Poisoning and Overdose: Interesting Illinois Cases

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Conflict of Interest

I have no conflicts of interest to report

Objectives

• Describe poisoning/overdose cases managed by the Illinois Poison Center.
• Explain the importance of stocking antidotes and their conjunctive therapies in a health system pharmacy.
• Discuss the current challenges and treatment methods in toxicology.
• Identify potential pitfalls in managing the poisoned patient.

IPC Overview

• The Illinois Poison Center is dedicated to reducing the incidence and injury of poisoning in our communities through immediate expert telephone recommendations, innovative public and health care professional education and focused research.
• All calls managed by Healthcare Professionals specially trained in toxicology
• 81,803 Cases in 2012
• 73,998 Exposures in 2012
  – 28.7% from Health Care Providers
• 1-800-222-1222; 24/7/365

Case #1

The snake enthusiast

18:30 30 y/o male presents to ED with snakebite to tip of right thumb. C/o nausea and vomiting X 1, pain at bite site.

• Patient states the snake is his pet—a ‘baby’ Gaboon Viper (*Bitis gabonica*)
  – Native to Africa
• PMH: none  NKDA  No meds
• VSS
• PE: One bite mark on R thumb with bluish discoloration of ~5mm around bite area. Some swelling and pain.
**Gaboon Viper (Bitis gabonica)**
- Viperidae, subfamily Viperinae
  - Viperidae, subfamily Crotalinae are native to the US (Rattlesnakes, Copperhead; Crofab®)
- Effects of envenomation
  - Tissue necrosis
  - Hypovolemia/hypotension
  - Coagulopathy
- Antidote = antivenom

**Antivenom??**
- Not stocked in IL hospitals
- IPC contacted Brookfield Zoo Reptile House
  - 6 vials of SAIMR antivenom
  - Transported by Illinois State Trooper to ED
  - Additional antidote procured from Milwaukee zoo
- SAIMR
  - Polyvalent
  - Equine origin
  - Dose = up to 8-10 vials

**Question 1**
- What adverse effects should you anticipate when administering a polyvalent immunoglobulin of equine origin?

**Meanwhile...**
- IPC contacts Chicago animal control, as snake is a public health hazard
- Chicago Animal Control and Brookfield Zoo Herpetologist head to patient’s house to confiscate snake
- IPC recommendations, “CAUTION: Do not get bit. No more antivenom in midwest.”
- Herpetologist positively ID’s snake as Gaboon Viper

**Case continued...**
- **21:00** Antivenom infusing with methylprednisolone, epinephrine and diphenhydramine at bedside. Patient doing well.
  - WBC: 8.9, Hbg: 18, Hct: 50, plt: 200. Other labs wnl
- **2300** 5 vials infused. Pt developed mild chills, but remained hemodynamically stable
- **0900 Day 2** Pt doing well, VSS, labs all wnl, wound shows no deterioration. Pt walking out door AMA.

**Case #1 Take Away**
- IPC can help you in procuring antidote!
- Relationships with other HCFs, Zoos, etc.
- Agreement with the Illinois State Police for antidote transport within the state.
- For IPC’s recommendation on hospital pharmacy antidote stocking, visit [www.illinoispoisoncenter.org](http://www.illinoispoisoncenter.org)
  - Click on ‘Information for Healthcare Providers” and then ‘IPC’s antidote stocking chart’
Case #2

Cloud Nine

**07:00** 19 y/o male reports smoking “Cloud Nine” the previous night at 2300. Experiencing anxiety, visual and auditory hallucinations.

- **PMH:** none
- **VS:** 155/87 148 28 98.4 100%RA
- **EKG:** sinus tach 120, QRS 90, QTc 461
- **EtOH:** neg Trop neg
- **CPK:** 2,420
- **BMP:** 133/3.7/96/18/1.2/108
- **AST:** 66  **ALT:** 46
- **Assessment:** synthetic/designer drug abuse

### Synthetic Drugs

- Controlled Substances Act
  - Derivative/Analog
- Technically legal as long as it is *not intended for human consumption*
- Street knowledge is that they are ‘legal highs’ and intended to be smoked or snorted
- Sold at reputable stores, easy to purchase
- False sense of security that they are safe because they are legal
- Two types that currently dominate US market: THC homologs (synthetic marijuana) and cathinones, AKA ‘Bath Salts’ (stimulants; can mimic cocaine, ecstasy or methamphetamines)

### THC Homologs

- Many THC analogs developed since 1960s for medical research purposes
- These are purchased from overseas, mixed with a diluent and sprayed on herbal leaves
- Brand names: K2, Spice, Purple Haze, Kryptonite, Potpourri Silver, Happy Hour, Wicked XXX, Purple Magic, Klimax, Mr Happy, Bliss, Cloud Nine, Mad Hatter, many others

**Source:** Illinois Attorney General’s Office, used with permission

### THC Homologs: Clinical Effects

- Binding to cannabinoid receptor can vary
- Activation of NMDA receptor
- Anxiety, agitation, paranoia, delusions, psychosis, suicidal ideation
- Tachycardia, HTN, chest pain, SOB, diaphoresis, tremor, seizures
- No antidote; s/s care
Cathinones

- Parent compound: Khat plant
- Native to the Middle East and East Africa
- Methcathinone (1928)
- Brand Names: Tranquility, Serenity, Eight Ballz, Ivory Wave, Charlie Sheen, Cloud Nine, White Lightening, Plant Food

Cathinones

- Mechanism of Toxic Action: Inhibit reuptake of dopamine and serotonin

Question 2

- Given the mechanism of toxic action for cathinones (and that they are said to mimic stimulants like ecstasy, cocaine and amphetamines), what symptomatology would you expect in a patient experiencing toxicity from this substance?

Cathinones, cont.

- Deaths reported
- No antidote, s/s care

IPC Experience

- Began seeing calls in 2010
- Peak in summer/early fall of 2011
  - Call volume 33% above the national PCC average for THC
  - Call volume about average the national PCC average for cathinones
- 85% were <30 y/o
- More than half of calls came from health care providers regarding patients in a HCF

Source: Illinois Attorney General's Office, used with permission
Operation Smoked Out
• 20 compounds added to the state’s schedule I controlled substance list
  – Market adapts quickly!
• Partnership between IPC, Attorney General’s office, and local law enforcement
  – IPC provided brand name of the product, store where purchased and clinical effects
  – Undercover buys
  – Laboratory testing
  – Meetings with retail business owners

Operation Smoked Out: Outcome
• >80 retail stores have voluntarily relinquished inventory of synthetic drugs worth over $500,000
• Calls to IPC have dropped from a high of nearly 100/month to <5/month

Case #2 continued

Case, cont.
• **Day 2** Agitated, on lorazepam drip. CPK: 37,934; AST 286 ALT: 57. On IVF with bicarb.
  VS: 119/74 103 20s 99.3 99%RA
• **Day 3** No complaints, lorazepam d/c’d, CPK: 15,225; AST 188 ALT 57

Case #3
Phat Antidote
• Patient ingested ~20 tablets bupropion extended release and unk # of diphenhydramine at 18:45.
• Presented to ED at 20:15, had single seizure, treated with 2mg lorazepam.
• Intubated for airway protection, had 3 more self-limiting seizures.
• Cardiac arrest at 20:31 with ROSC after 17 minutes.
• Call to IPC at 2100

• PMH: Depression
• Meds: Wellbutrin XL
• VS: 90/50 on 6mcg norepi, HR 84, RR 12 99% on vent
• PE: unresponsive on vent, midazolam 2mg/hr
• EKG: QRS initially 156, 106 after bicarb; QTc 470
• ABG: 7.15/54/109/24.3
• Chem: 153/3/110/19/12/1.3/131
• AST: 34 ALT: 33
• ASA/APAP: neg

• Wellbutrin
  – Reuptake inhibitor of dopamine, norepinephrine and serotonin
  – Toxic effects: agitation, seizures, prolonged QTc/QRS, ventricular dysrhythmias
• Diphenhydramine
  – H-1 antagonist with strong anticholinergic properties
    • Blind as a bat, mad as a hatter, red as a beet, hot as a hare, dry as a bone, the bowel and bladder lose their tone, and the heart runs alone.
  – Toxic effects: lethargy, confusion, agitation, tremors, hallucinations, seizures, coma, ventricular arrhythmias, widened QRS, prolonged QTc

• IPC Plan: Given severity of toxicity, administer intravenous lipid emulsion.

Intravenous Lipid Emulsion (ILE)
• FDA approved as calorie source for TPN
• Also used for antidotal therapy in the setting of severe cardiac toxicity of lipid-soluble drugs
  – Lipid resuscitation therapy (LRT)
ILE as an antidote: Mechanism of Action

- Lipid Sink
- Energy source for the heart
- Activating calcium channel current in the heart
- Interference with the toxin binding to sodium channels

ILE: dosing and administration

- Bolus: 20% solution, 1.5 mL/Kg over 1 minute –100 ml for a 70kg person
- Follow with continuous infusion of 0.25ml/kg/min for 30 min
- Bolus may be repeated in 3-5 minutes if no improvement
- May increase the infusion up to 0.5 mL/kg/min if blood pressure declines.

ILE: Cautions and Contraindications

Risks?
- Pulmonary Injury
- Fat Overload Syndrome
- Interaction with other antidotes?

Contraindications
- Allergy: egg, soybean
- Fat metabolism disorder, liver disease

Case, cont.

- Patient administered lipids overnight.
- No further seizures or cardiac events.
- Norepi d/c’d Day 2
- Following commands by Day 4
- Discharged Day 5

Case #4

Fugu

- 47 year old female ate soup containing a puffer fish at 20:00 (purchased at local market).
- Approx 2 hours post ingestion, pt developed N/V, LE weakness and perioral paresthesias.
  Presented to ED at 02:30
- PMH/Meds: none
- VS: 97.7 102 131/76 20 98% on RA
- PE: AOx3, neuro: 3/5 bilateral lower ext; 4/5 bilateral upper ext. Difficulty holding head up.
- BMP: 141/3.6/106/24/27/0.5/123 9.3, CBC wnl
Puffer Fish
• Blow fish, Fugu, blue‐ringed octopus, newts
• Tetrodotoxin (TTX)
  – MOA: Sodium channel blockade
  – Clinical effects
    • HA, vomiting, paresthesias, weakness, muscle twitching/fasciculations
    • Bradycardia, respiratory paralysis, hypotension, flaccid paralysis (6‐24 hours post ingestion)
  – No Antidote; s/s care

Public Health Threat
• Illinois Department of Public Health (IDPH) and Chicago Department of Public Health (CDPH) notified.
• Soup sample obtained for testing
• Fish confiscated from market
  – Cartons said ‘Monkfish’ in English
  – On inner packages, in Korean, said ‘Puffer Fish’
  – ~250 boxes of fish removed
• Test results later showed high levels of TTX in soup and fish from market

Case, cont.
• 09:30 Pt admitted to ICU. VSS, V continues, perioral paresthesias and weakness improving
• Day 2 VSS, V resolved, mild HA, diffuse paresthesias improving, weakness improving (L side stronger than R)
• Day 3 VSS, HA still present, pt reports ‘pins and needles’ sensation in legs, also with “shaking” of LE when standing. Weakness mildly improved (again L>R)
• Day 4 VSS, weakness stable, can ambulate to commode with assistance
• Day 5 Weakness continuing to improve but still present, esp in L leg.
• Day 6 On medicine floor, weakness stable
• Day 7 Weakness stable, PT to begin today
• Day 8 Weakness slowly improving, to be transferred to rehab facility for PT

Take‐Aways
• IPC is a resource for you and your patients!
• IPC serves the public health in IL
  – Can serve as the “canary in the coal mine”
  – Relationships

Question 3
• An 18 year old male presents with an intentional ingestion of metoprolol 25mg #180. He is unresponsive, hypotensive, bradycardic. Insufficient response to glucagon, pressors. What antidote would you recommend?

Question 4
• A 56 year old female presents to the emergency room several hours after ingesting a fish entrée at a new, authentic Caribbean restaurant on it’s opening night. She complains of nausea, vomiting, paresthesias and that when she drinks cool water, it feels hot. What is your first course of action?
Questions?

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