Intoxications in the ED

P Halpern, MD
Chair, Emergency Department
Tel Aviv Surasky Medical Center
Intoxications

- Intoxications are a major cause of severe morbidity and mortality in the ED
- Fulfill definition of “important event” in EM:
  - Potentially lethal;
  - Usually treatable.
- Mortality in a modern ED is very low, provided basic principles of care are followed.
Coca Wine was one of a huge variety of wines with cocaine on the market.

Bayer's 'Heroin' 1890-1910 sold to treat children suffering with a strong cough.

Cocaine tablets: singers, teachers and preachers had to have them for maximum performance.
Rate of unintentional drug overdose death in the US, 1970-2006, (CDC)
In 1999, the number of unintentional poisoning deaths was 279; in 2008, the number of deaths was 1,016.
For first time, in 2007 unintentional drug poisoning exceeds MV traffic and suicide as the overall leading cause of injury death in Ohio.
Epidemiology is very local, so caregivers must often treat based on a thorough knowledge of their own epidemiology;

Main symptom is altered level of consciousness;

Often diagnosis is provided by patient;

Sometimes, patient tries to mislead caregivers.
Altered LOC: **Reversible** conditions rapidly leading to irreversible CNS damage

- **A, B:** Hypoxia
- **C:** Ischemia
- **D:** Epilepsy, Increased ICP
- **D:** Hypoglycemia (dextrostix)
- Hyperthermia
- Trauma
- Infection
Suicide attempts - 216 (74%)

Accidental poisonings 58 (20%)

Recreational 17 (6%)
Comparison of severity of intoxication by intent

- **None**: 124
  - Suicides: 58
  - Adverse drug effects: 12
  - Accidental poisonings: 22
  - Recreational: 4

- **Mild**: 60
  - Suicides: 23
  - Adverse drug effects: 59
  - Accidental poisonings: 7
  - Recreational: 4

- **Moderate**: 40
  - Suicides: 12
  - Adverse drug effects: 10
  - Accidental poisonings: 2
  - Recreational: 1

- **Severe**: 1
  - Suicides: 4
  - Adverse drug effects: 6
  - Accidental poisonings: 5
  - Recreational: 0
The Top Poisonings

**Exposures**
1. Drugs of suicide
2. Drugs of abuse
3. Alcohol
4. Cleaning Products
5. Analgesics
6. Plants
7. Bites
8. Chemicals

**Deaths**
1. Drugs of abuse
2. Antidepressants
3. Analgesics
4. Cardiovascular drugs
5. Alcohol
6. Fumes
7. Chemicals
8. Asthma Medications
9. Cleaning Products
<table>
<thead>
<tr>
<th>Substance</th>
<th>Deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cocaine, heroin, methamphetamines</td>
<td>989</td>
</tr>
<tr>
<td>Legal opioids (Vicodin, OxyContin)</td>
<td>2,328</td>
</tr>
<tr>
<td>Benzodiazepines</td>
<td>743</td>
</tr>
<tr>
<td>Alcohol</td>
<td>466</td>
</tr>
<tr>
<td>Cocaine</td>
<td>843</td>
</tr>
<tr>
<td>Methamphetamine</td>
<td>25</td>
</tr>
<tr>
<td>Marijuana</td>
<td>0</td>
</tr>
</tbody>
</table>
Principles of Care of Intoxications

- Suspect
- ABCD (including dextrostix)
- Make a group diagnosis
- R/O associated conditions (e.g. trauma, rhabdomyolysis, hyperthermia)
- History (remember suicide pts may mislead)
- Determine if there is an antidote/antagonist
- Supportive care
Diagnosis

- Diagnosis of both illicit drug use and attempted suicide is complicated by inability or reluctance of the patient to disclose their use.
- The signs and symptoms of many drugs may be non-specific (e.g. restlessness and tachycardia).
- Many pts take more than one drug, making the clinical picture confusing.
Priorities of Care

- Control and maintain ABC’s
- Make group (toxidrome) diagnosis
- Prevent absorption
- Enhance elimination
- Administer antagonists/antidotes
- Provide support
Potential interventions

- **Limit drug absorption**: Vomiting; Gastric drainage; Gastric lavage; In-gut chelation
- **Systemic chelation** (e.g. snake antiserum, digoxin Fab)
- **Systemic detoxification** (e.g. nitrates and thiosulfate)
- **Antidotes** (e.g. N-acetyl cysteine)
- **Antagonists** (e.g. naloxone, flumazenil)
- **Enhanced excretion** (e.g. dialysis, rarely diuresis)
- **Supportive care**
NGT and gastric lavage

- **Indications:**
  - Large quantity or very toxic drug
  - Taken < 1 hr ago (or very slow gastric emptying suspected)

- **Contraindications:**
  - Airway not secure (i.e. unconscious)
  - Never as an “educational tool”
  - Coumadin
  - Pt refusal
Whole Bowel Irrigation

- PEG (Polyethylene glycol) solution
- Dosing
  - children: 10 ml/kg/hr increased to 25 ml/kg/hr (max of 500 ml/hr)
  - adults: 500 ml/hr increased to 2 L/hr
- Administer via NG tube
- Endpoint is clear rectal effluent
Indications

- Iron, lithium ingestion
- Concretions
- Sustained release products
**Antagonists and Antidotes**

- **Antagonists**: bind to same receptor as agonist, displace it, are inert; Examples: naloxone, flumazenil, atropine

- **Antidotes**: reverse negative effects of poison via binding of poison, inhibition of toxic mechanism etc.
Antidotes in intoxications

- **Paracetamol**: N-acetylcysteine,
- **Methanol and ethylene glycol**: ethanol, fomepizole,
- **Tricyclics**: physostigmine, sodium bicarbonate,
- **Sulfonylurea (metformin)**: octreotide,
- **Isoniazid**: pyridoxine,
- **Cyanide**: antidote kit,
- **Digoxin**: digoxin immune Fab,
- **Beta blockers**: glucagon,
- **Calcium channel blockers**: calcium gluconate,
- **Iron**: deferoxamine,
- **Coumadin**: Vit K (phytonadione),
- **Botulinum toxin**: botulism antitoxin,
- **Methemoglobinemia**: methylene blue,
- **Snakes, scorpions, stone fish**: antivenom
Charcoal

- Large ionically active surface area supposedly binds toxins in GI.
- Debatable utility.
- None in iron, lithium, alcohol, corrosives.
- If <24 hrs, consider, unless contraindicated.
- Multiple doses may be indicated.
- May be given PO.
TOXIDROME

A pattern of signs and symptoms
that suggests a specific
class of poisoning
Examples of toxidromes

- Coma, bradypnea, miosis, diaphoresis.
- Coma, tachypnea, mydriasis, warm flushed skin;
- Normal consciousness, vomiting, elevated LFT.
- Agitation, mydriasis, hot skin.
- Altered LOC, vomiting, diarrhea, salivation.
Bradycardia

- Beta- blockers, calcium-channel blockers, Digoxin
- Clonidine
- Organophosphates
- TCA's
- Antidysrhythmics
- Opioids
- Hypoxemia, MI, hyperkalemia, hypothermia, hypothyroidism, ICP
Respiratory pattern

- **Slow, deep breathing** = CVA
- **Slow, shallow breathing** = opiates, extreme sedative intoxication, massive CVA, hypothermia

**BRADYPNEA IS ALWAYS AN EMERGENCY**

- **Rapid, shallow breathing** = any pulmonary pathology (e.g. ARDS), airway obstruction
- **Rapid, deep breathing** = acidosis, hyperglycemia, hyperthermia, anxiety, CVA
Pupils

- **Myosis** = opiates, brainstem, organophosphates
- **Mydriasis** = severe brain insult; excitatory drugs (e.g. cocaine, ecstasy, tricyclics, kathinone), atropine-like drugs, CPR meds (epi, atropine, dopamine);
Heroin

- Triad of: bradypnea, shallow breathing, miosis
- Consider Naloxone carefully
- Intubation for hypoxemia, airway, unresponsive bradycardia, pulmonary edema, convulsions, trauma
- Remember HIV/hepatitis/TB
Naloxone

- Careful titration until adequate breathing, NOT necessarily until full consciousness.
- May give IM or IN if no IV and situation not critical (not impending respiratory arrest or severe hypoxemia).
- If methadone – pt may wake up and revert back after 30-60 minutes (Naloxone active 45 min, methadone 24 hrs).
Sedatives

- Benzodiazepines, alcohol, barbiturates
- Altered mental status, stupor, coma
- Respiratory depression
- Pupil changes variable
- Hypotension
- Hypothermia
- Anexate-flumazenil
Anticholinergics

- TCA, antihistamines, antipsychotics, phenothiaizines, mushrooms, scopolamine, tricyclics
- **Hot as a hare, Red as a beet, Dry as a bone, Blind as a bat, Mad as a hatter**
- Tachycardia, hyperpyrexia, cutaneous vasodilatation, dry mouth, mydriasis, hallucinations
- Urinary retention
- Seizures, dysrhythmias
• 17 y/o male arrives agitated, combative, confused, mydriatic.
• Mother claims was en route from school, is “good boy”.
• Pt sedated with IM midazolam-haloperidol.
• IV started, etomidate, scoline, intubation.
• HR 132, BP 140/90, PR temp 39.
• CT scan normal, VBG’s mild acidosis.
• Urine tox screen negative.
Datura stramonium

- Grows freely
- Seeds contain scopolamine, atropine.
- Symptoms: atropine-like.
- DD by toxidrome, Hx.
- Consider physostigmine
Cholinergics:
Insecticides, nerve gas

SLUDGE
- Salivation
- Lacrimation
- Urination
- Defecation
- Gastric cramping
- Emesis

DUMB BELS
- Diarrhea
- Urination
- Meiosis
- Bradycardia
- Bronchorrhea
- Emesis
- Lacrimation
- Salivation

Cholinergics:
Insecticides, nerve gas
Serotonin syndrome

- Fluoxetine, trazadone, meperidine
- Irritability, hyperreflexia, tremor, myoclonus,
- Trismus
- Flushing, diaphoresis
- Diarrhea
- Hyperthermia
- Rhabdomyolysis
Methylenedioxymethamphetamine

אקסטסי
אקסטס
כדור
מיצוביני
עגול
Pattern of use

😊 Often at rave parties, but home use prevalent
😊 Hours of dancing
😊 Heavy water intake
😊 Up to 10 tab / night
😊 Variable dose per tablet
😊 Often repeat use
😊 Often combined with alcohol, downers
Clinical manifestations

- **CNS**: Anxiety, bruxism, mydriasis, seizures, brain hemorrhage / infarct / edema
- **GIT**: anorexia, nausea, vomiting Hepatitis
- **CVS**: Chest pain, ↑HR, ↑BP, arrhythmias, MI (rare)
- Systemic: Hyperthermia, dehydration, rhabdomyolysis, ARF, DIC
- ↓↓ Na, myoglobinuria, metabolic acidosis
- **Management**: symptomatic
Such lesions, and other neuroimaging abnormalities, have been reported in abstinent amphetamine users and in cocaine users. Consistent with the known effects of these stimulant drugs to cause vasospasm. Reported cognitive effects in amphetamine users could be related to small vessel disease.
Khat
וליד צומת כבישים ראשית באזור המרכז

במקום ניתן לרכוש ממגוון מוצרים האורגניים כנו שמן

"במקדש יינן לרובו מחוזים מצורפים האורגניקה כנו שמ

יזית, ביש סוחר, פריות וירקות, אוכל ענייר גידולים זה

הסט האדום האיצטטי

לפיים גת מופיעה גורמות לתחושת עניקה, הדרת עילית,이고 יד עם זה היא

משרה תחושת ניווחות. ידוע כי ליעיסת גת מעוררת את החשש המיני.
Cathinone
(β ketoamphetamine)

- Found in the shrub Catha edulis (Khat) and chemically similar to ephedrine.
- Like amphetamine, produces sympathetic activation, anorexia, euphoria, increased intellectual efficiency and alertness
Sympathetic Poisoning

- $\alpha$: vasoconstriction, mydriasis, coronary artery constriction, bladder contraction
- $\beta$: tachycardia, hypotension
- $\beta$ blockers: Bradycardia, hypotension
Cocaine

- Sympathetic syndrome;
- Coronary ischemia: benzodiazepines (!!);
  - Consider PCA;
- Agitation: intracranial bleeding? Psychotropic?
  - Sedate? Intubate?
  - Arrhythmias: avoid beta blockers!!
- Convulsions;
Ketamine: “K”, “special K”

- Structurally resembles PCP
- Symptoms
  - Nystagmus
  - Tachycardia
  - HTN
  - Vomiting

- Treatment
  - Benzodiazepines
  - Supportive care
  - IV
  - Can consider urine alkalization
Paracetamol

- Perhaps the major killer;
- Dangerous because often perceived innocuous, not reported;
- Toxic dose: 150 mg/kg (20 tablets in adult)
- Latent period then irreversible damage to liver;
- Timely diagnosis and treatment are critical.
Mechanism of NAC action

- Cytochrome P450 converts PA to reactive N-acetyl-p-benzo-quinone imine (NAPQI).
- In PA toxicity, sulfate & glucuronide pathways become saturated, PA shunted to P450 to produce NAPQI.
- Hepatocellular supplies of glutathione become exhausted and NAPQI is free to react with cellular membrane molecules, resulting in hepatic necrosis.
- Glutathione needed for detox;
- Cysteine is the rate-limiting factor in glutathione synthesis. Acetylcysteine, is readily absorbed, providing the substrate for glutathione synthesis.
• The Rumack–Matthew nomogram estimates the likelihood of hepatic injury for pts with a single ingestion at a known time. If the concentration is above and to the right of the sloping line, hepatic injury is likely to result and acetylcysteine is indicated.
Corrosives

- Alkali vs acid
- Quantity,
- Concentration,
- ENT exam
- ?Esophagogastroscopey?
- Observation
- Psych consult?
Ethanol

- Most common toxic exposure
- Often associated with:
  - Aspiration
  - Trauma (head and other)
  - Hypoglycemia
  - Rhabdomyolysis
  - Other drug exposure
- Frequently recurrent, may cause missed diagnoses
CLINICAL SCENARIO 1

- A 48 year old unconscious woman is brought to the hospital. She is convulsing and has an odor of garlic on her breath. She is incontinent for urine and stool. On exam her VS: T99, HR50, RR24, BP146/88. Skin is diaphoretic. She is drooling. Pupils are constricted. Lungs diffuse wheezing.
CLINICAL SCENARIO 1

- Recognize: Cholinergic poisoning

- Treatment:
  - Gastric decontamination
  - Respiratory support
  - Cardiac monitoring
  - Atropine followed by pralidoxime
  - Treat seizures with benzodiazepine
CLINICAL SCENARIO 2

17 year old male presents with somnolence, slurred speech, and combative behavior. His younger sister said he showed her a handful of small seeds that he was going to take. On exam T 39.5, HR 120, BP 100/60, RR 22. Skin is warm and dry. Mucous membranes are dry. Pupils are dilated and not reactive.
CLINICAL SCENARIO 2

- Recognize: Anticholinergic poisoning
- Treatment
  - Supportive
  - Physostigmine
    - Coma
    - Arrhythmias
    - Severe HTN
    - Seizures
CLINICAL SCENARIO 3

- 26 y/o male presents unresponsive. His friend states he took a handful of pills because he was in pain.

- On exam his VS: T96, HR40, RR6, BP50/30. Pupils are 3mm.
CLINICAL SCENARIO 3

- Recognize: Opioid poisoning
- Treatment
  - Naloxone
Summary of management

- Suspect
- Mistrust Hx
- ABCD
- Antagonists
- Antidotes
- Supportive
- Consider (carefully): NGT, lavage, charcoal