

Misused Prescribed and Non-Prescribed Medications in Adolescents and Diversion

- ▶ Child and Adolescent Psychiatry Practical Review
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Scope of the Problem

- ▶ Pharming is the act of misuse at often high doses of both prescription and OTC medications, often in the combination with alcohol
- ▶ Users often refer to themselves as “psychochonauts” who then share their experiences on social media or reddit

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Why These Substances?

- ▶ Accessible-Diverted from family, bought readily in head shops or gas stations
- ▶ Cheap
- ▶ Reward
- ▶ Decreased perception of harm

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Diphenhydramine

- ▶ Antihistamine
- ▶ Sleep aid
- ▶ Supratherapeutic doses may cause paradoxical euphoria and hallucinations

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Scope of the Problem

- ▶ According to the National Surveys on Drug use and Health rates of misuse of both prescribed and OTC medication has risen steadily over the last 10 years
- ▶ Often referred to as “Pharming”

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Diphenhydramine

- ▶ Social Media has driven much of the use... “Benadryl Challenge”
- ▶ Tik Tok Video of high dose ingestion was implicated in many hospitalizations and deaths

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Diphenhydramine

- ▶ Associated with blurred vision, tachycardia, confusion, urinary retention and so on
- ▶ Occasional body heaviness, stabbing abd pain, twitching, restless legs

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Dextromethorphan

- ▶ OTC cough suppressant, that actually has poor data supporting that use.
- ▶ Dissociative, hallucinogenic properties
- ▶ Common drug of abuse in adolescents
- ▶ Poor man's PCP

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Dextromethorphan

- ▶ Found in 140 OTC medications
- ▶ Recent changes in laws have decreased the misuse since about 2015
- ▶ When taken at directed doses is quite safe.

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Dextromethorphan

- ▶ Potential complications are dose dependent
- ▶ At lower doses may cause mild motor and cognitive impairment
- ▶ High doses may cause delusions, paranoia dissociative states

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Dextromethorphan

- ▶ Structurally is an isomer of the opioid Levorphanol
- ▶ Has a marginal affinity to the mu receptor, so is not classified as an opioid
- ▶ The direct metabolite is the cause of the dissociative effects

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Loperamide

- ▶ Has remained OTC due to the general belief, that although a potent opioid structurally similar to fentanyl, it lacks a central mechanism of action, has poor bioavailability and generally does not cross the BB barrier.

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Loperamide

- ▶ Other OTC drugs are used to increase the amount of Loperamide that crosses the BBB
 - 1) Omeprazole
 - 2) Ranitidine decreases metabolism of Loperamide and increases circulating levels

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“Dirty Sprite”

- ▶ Originated in Texas in 1990’s
- ▶ Mixture of Codeine/Promethazine in soda
- ▶ Popular topic of hip hop and rap songs

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Loperamide

- ▶ Doses between 100 and 200 mg are used to improve opioid withdrawal
- ▶ At doses in this range concerns for Qtc prolongation and ventricular arrhythmias should be considered.

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“Dirty Sprite”

- ▶ Many other street names
Lean, Drank, barre, purple stuff
sizzurp, purple drank.

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Promethazine

- ▶ Potentiates opioids like Codeine
- ▶ Usual dosing causes sedation
- ▶ High dose may cause calming effect, euphoria or auditory/visual hallucinations.
- ▶ Enhanced effects with ETOH

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“Dirty Sprite”

- ▶ Can be lethal...numerous hip-hop artists have died from OD
- ▶ Fast acetylators of Codeine convert quickly to Morphine and can precipitate OD

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Gabapentin

- ▶ Roughly 20% is diverted
- ▶ Can be smoked, swallowed, snorted
- ▶ Not uncommon to use 20-30 pills orally at one time
- ▶ Potentiates opioids and meth

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Benzodiazepines

- ▶ If an adolescent admits to Xanax use, and is buying from a “friend” always get a fentanyl screen
- ▶ In my experience over the last 2-3 years it is more likely to be fentanyl than Xanax

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Gabapentin

- ▶ Perception is that it is difficult to OD
- ▶ Effects may include mellow feeling, euphoria, increased relaxation, although “bad trips” have been reported

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Stimulants-Diversion?

- ▶ 59% of physicians suspected at least one of their patients were diverting stimulants
- ▶ 39% of physicians believe it is common

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Benzodiazepines

- ▶ Xanax has been historically the most popular in the adolescent group...for obvious reasons (often referred to as “bars”) Often diverted from parents or grandparents.
- ▶ Xanax is generally not Xanax anymore, at least in my clinic...

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Stimulants-Diversion?

- ▶ In one study, 26% of patients prescribed stimulant medication diverted some of their medication in the last month
- ▶ Poulan 2007

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Stimulants-Diversion?

- ▶ Youth surveys showed that misuse is perceived as common and often peer pressure was one reason for diversion
- ▶ Majority of youth felt diverted stimulants are effective at increasing energy, focus and pleasure...

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Cannabis and other SUD's

- ▶ CUD is associated with higher prevalence of other SUD's across all drug classes
- ▶ Past year CUD odds ratio of co-occurring use

1) Cocaine 9.3	4) Stimulants 4.3
2) Sedatives 5.1	5) Club drugs 16.1
3) Opioids 4.6	

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Cannabis and Nicotine

- ▶ When talking with adolescents understand that it is more common to smoke cigarettes and cannabis (5.4%) than to smoke either substance alone (cigs 3.9%, MJ 2.2%)
- ▶ Please ask!

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Cannabis and Cognition

- ▶ Becker et al. showed decreased white matter in specific areas of the brain. This correlated to diminished verbal learning and memory in users compared to non users
- ▶ Camchong et al. showed similar findings in CUD adolescents (compared to controls) with lower IQ scores and slower cognitive function

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Cannabis and the Gateway Drug Theory

- ▶ Regular or heavy use is CLEARLY associated with increased risk for both misuse and dependence on other illicit substances.
*Neither causality nor directionality have been proven...
- ▶ A 25 year longitudinal study showed a strong association between adolescent use and later drug use, while also showing as cannabis use increased frequency of illicit drug use increased.

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Cannabis and Cognition

- ▶ Regarding long term effect of chronic cannabis use...well there is not much to find
- ▶ Literature on adolescent cannabis use and neurologic functioning is limited and inconclusive.
- ▶ Most researchers believe the structural changes that occur in the brain over time must have significant effects over a life time but again, no data exists.

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Kratom

- ▶ Active ingredient Mitragynine
- ▶ Sold in “Head shops”, gas stations
- ▶ MU receptor agonist
- ▶ Originally obtained in Malaysia from the leaves of 3 related trees

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Tianeptine

- ▶ European anti-depressant originally thought to be similar to an SSRI
- ▶ Seemed unique in that it improved anxiety very quickly, even in first day!

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Kratom

- ▶ Tolerance develops quickly
- ▶ At low doses may improve anxiety, and at higher doses may improve pain
- ▶ Withdrawal is often characterized as “mild” by advocates...but is often quite impressive

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Tianeptine

- ▶ After market research by people outside of the manufacturer showed it was a MU agonist and had strong opioid effects
- ▶ Still used in Europe to a degree and is easily bought on the dark web in US

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Kratom

- ▶ Withdrawal is treated with buprenorphine (Suboxone)
- ▶ Often patients will transition from opioids to Kratom
- ▶ Associated with many OD's and deaths throughout the US

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Tianeptine

- ▶ Recently showed up on gas station shelves as a “supplement” to boost brain function. Commonly known as “gas station heroin”
- ▶ Has many names OTC, Red dawn and so on. Withdrawal can be severe and is treated with buprenorphine.

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Duster's

► Difluoroethane or DFE

The hidden epidemic of dusting spray misuse in rural America

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Where is DFE-containing dusting spray obtained?

- Any hardware store, computer store, Walmart, Target, etc. sells dusting spray
- Almost every American is a short drive from purchasing dusting spray
- Dusting sprays are often found among the household products or in the electronics aisles
- Sometimes dusting spray is found in the "back to school" section or video game section, marketed to adolescents
- Sometimes dusting sprays are kept behind the counter or in the back of the store (e.g. target)

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Products



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What is DFE?

- Dusting sprays are >99.5% pure compressed DFE, released in a jet of gas for as long as a person pulls the can's trigger mechanism
- DFE in a halogenated hydrocarbon which acts as a sedative anesthetic
- DFE could have been a legit anesthetic, but it is too explosive to use in an operating room
- Inhaling DFE is experienced like inhaling laughing gas

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What is dusting spray?

- Keyboard dusting spray is sold as a household cleaning product
- Dusting sprays blow dust away from between the keys of a keyboard
 - It is not really "air" as described below
- Dusting spray can be useful for cleaning sensitive areas such as the threads of a screw or mechanical/electronic components
- Dusting sprays work by releasing compressing a gas from a can, using a button or trigger producing a jet of that gas
- The gas used to be CFCs which destroyed the ozone layer
- In about 2000, the compressed gas was switched to Difluoroethane (DFE) to protect the ozone layer

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Pharmacokinetics/dynamics of DFE

- DFE is absorbed through the lungs (inhalation)
- 70% of absorbed DFE travels to the brain
- It deposits and can build up in fatty tissues such as the brain
- It's primary mode of excretion is also through the lung (exhalation)
- Only a tiny fraction (1%) of DFE is metabolized by the liver and excreted by the kidneys
- DFE is essentially not detectable on toxicology – more on that later

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Inhaled DFE

- DFE is mostly a GABA agonist but has some NMDA antagonism
- Intoxication is that of a sedative – euphoria and giddiness, initial excitability (sometimes rage), quickly followed by relaxation
- Impairment includes amnesia, analgesia, ataxia, dysarthria, sedation and ultimately coma
- Onset of inhaled effects are within 10 seconds. Duration of a single use 5-10 minutes
- Repeated or sustained use can have noticeable effects for up to an hour.

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Things to Consider

- ▶ Weight-up or down
- ▶ Grades-consistent?
- ▶ Injuries-does the story fit?
- ▶ ED visits-sometimes they are a clue
- ▶ Pupils and pulse

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What do we know about DFE use patterns?

- NSDUH estimates that 3 million people use dusting spray per year at least once
- 60% of DFE users use less than 11 days per year
- 22% of DFE users use more than 50 days per year
- Active DFE use at any given time is 0.2% of Americans
- Cost to society
- \$140 million in damages, harms and lost productivity
- \$690 Million in deaths

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Things to Consider

- ▶ Elevated BP in a teen
- ▶ Pupils-always look
- ▶ Urine drug screens are often not helpful
- ▶ History from family might be helpful

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What is the epidemiology of DFE misuse

- Onset of inhalant use precedes all other drugs on average
- Inhalants often initiated by 8th grade!
- Early inhalant use associated with progression to other drugs
- 10-20% of high school seniors have tried inhalants
- DFE among the most common
- Dusting spray use began 20 years ago. Therefore, people in their late 30s and younger have been "exposed" to dusting sprays and may return to it
- 70% DFE users male and 92% <54 years

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Questions?

- ▶ Need more Addiction Education?
- ▶ Stratis Health Addiction and Opioid ECHO Wednesdays at 1215-115
- ▶ Free CME
- ▶ State and National Speakers
- ▶ Email kurt.devine@centracare.com and I will have our coordinator send a link

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