summary: BHO

- Not necessarily new as hash oil has been around for many decades
- Increasing popularity even prior to legalization
- New methods of producing more concentrated hash oil
- May induce psychosis or appear like a sympathomimetic
- Many explosions and burn victims
Flakka

- Alpha-pyrrolidinopentiophenone (alpha-PDP, alpha-PVP)

- Also known as “gravel”

- People have described it as looking like “aquarium rocks”
Flakka

- Alpha-PVP is a derivative of methcathinone
- Other derivatives of methcathinone are often referred to as "bath salts"
Cathinones

- False marketing
  - “research chemicals”, “jewelry cleaner”, “stain remover”, “plant food or fertilizer”, “insect repellants”, or “bath salts”
  - “not for human consumption”
Law


- A controlled substance analogue is a substance which is intended for human consumption and is structurally or pharmacologically substantially similar to or is represented as being similar to a Schedule I or Schedule II substance and is not an approved medication in the United States.

UNITED STATES OF AMERICA, Plaintiff, v. DAMON S. FORBES, et. al.,
Defendants.
Criminal Action No. 92-CR-105
UNITED STATES DISTRICT COURT FOR THE DISTRICT OF COLORADO
November 20, 1992, Filed

Alpha-ethyltryptamine (AET)
Dimethyltryptamine (DMT)
Diethyltryptamine (DET)
Category 1 controlled substance
Category 1 controlled substance
March 7, 2014: Temporary Placement of 10 synthetic Cathinones into Schedule I

- 4-MEC
- 4-MePPP
- α-PVP
- Butylone
- Pentedrone
- Pentyline
- 4-FMC
- 3-FMC
- Naphyrone
- α-PBP

“necessary to avoid an imminent hazard to public safety”
Flakka

- Cheap alternative to cocaine and methamphetamines (sympathomimetics)
- NE/DA reuptake inhibitors
- Can be smoked, snorted, vaporized, injected
- Most cases reported in Florida. Also Alabama, Mississippi, New York, and New Jersey.
Flakka

- Effects reported to last 3-4 hours (1 user reported amnesia for 2 days)
- Excited delirium
- Tachycardia
- Hypertension
- Hallucinations
- Runny around naked
- Hyperthermia
Flakka

Treatment
- An adequate dose of benzodiazepines
  - Patients need to sleep for a few hours
- IV fluids
  - Restore volume loss through sweating and maintain GFR
- External cooling as needed
  - Ice water immersion
    - Benefits: rapid cooling, possibly prevent MSOF, DIC, and death

“Anecdotal reports from both street users and law enforcement officers say that flakka is not even available”

“The main force that stemmed the flakka surge was a Chinese ban on the production of alpha-PVP” (due to pressure from US and Europe)
Flakka Summary

- Flakka is probably gone
- A new synthetic cathinone ("bath salt") is sure to take its place.
- Usually cheaper than methamphetamines and cocaine
- Treat it like other sympathomimetics
GHB & GHB Analogs
GHB

- Clear, odorless, water soluble, and tasteless
- Rapid absorption and crosses BBB
- Onset 15-20min with peak effect 30-60min
  - **Rapid resolution**
- 20-30mg/kg: Euphoria, memory loss, and drowsiness
- 40-60mg/kg: Coma

Goldfranks’s Toxicologic Emergencies 9th edition, pages 1151-1154
GHB

- Uses
  - Drug facilitated sexual assault
  - Narcolepsy
    - Xyrem (sodium oxybate)
  - Body building
    - May increase growth hormone by increasing slow wave sleep
  - Party drug
    - Often used with ecstasy, marijuana, cocaine, amphetamines

Butylene Glycol

- Also known as
- 1,4-butanediol
GHB & GHB Analogs

1,4-butanediol $\xrightarrow{\text{ADH}}$ ADH

4-hydroxybutaldehyde $\xrightarrow{\text{ALDH}}$ ALDH

$\beta$-butoyrolactone $\xrightarrow{\text{lactamase}}$ lactamase

GHB $\xrightarrow{\text{ADH}}$ ADH

$\gamma$-hydroxybutanoic acid $\xrightarrow{\text{GABA transaminase}}$ GABA transaminase

$\gamma$-aminobutanoic acid $\xrightarrow{\text{ALDH}}$ ALDH

succinic semialdehyde $\xrightarrow{\text{ALDH}}$ ALDH

GABA

ADH = alcohol dehydrogenase
ALDH = aldehyde dehydrogenase
GHB

- Recalled in November 2007
- Contained 1,4-butanediol
- When ingested, caused seizures and coma in about a dozen children
GHB Addiction

- Dependence tends to occur in individuals that use at regular intervals
  - Does not have to be taken for long period of time
- Withdrawal can be severe
GHB Withdrawal

- GHB withdrawal treatment can be challenging
  - High dose benzodiazepines and barbiturates (GABA_A) protocols
  - Baclofen (GABA_B) (only available PO)
  - Alpha-2 agonists e.g. clonidine and dexmedetomidine
GHB Diagnosis

- Confirmatory testing is difficult
  - GHB has a short T½
  - Endogenous vs exogenous
  - Precursor and by product of GABA synthesis and degradation
- Diagnosis is clinical
Crime Stoppers

- UC Davis Medical Toxicology fellows tip off investigators
Police: Synthetic “Date-Rape Drug” in Roseville Arrest Packaged as Massage Oil

POSTED 11:42 AM, DECEMBER 16, 2014, BY SAM COHEN AND MARIN AUSTIN, UPDATED AT 09:57PM, DECEMBER 16, 2014

Play video

Police Bust Alleged Date Rape Drug Ring

Police say about 42 gallons of a highly potent date rape drug disguised as massage oil was found in a home.
11 months, 6 patients with GHB withdrawal

All obtained GHB from same supplier disguised as massage emollient

Varying degrees of withdrawal

2 ICU, 3 telemetry, and 1 outpatient management

Treated with combination of baclofen and diazepam + clonidine prn

Dexmedetomidine for ICU
GHB Summary

- Analogs are easy to obtain
- Intoxications are difficult to distinguish from other sedative hypnotics
- It’s not all about drug facilitated sexual assault
- Regular use leads to dependence
- Withdrawal symptoms are similar to ethanol/benzodiazepines and difficult to treat
Desomorphine
AKA RUSSIAN MAGIC OR KROKODIL
Background – Opiates vs Opioids

- **Opiates** are naturally occurring
  - Morphine
  - Codeine (metabolized to morphine)
  - Thebaine (can be metabolized to morphine and codeine)

- **Opioids** are synthesized
  - Heroin (3,6-diacetylmorphine)
  - Methadone
  - Fentanyl
  - Many others
Problem #1: High prevalence opioid abuse particularly home made opioids

Problem #2: Heroin is expensive and difficult to obtain.

Fact: Until June 1, 2012, Codeine was readily available in Russia.

Solution: Synthesize a drug using codeine
Desomorphine

- Originally synthesized in 1932 and sold under brand name Permonid in Switzerland
Desomorphine – clandestine synthesis

https://www.erowid.org/chemicals/desomorphine/desomorphine_basics.shtml
Desomorphine – clandestine synthesis

Soluble codeine + = desocodeine – CH3

desomorphine

https://www.erowid.org/chemicals/desomorphine/desomorphine_basics.shtml
Lab Hazards

- Red phosphorus $\rightarrow$ **phosphine** (toxic gas)
  - ALI, death, and explosive
- Gasoline $\rightarrow$ explosive
- NaOH and HCl are caustics
HEROIN vs KROKODIL

ONE DOSE OF HEROIN
= A HIGH FOR 4-6 HOURS

IT TAKES WEEKS EVEN MONTHS TO HARVEST, REFINE AND CONVERT OPIUM INTO HEROIN

WITHDRAWS FOR HEROIN CAN LAST A WEEK

HEROIN ON AVERAGE COSTS $100-$300/GRAM

ONE DOSE OF KROKODIL
= A HIGH FOR 1 HOUR

IT TAKES 1 HOUR TO COOK KROKODIL

WITHDRAWS FOR KROKODIL CAN LAST OVER A MONTH

KROKODIL ON AVERAGE COSTS $10-$30/GRAM

KROKODIL IS 10X STRONGER AND 3X MORE TOXIC THAN HEROIN
WARNING: Graphic Content

The following images and/or content may be disturbing to some viewers. Viewer discretion is strongly advised.
FROM RUSSIA WITH KROKODIL

THE MOST DANGEROUS DRUG
НИЖНИЙ НОВГОРОД.

ПРОИСШЕСТВИЯ

СО СПЕЦСЛУЖБАМИ КИРГИЗИИ.
Soft tissue Effects

- NaOH and HCL are strong caustics
- End product has pH 3
- Unremoved parts of pills containing codeine e.g. ibuprofen, acetaminophen, pill binders, and coatings.
- Bacterial infections


Additional Effects

- Infections
  - HCV, HIV, bacterial

- Social stigma leads to delayed treatment
Krokodil Geographic Distribution

- Russia, Ukraine, Georgia, and Kazakhstan (Former Soviet Union)
- Germany, Czech Republic, France, Belgium, Sweden, and Norway
- 0 confirmed cases in the United States
Krokodil

Summary

- Cheap alternative to heroin made with dangerous, readily available chemicals
- Soft tissue necrosis
- Highly addictive
- Not in the USA...yet
Loperamide

- Anti-diarrheal agent that is over the counter
- Opioid Mu-receptor agonist
- Known as a replacement for people with opioid withdrawal to lessen symptoms
- Now being abused primarily in massive amounts (150-200 tablets per day)
Loperamide

- Biggest life threatening consequences are the cardiac arrhythmias
  - Ventricular Tachycardia
  - Polymorphic Ventricular Tachycardia
  - Prolonged QT/ Torsades

*EKG’s courtesy of David Juurlink, MD, Toxicologist, University of Toronto*
Loperamide

- Manage opioid toxidrome with naloxone
- Determine if current arrhythmia is manifesting Na channel blocking properties or QT prolonging properties
  - NaHCO3, 3% Saline
  - Magnesium, Calcium, Overdrive pacing
  - Can consider traditional anti-arrhythmics, fat emulsion, electricity but limited data
- Recommend optimizing electrolytes including magnesium regardless the presentation

Prescription Opioids
Prescription Opioids

- Drug overdose is the #1 cause of injury related mortality age 35-54
  - #2 cause of injury related mortality age 14-34
- Most commonly involved opioids
  - Methadone
  - Oxycodone
  - Hydrocodone

http://webappa.cdc.gov/cgi-bin/broker.exe
http://www.cdc.gov/drugoverdose/data/overdose.html
Prescription Opioids

Opioid overdoses driving increase in drug overdoses overall

Age-adjusted rate of drug overdose deaths and drug overdose deaths involving opioids, United States, 2000-2014


www.cdc.gov/drugoverdose
Prescription Opioids

Figure 1. Age-adjusted rates for drug-poisoning deaths, by type of drug: United States, 2000–2013

NOTES: The number of drug-poisoning deaths in 2013 was 43,962, the number of drug-poisoning deaths involving opioid analgesics was 16,235, and the number of drug-poisoning deaths involving heroin was 9,257. A small subset of 1,342 deaths involved both opioid analgesics and heroin. Deaths involving both opioid analgesics and heroin are included in both the rate of deaths involving opioid analgesics and the rate of deaths involving heroin. Access data table for Figure 1 at: http://www.cdc.gov/nchs/data/databriefs/db190_table.pdf#1

Counterfeit Norco

Recent “Norco” epidemic
- 18 patients over about 10 days
  - 1 confirmed death
## Counterfeit Norco

<table>
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<tr>
<th>Pill Source</th>
<th>Mass (mg)</th>
<th>Description</th>
<th>Fentanyl</th>
<th>Hydrocodone</th>
<th>Acetaminophen</th>
<th>Promethazine</th>
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</table>
Counterfeit Norco

- Pills were actually Fentanyl
  - 6.90mg = 6900mcg
Questions?
References


References

- Goldfranks’s Toxicologic Emergencies 9th edition, pages 1151-1154
- https://www.erowid.org/chemicals/desomorphine/desomorphine_basics.shtml