Look Who’s Toxing

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SPEAKER DISCLOSURE: NO CONFLICTS OF INTEREST TO DISCLOSE
Other Disclosures

• I’m not a toxicologist
Learning Objectives

• Describe the clinical presentations of common toxidromes

• Identify key features of uncommon toxic exposures in pediatric patients

• Review nomenclature and definitions of newer adolescent recreational drug behaviors
Toxidrome

- Constellation of signs and symptoms that characterize a particular toxin or category of toxins
- Helps in “unknown” situation to narrow DDx
- Challenging in co-ingestions
Pediatric exposures and poisonings cause significant M&M, yet we’re under trained

National survey of psychiatry residency training programs:

• <5% of training programs have a formal elective

• only 40% had any formalized educational session (didactic, SIM)

As a PCP, why do I need to know toxidromes when I’m just gonna send the kid to the ER?

• You may be the first to recognize the toxidrome

• Vague and non-specific signs or symptoms may be a clue to a toxic exposures

• You may be the first to be called (on call/phone triage) after acute ingestion

• You may be the one who needs to initially stabilize

• Commonly asked/tested on boards and recertification
Reviewed 5 years of PREP....Most commonly tested toxidromes

- Anticholinergic
- Cholinergic
- Opioid
- Sedative/Hypnotic
- Hallucinogen
- Sympathomimetic
Practice Picking Poisons
Which choice is consistent with Sympathomimetic toxidrome (i.e. amphetamines, cocaine)

<table>
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<tr>
<th>CHOICE</th>
<th>Pupils</th>
<th>Temperature</th>
<th>Skin</th>
<th>HR</th>
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<tr>
<td>1</td>
<td>Miosis</td>
<td>Elevated</td>
<td>Dry</td>
<td>Decreased</td>
</tr>
<tr>
<td>2</td>
<td>Mydriasis</td>
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<td>Diaphoretic</td>
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<td>Elevated</td>
<td>Dry</td>
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Sympathomimetic

mydriasis

hyperthermia

diaphoresis

agitation
Which aspect of the physical examination can best distinguish toxicity from an anticholinergic agent from that of a sympathomimetic agent?

A. Skin
B. Heart rate
C. Pupils
D. Temperature
## Anticholinergic vs. Sympathomimetic toxidrome

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American Association of Poison Control Centers (AAPCC)

Calls to the US National Poison Data System 2016: (2,159,032)

60% children <18yo

1,295,420
Younger kids have more exposures

75%
Kids get into stuff that we more frequently use

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<td>Cleaning Substances</td>
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<td>Analgesics</td>
<td>96,312</td>
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<td>Pesticides</td>
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<tr>
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<tr>
<td>Plants</td>
<td>28,636</td>
<td>2.7</td>
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</table>
A case of a drooly girl

- 3 year old girl presents with altered mental status.
- Seems confused, sweaty and sleepy per parents.
- Parents say she is potty trained but was found to be incontinent of urine and stool.
- Other symptoms include vomiting x 2 and drooling.
- On presentation vitals significant for normothermia, tachycardia.
- Physical exam: miosis
A look at what’s in the house
What is the culprit?

A. 

B. 

C. 

D.
Nicotine can kill

Average 2 year old only has to ingest 10mg (1mg/kg) for it to be lethal

Average liquid nicotine concentration = 15mg/mL

1mL can be lethal

Average refill bottle of e-cig liquid is 30mL = 450mg nicotine

50x the lethal dose
E-cig nicotine exposure on rise in kids <6yo
miosis
sweating
lacrimation
salivation
A young girl with hypertension

• 3 year old girl presents with intermittent abdominal pain, diaphoresis, tachycardia.

• 4 days prior to presentation she developed pain in her hands and feet

• In office: BP 158/100

• Normal neurologic exam, but irritable
Hands and Feet
This kid has been exposed to:

A. A pain medication
B. An element
C. An antibiotic
D. A household cleaning product
E. Sibling’s ADHD medication
Urine Mercury Level = 108 mcg (0-20)
Mercury poisoning

• In children → acrodynia (pink’s disease): Skin becomes pink and peels
  • Desquamation can be mistaken for GAS infection or Kawasaki Disease

• Peripheral neuropathy → pain in hands/feet or sometimes formication

• Mercury disrupts catecholamine degradation → HTN and tachycardia
  • May mimic pheo
A case of Mercury Poisoning from the Ocean State

Must be from fish, right??

A case of Mercury Poisoning from the Ocean State

• Required Rhode Island DOH investigation

• Previous tenant used elemental mercury in cultural and religious practices

• Obtained at a community botanica

A case of a fast breather

• 2 year old presents with vomiting, agitation and ‘fast breathing’

• Exam/vitals: T: 101F, RR: 70, normal pupils, clear lungs

• On workup found to have anion gap metabolic acidosis and overcompensated respiratory alkalosis. Blood glucose 50.
Who’s item did the 2 year old get into?

A. Sister has been using nail polish remover

B. Grandfather is on an over-the-counter daily medicine for ‘heart protection’

C. Grandmother is on an oral diabetes medicine

D. Father appreciates aromatherapy and uses air fresheners and essential oil diffusers
Essential oil of wintergreen toxicity

• AKA: Methyl salicylate

• Toxicity same as aspirin (ACETYL salicylate)

15mL = 21g salicylate

250 ‘baby aspirin’ (81mg) tabs
Diffusers and essential oils are increasingly popular.
Obligatory Cartoon

Hey, look! I didn't ask to be drawn!
Drug use is common in Teens

In the past 12 months...

- 8th Grade: 38%
- 10th Grade: 27%
- 12th Grade: 12%

Of calls to poison control, older kids have more serious exposures.
What are high school seniors abusing?

- Marijuana: 36.4%
- Illicit drugs: 25.3%
- Prescription or OTC drugs: 14.9%
- Salvia: 3.4%
- MDMA (Ecstasy): 4.0%
- Hallucinogens: 4.5%
- Tranquilizers: 4.6%
- Sedatives: 4.8%
- Cough Medicine: 5.0%
- Prescription Painkillers*: 7.1%
- Synthetic Marijuana: 7.9%
- Amphetamines*: 8.7%

Monitoring the Future National Results on Adolescent Drug Use: Summary of Key Findings, 2013
Anticholinergic

- mydriasis
- flushed
- dry
- delirious
A case of chest pain

• 15 yo girl presents with chest pain, tachycardia, diaphoresis.

• On exam, she is nervous, pupils are normal

• She has recently been having nose bleeds

• She has an eczematoid dermatitis in the perioral area
What next step in workup is most likely to explain her chest pain?

A. Urine tox screen

B. CXR

C. EKG

D. Troponin level
Huffing

• Inhaling volatile liquid substances from a saturated cloth that is held under the nose or near the mouth

• Most frequently used inhalants include:
  • glue, shoe polish
  • gasoline or lighter fluid
  • nitrous oxide or "whippets”
  • spray paint

• Produces euphoria, intoxication, lightheadedness (lasts 15-30min)
“Glue Sniffer’s Rash”

• eczematoid dermatitis with erythema, inflammatory changes, and pruritus that occurs in the perioral area and extends to the midface.

• caused by the drying effects of hydrocarbons

• Seen with “bagging” too
Symptoms of inhalant abuse and cocaine are similar

Both have been associated with spontaneous pneumomediastinum

Subcutaneous emphysema and pneumomediastinum following cocaine inhalation: a case report
A case of a depressed teen

• 17 yo female with increasing depressed mood

• She has been isolating herself more and moved into the family’s basement apartment from which she has been more easily sneaking out of the house

• Parents smell marijuana occasionally on her clothes and coming from the basement

• Started on sertraline 50mg daily 3 weeks ago by her PMD
Case continued..

• Earlier in the week starts complaining of daily headaches. Mom thinks she’s been taking some OTC pain medications.

• Later in the week started having intermittent non-bloody, non-bilious vomiting. Parents thought it may be related to GI illness going around at school.

• One morning, patient later coming up from basement. Parent found patient more confused, ataxic and vomiting.
What is your initial thought of her symptoms?

A. Related to marijuana
B. Related to the sertraline
C. Related to something that interacts with sertraline
D. Related to an over-the-counter medication
E. Related to opioid use
F. Related to an environmental exposure
G. Related to something she drank
More information...

- Dysarthric
- Dizzy
- Tachycardic
- Normothermic
- Normal pupils
- Normal DTRs
What next step is most likely to give the final Dx.

A. Order Ethanol level
B. Order Urine tox
C. Order CPK
D. Order Tylenol levels
E. Order LFTs
F. Perform co-oximetry
G. Order BUN/creatinine
H. Nothing, since synthetic marijuana is not positive on normal urine tox
Carbon Monoxide poisoning - A great mimicker

The earliest symptoms (especially from low level exposures) = non-specific

Often confused with viral syndromes

DDx: also includes depression, opioid abuse, alcohol intoxication, DKA

Hint: even the family pets are sick!
More recently described cause of CO poisoning

Carbon Monoxide Poisoning from Hookah: An Emerging Public Health Problem

Produces high levels of ambient CO far above levels seen with other combustible smoking methods primarily because charcoal is the heat source.
Hookah

Has been around for centuries, but has been increasingly popular in the last decade with emergence of hookah lounges throughout the US

2015 National Youth Tobacco Survey

• 7.2% of high school students smoke hookah within the past 30 days
Opioid

depressed mental status

decreased temp
- hands in pocket

miosis
Recreational drug use in the digital age

Increased access to the internet

Instant sharing and discussion via mobile devices
Learning about/seeing drug use and behaviors is just a click away
Teens are talking to each other about drugs

1 in 10 of messages

- Instant/text messaging, message boards, social forums, other social media sites

Top 2 questions:

- How to take illicit drugs “safely”
- How to take and not get caught
Teens want to know how to get high ‘legally’
“Legal highs”

• Substances that are readily available, easy to obtain, and mostly over-the-counter

• Novel psychoactive compounds made in labs

• Marketed creatively and continuously re-designed to stay ahead of legislative regulations

• Difficult to diagnose since not detected by traditional urine tox screening
Synthetic Cannabinoids

What: heterogenous and continually changing group of chemicals

• AKA: synthetic marijuana, K2, Spice, Kush, Yucatan Fire, Geenie, Solar Flare
• Liquid spread on plant material and smoked, or vaporized
• Many have been added to Schedule 1, but manufactures constantly designing new analogs

How acts: agonists of the cannabinoid receptor, like THC

High produced:
• Similar to marijuana, psychomotor slowing
• Lasts about 8hrs
Synthetic Cannabinoids

• Marketed as ‘incense’ or ‘potpourri’

• Maintain legality with label ‘not for human consumption’

• More potent direct cannabinoid receptor agonist than THC
  • More likely than marijuana to produce over-toxicity.
  • Cases of excited delirium, and cases of new onset refractory status epilepticus
Kratom

What: M. speciose, leafy plant indigenous to SE Asia
- AKA: Thang, Thom
- Contains psychoactive alkaloids
- Chew leaves, make tea
- Traditional use for analgesia, has been used to treat opiate withdrawal

How acts: acts as mu-opioid receptor agonist and stimulant

High produced: increased energy, euphoria
- Stimulant at low doses
- Opioid-like at higher doses
Kratom

• Available by mail or in smoke shops as “tea” and “supplement”

• Remains legal since DEA unable to get it listed as Sch.1

• Lots of GI side effects in acute intoxication
  • Can develop withdrawal symptoms similar to opiate withdrawal
Salvia

What: Salvia divinorum, leafy plant (mint family) native to Oaxaca, MX

• AKA: Diviner’s sage, sage of seers
• Traditionally used in rituals/spiritual healing practices
• Dried leaves
• Sublingual, or smoked

How acts: active compound salvinorin A acts as kappa-opioid receptor agonist and stimulant

High produced: transient hallucinogen

• Similar to LSD
• Rapid onset (w/in 30 sec), short duration (10min)
Salvia

• Available as “incense” and “supplement”

• Illegal in certain states (red), legal in others (green), legal with age restrictions (yellow)

• Can produce altered mental status. Very few reports of severe toxic effects
  • Often co-ingested with other substances
**Legal highs mimic classic toxidromes**

<table>
<thead>
<tr>
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<th>Opioid</th>
<th>Sympathomimetic</th>
<th>Dissociative / Hallucinogenic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diphenhydramine</td>
<td><strong>Kratom</strong></td>
<td>Bromo DragonFLY</td>
<td><strong>Salvia</strong></td>
</tr>
<tr>
<td>Nutmeg</td>
<td>Poppy seed tea</td>
<td>Synthetic cathinones</td>
<td>Dextromethorphan</td>
</tr>
<tr>
<td></td>
<td></td>
<td>‘bath salts’</td>
<td></td>
</tr>
<tr>
<td>Amanita muscaria</td>
<td>Loperamide</td>
<td></td>
<td></td>
</tr>
<tr>
<td>mushroom</td>
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</table>
Say what?

Slang is often used to mask/hide behaviors
“Robotripping”

A. Getting high on codeine

B. Getting so high your movements are ‘robot-like’

C. Getting high on rohypnol

D. Getting high on dextromethorphan

E. Getting high on Benadryl
Dextromethorphan

- Produces a hallucinogenic and dissociative high
- Dangers of ‘multiple symptom’ med combinations
  - Acetaminophen → hepatoxicity
- Anticholinergic toxidrome
“Dripping”

A. Inhaling heated and vaporized e-cigarette liquid

B. Getting high on liquid THC

C. Putting liquid LSD under tongue

D. Getting high on ecstasy

E. Putting alcohol on conjunctiva for faster absorption
E-Cigarettes and “Dripping” Among High-School Youth

Suchitra Krishnan-Sarin, PhD, Meghan Morean, PhD, Grace Kong, PhD, Krysten W. Bold, PhD, Deepa R. Camenga, MD, Dana A. Cavallo, PhD, Patricia Simon, PhD, Ran Wu, MS
Why drip?
- Increased flavor
- ‘Cloud chasing’
Dripping Dangers

“Direct Dripping”: A High-Temperature, High-Formaldehyde Emission Electronic Cigarette Use Method

Soha Talih, Zainab Balhas, Rola Salman, Nareg Karaoghlanian, Alan Shihadeh

Nicotine & Tobacco Research, Volume 18, Issue 4, 1 April 2016, Pages 453–459,
“Skittling”

A. Combining energy drink with Adderall

B. Taking a red cough medicine

C. Combining fruit punch, hard candy and Percocet

D. Sampling random pills from a baggie at a party (‘like candy’)
B.

“Triple C”
“Juuling”

A. Getting a piercing while high

B. Ingesting solidified e-cig liquid into a Nicotine ‘candy’

C. Using a certain E-cigarette device

D. Hiding illicit substances in wearable jewelry
Teenagers Embrace JUUL, Saying It’s Discreet Enough To Vape In Class

December 4, 2017 · 11:58 AM ET

ANGUS CHEN
We need to change our screening and anticipatory guidance vocabulary

Me: ‘Do you smoke cigarettes?’
• Patient: ‘No’
Me: ‘Do you smoke e-cigarettes?’
• Patient: ‘No’
Me: ‘Do you vape?’
• Patient: ‘No’
Me: ‘Do you Juul?’
• Patient: ‘Yes’
“I don’t vape ...... I Juul”
E-cigarette use leads to future traditional cigarette use

“You will never know everything, but you don’t want your [patients] to think you are an idiot”

- Janice Styer
MSW clinical coordinator-addictions counselor
Caron Treatment Center
Thank you!
Final Questions
Which statement about poison control reported exposures in kids is TRUE:

A. Teens have fewer exposures than younger children and they are more likely to have no effect or be minimally toxic.

B. Kids younger than 6 have more exposures than older age groups, but they are more likely to have no effect or be minimally toxic.

C. Teens have more exposures than younger children and they tend to more moderate/seriously toxic.

D. Kids younger than 6 have fewer exposures than older age groups but they tend to more moderate/seriously toxic.
Nicotine toxicity has symptomatology similar to:

A. Anticholinergic toxidrome

B. Sympathomimetic toxidrome

C. Cholinergic toxidrome

D. Opioid toxidrome
Which substance below is NOT an example of a legal high?

A. Dextromethorphan

B. Kratom

C. Juul

D. Diphenhydramine
References


• CDC, MMWR, October 21, 2016 / 65(41);1148–1149

• https://www.poison.org/poison-statistics-national


• Monitoring the Future National Results on Adolescent Drug Use: Summary of Key Findings, 2013


• www.caron.org

