Management of Acute Overdose

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DISCLOSURES

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ACCREDITATION

Boston College Connell School of Nursing Continuing Education Program is accredited as a provider of continuing nursing education by the American Nurses Association Massachusetts, an accredited approver by the American Nurses Credentialing Center’s Commission on Accreditation.
SESSION OBJECTIVES

• Discuss common agents of abuse in this patient population.
• Explain management of the acute overdose patient.
• Discuss issues that need to be addressed following early recovery.
Clinical Management of the Acutely Intoxicated Patient

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Disclosures

• Financial: none
Outline

• Cases
• Epidemiology
• Supportive Care
• Specific Intoxicants
• Summary
Case 1

CC: altered mental status

HPI: 28 year old male with limited PMH brought by EMS after his mother found him in his room unresponsive. Incense and “Spice” found in his room.

On arrival to the ER: GCS 7, RR 27, pupils were small but reactive. Subsequently intubated for airway protection.
Case 1

Exam: no sign of trauma. Vitals otherwise unremarkable. No rigidity.
Labs: CBC unremarkable.
Chemistries: K 7, Cr 1.8, CPK 125000
Tox screen: THC+
Case 1: Clinical Course

Additional testing with NCHCT was unremarkable.

Patient had progressive renal failure requiring dialysis.

Subsequently extubated to good neurologic status.

Gradual renal recovery occurred and by discharge (~2.5 weeks hospital stay) dialysis was no longer needed.
Case 2

CC: out of hospital cardiac arrest

HPI: 31 year old male found by family unresponsive and not breathing with a needle in his arm.

Upon EMS arrival he was in VF and standard ACLS administered.

ROSC after 30 minutes prior to ER arrival.
Case 2: Clinical Course

Upon arrival to ER: GCS 3T, pupils 6mm and responsive. No evidence of MI on EKG.
Tox screen: opiates, benzos, THC + NCHCT showed no acute process.
Patient underwent therapeutic hypothermia protocol over next 48 hours.
Post-rewarming patient remained comatose but with intact brainstem reflexes.
Patient dies after extended hospital stay and challenging discussions with his family.
Case 3:

CC: found down

HPI: 20 year old male found by family with suicide note next to empty oxcarbamezpine bottle.

On arrival to ER: awake, combative, tachycardic, hypertensive, pupils small, arms rigid, febrile to 101F
Case 3: Clinical Course

Patient intubated to control agitation.
NCHCT negative
EKG: sinus tach with normal axis and intervals.
Admitted to ICU for further management

olanzapine
oxcarbazepine
Case 3: Clinical Course

Daily spontaneous breathing trials were limited by ongoing agitation.

Sedation with combination of propofol, dexmedetomidine, and lorazepam

Extubated on 5th hospital day

Neurologically intact and discharged to inpatient psychiatry service
Epidemiology
Drug overdose

• Drug overdose was the leading cause of injury death in 2012. Among people 25 to 64 years old, drug overdose caused more deaths than motor vehicle traffic crashes.

• Drug overdose death rate has more than doubled from 1999 through 2013

• In 2013, of the 43,982 drug overdose deaths in the United States, 22,767 (51.8%) were related to pharmaceuticals.

http://www.cdc.gov/homeandrecreational safety/overdose/facts.html
Figure 1. Reasons for Drug-Related Emergency Department (ED) Visits, by Year: 2004 to 2011

* The estimate for ED visits involving adverse reactions in 2004 was suppressed due to low statistical precision.


The DAWN Report: Highlights of the 2011 Drug Abuse Warning Network. Published 2/22/13
Figure 3. Rates of Emergency Department (ED) Visits Involving Misuse or Abuse of Pharmaceuticals among Patients Aged 12 to 24 per 100,000 Population, by Age Group: 2011

- Narcotic Pain Relievers*
  - Persons Aged 12 to 17: 38.4
  - Persons Aged 18 to 20: 157.2
  - Persons Aged 21 to 24: 306.2

- Anti-anxiety and Insomnia Medications*
  - Persons Aged 12 to 17: 37.0
  - Persons Aged 18 to 20: 50.7
  - Persons Aged 21 to 24: 179.7

- Antidepressants
  - Persons Aged 12 to 17: 57.2
  - Persons Aged 18 to 20: 33.9
  - Persons Aged 21 to 24: 56.0

- Central Nervous System Stimulants**
  - Persons Aged 12 to 17: 31.3
  - Persons Aged 18 to 20: 29.5
  - Persons Aged 21 to 24: 40.8

- Antipsychotics***
  - Persons Aged 12 to 17: 15.1
  - Persons Aged 18 to 20: 29.5
  - Persons Aged 21 to 24: 40.8

* All differences between age groups were statistically significant at the .05 level.
** The difference between patients aged 12 to 17 and those aged 21 to 24 was statistically significant at the .05 level.
*** The differences between patients aged 12 to 17 and the two older age groups were statistically significant at the .05 level.

Figure 2. Rates of Emergency Department (ED) Visits Involving Illicit Drugs among Patients Aged 12 to 24 per 100,000 Population, by Age Group: 2011

* The differences between those aged 12 to 17 and the two older age groups were statistically significant at the .05 level.
** All differences between age groups were statistically significant at the .05 level.


The DAWN Report: Highlights of the 2011 Drug Abuse Warning Network. Published 2/22/13
New Hampshire Heroin Epidemic

Toxi-drome Recognition

- Opiate
- Cholinergic
- Anti-cholinergic
- Sympathomimetic
- Cholinergic
- Serotonin syndrome
- Hallucinogenic
## Dilated-Pupil Toxi-dromes

<table>
<thead>
<tr>
<th>Type</th>
<th>Mental status</th>
<th>Vitals</th>
<th>Other manifestations</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sympathomimetic</td>
<td>Hyperalert, agitation, hallucinations, paranois</td>
<td>Hyperthermia, tachycardia, hypertension</td>
<td>Diaphoresis, tremors, hyperreflexia, seizures</td>
<td>Cocaine, amphetamines, cathinones</td>
</tr>
<tr>
<td>Anticholinergic</td>
<td>Agitation to coma, mumbling</td>
<td>Hyperthermia, tachycardia, hypertension</td>
<td>Dry flushed skin, dry membranes, myoclonus, urinary retention</td>
<td>Antihistamines, TCA</td>
</tr>
<tr>
<td>Hallucinogenic</td>
<td>Hallucinations, agitation</td>
<td>Hyperthermia, tachycardia, hypertension</td>
<td>Nystagmus</td>
<td>PCP, LSD, ecstasy</td>
</tr>
<tr>
<td>Serotonin syndrome</td>
<td>Confusion to coma</td>
<td>Hyperthermia, tachycardia, hypertension</td>
<td>Tremor, rigidity, clonus, diaphoresis</td>
<td>MAOI, SSRI</td>
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</tbody>
</table>
# Constricted Pupil Toxi-dromes

<table>
<thead>
<tr>
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<th>Mental status</th>
<th>Vitals</th>
<th>Other manifestations</th>
<th>examples</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Opioid</strong></td>
<td>CNS depression, coma</td>
<td>Hypothermia, bradycardia, bradypnea, hypotension</td>
<td>Hyporeflexia, pulmonary edema</td>
<td>opioids</td>
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<tr>
<td><strong>Sedative-hypnotic</strong></td>
<td>CNS depression, coma</td>
<td>Hypothermia, bradycardia, bradypnea, hypotension</td>
<td>Hyporeflexia</td>
<td>Benzodiazepines, zolpidem</td>
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<tr>
<td><strong>Cholinergic</strong></td>
<td>CNS depression, coma</td>
<td>Bradycardia, hypo/hypertension, brady/tachypnea</td>
<td>Salivation, diaphoresis, muscle fasciculations, seizures</td>
<td>organophosphates, physostigmine</td>
</tr>
</tbody>
</table>

Uptodate 2015
Clinical Evaluation

• History:
  – Substance and quantity
  – Time of ingestion
  – Sustained or immediate release
  – Acute or chronic

• Physical examination
  – Vital signs
  – Neurologic findings

• Labs and EKG
• Imaging
• Ancillary studies (e.g. LP, HIV screen)
Toxicology Screens

• Hospital assays vary
• These detect presence of chemicals but do not prove causation of a clinical syndrome
• Synthetic or “Designer” drugs are infrequently detected on rapid screens
• Major benefit is ruling out important co-ingestants that would change management (e.g. acetaminophen, aspirin)
Evidence Disclosure Statement

• Level of evidence for specific care processes in toxicology is limited.

• Pharmacological and physiological rationale and case reports are major sources of data.

• Off-label usage of treatments is common given the lack of robust data
Supportive Care

- Airway protection
- Thermal regulation
- Adequate organ perfusion
- Prevent seizures
- Post-recovery
Anti-toxin Measures

1. Decrease absorption and/or enhance elimination
   1. Activated Charcoal
   2. Urine alkalinization (ion trap anionic toxin in urine) or salt loading (i.e. for TCA overdose)
   3. Hemodialysis (typically for small water soluble molecules)
   4. Lipid emulsification (lipid soluble cardiotoxic substances)

2. Direct counteract the toxin (e.g. naloxone)
Activated Charcoal

• Dose 1g/kg
• Most effective within 1-2 hours
• May need nasogastric tube for delivery
• Not effective for:
  – Iron, cyanide, lithium, alcohols, hydrocarbons, acid/alkali

• Drawbacks: vomiting, bezoar formation
Acetaminophen

- Consider as co-ingestant
- Charcoal is effective
- Assess level > 4 hours after ingestion
- Multiple formulations with combination pills
- Antidote: N-acetylcysteine (PO, IV)
  - Most effective within 8 hours
Rumack-Matthew Nomogram

Heard KJ. NEJM 2008;359:285-92
Opiates

• The earliest reference to opium growth and use is in 3,400 B.C. when the opium poppy was cultivated in lower Mesopotamia. The Sumerians referred to it as *Hul Gil*, the "joy plant."
Opiates

• Heroin patented by Bayer 1897
• 1913 Bayer ceases heroin production
• 1924 Heroin Act making substance illegal to possess

• In 2011, >678,000 ER visits were attributed to misuse/abuse of opiates
Opiates

- Receptors throughout the body
  - Anterior and ventrolateral thalamus
  - Amygdala and dorsal-root ganglia
  - Brain stem (respiratory response)
  - Edinger-Westphal; pupillary constriction
  - GI tract to decrease mobility
Opiate Overdose

• Direct antidote: naloxone
• \( \mu \) antagonist
• T ½ 30-81 minutes.
• Dose: 0.4 mg -20 mg IV, IM, SL, endotracheal

Boyer, EW. NEJM 2012;367:146-55
Ecstasy (MDMA)

• 1912 Anton Köllisch first synthesized MDMA and Merck patented the compound
• 1970 first recreational use published
• 1988 MDMA permanently placed on schedule I by DEA

• Mechanism: pre-synaptic release of NE, 5HT, DA
Ecstasy (MDMA) Overdose

• Presentation varies
  – CNS, cardiovascular, thermal, renal, muscular effects

• No specific antidote
Bath Salts (cathinones)

- Synthetic derivatives of cathinone, one of the psychoactive chemicals in khat (*Catha edulis*).
- Related to amphetamines (may cross-react on tox screens)

http://www.emcdda.europa.eu/
Bath Salts

22,904 ED visits in 2011

Presenting complications of overdose can include: severe agitation, violent behavior, hypertensive crisis, hyperthermia, seizures, and death.

Emergency Department Visits Involving Bath Salts, by Drug Combination: 2011

- Bath Salts Only: 7,578 (33%)
- Bath Salts and Other Drug Combinations: 11,987 (52%)
- Bath Salts with Marijuana/Synthetic Marijuana: 3,339 (15%)

Samhsa.gov
Bath Salts Overdose

• Keep staff safe
• Supportive care
  – GABA agonists
  – Alpha 2 agonists
  – Neuroleptics
“Spice” (Synthetic Cannabinoids)

Figure 2. Emergency department (ED) visits involving synthetic cannabinoids, by age group: 2010 and 2011

* Low precision; no estimate reported.
** The difference between 2010 and 2011 was statistically significant at the .05 level.
“Spice”

- Intoxication: similar to marijuana
- Overdose: severe agitation, anxiety, nausea, vomiting, tachycardia, hypertension, tremors, seizures, hallucinations, paranoid behavior, and coma.

- Treatment: supportive care

Summary

Acute drug intoxication is common and presents a serious public health menace.

Primary prevention must be major policy focus.

Clinical care in the crisis is actually straightforward in that high quality supportive care is the mainstay of acute therapy.