

Toxicology

- ETOH Intoxication
- Acetaminophen Overdose
- Salicylate Overdose
- TCA Overdose
- Cocaine Overdose
- Opiate Overdose
- Carbon Monoxide Inhalation

ETOH Intoxication

Management:

- Ensure airway, adequate respiratory drive, and management of secretions/emesis
- Thiamine, consider folate/MVI, D5NS (for volume and glycogen/NAD+ depletion - will not enhance elimination)
- Check FSBG. Hypoglycemia is caused by impaired gluconeogenesis in poorly nourished patients with depleted or low glycogen stores.
- Search for other causes if mental status not clearing in 3 to 4 hours.
- Alcoholic ketoacidosis: Volume repletion, thiamine, and supplemental glucose
- Start CIWA protocol for all suspected chronic alcoholics

Symptoms:

1. Tremulousness (6-12 hours after last drink)

- Pt irritable, hypervigilant, agitated. coarse tremor of hands and tongue
- Thiamine 100mg IV, MVI, Folate 1 mg IV/PO. Give thiamine before glucose
- Mg replacement, watch for drop in phosphate
- Valium 5-10 mg IV q5-10min until stops or Librium 25-100 mg PO hourly. Monitor closely for oversedation

2. Seizures

- If no past h/o seizure, work up to r/o head trauma, meningitis, brain abscess, etc.
- If past h/o ETOH seizure, treat as other seizures but loading with anticonvulsants not indicated

3. Delirium Tremens - autonomic instability with fluctuating mental status. 2-7 days after last drink, usually with visual hallucinations, perspiration, fever, tachycardia, hypertension. This is a medical emergency. mortality is approx. 5%

- Valium 5-10 mg IV every 5 to 10 minutes until appropriate sedation is achieved.
- Librium 25-100 mg PO at presentation, repeat as needed hourly. Monitor respirations.
- Thiamine, folate, MVI iv/po
- Replete Mg, K, Ca, PO4
- Rule out infection, pneumonia
- Admit to monitored setting

Other toxic alcohols:

- Send ethanol level to calculate corrected osmole gap in the case of suspected concurrent ethylene glycol or methanol ingestion.
- Toxic alcohol panel (ethylene glycol, methanol, isopropyl alcohol) can be sent but do not delay treatment if clinical suspicion is high.
- Most common differential diagnosis is alcoholic ketoacidosis, which can cause severe anion gap acidosis and moderate osmolar gap. Send a beta hydroxybutyrate level, which is more reliable than standard ketone test (acetoacetate).

References:

Kraut JA, Kurtz I. Toxic alcohol ingestions: Clinical features, diagnosis, and management. Clin J Am Soc Nephrol 2008 Jan;3(1!):208-25.

Goldfrank's Toxicology Emergencies, 9th ed 2010.

Poisoning and Drug overdose, 6th ed. 2012.

UpToDate. (2022). <https://www.uptodate.com/contents/management-of-moderate-and-severe-alcohol-withdrawal-syndromes>.

Acetaminophen Overdose

Check Acetaminophen levels and urine toxicology for co-ingestions

1. Call poison control
2. NGT, lavage with 2 L NS
3. Activated charcoal: Give a single dose of activated charcoal at 1 g/kg p.o. via NG tube within 4 hours of ingestion
4. N-Acetylcysteine: Passive given within 8 hours of ingestion and before ALT begins to rise, can give a charcoal
5. Oral dosing of acetylcysteine: 140 mg/kg loading dose followed by 17 doses of 70 mg.kg every 4 hours. If patient vomits within 1 hour administration give full dose again
6. Give acetylcysteine based on the nomogram. If unable to obtain level just treat.
7. Follow acetaminophen levels q4h, LFT, PT/PTT
8. Evaluate potential need for liver transplant; pH < 7.3, Cr > 3.4, INR >6.5

References:

1. Hospitalist Handbook, iPhone App
2. [UpToDate -- Acetaminophen Overdose](#)
3. [NCBI](#)

Salicylate Overdose

Check salicylate level and check urine toxicology for co-ingestions. Try to determine whether salicylate was regular or enteric-coated (Affects pharmacokinetics).

1. Call poison control
2. NGT, lavage with 2L NS
3. Intubate for respiratory depression if indicated
4. Activated charcoal, if indicated. 1g/kg po/per NGT q2-4h
5. Alkalinize plasma/urine with a bolus of 1 to 2 Amps of sodium bicarb, then start 2 Amps of sodium bicarb per 1 L of D5 ¼ NS. Run this at approximately 4 mL/kg/hr. Do not use acetazolamide. Caution in elderly and renal failure as aspirin can cause pulmonary edema
6. Replete potassium to maintain normal serum levels otherwise alkalinization will be difficult to achieve
7. Be sure to treat concurrent hypoglycemia and coagulopathy if present
8. External cooling if febrile (no acetaminophen)
9. Hemodialysis indicated if level > 100mg/dL - level checked 6 hours after ingestion, refractory acidosis, persistent CNS symptoms, and/or if renal failure.

References:

1. Hospitalist Handbook, iPhone App
2. [UpToDate -- Salicylate Toxicity](#)

TCA Overdose

Call poison control.

- Check urine toxicology for co-ingestions esp. salicylates , acetaminophen.
- Get an EKG. Pay special attention to QRS, QTc, PR Beware QRS on EKG > 0.10 sec; VT, VF, myocardial depression can ensue (Q on T phenomenon)
- Evaluate if ICU admission is necessary: AMS, Respiratory depression, hypotension
- Telemetry
- If asymptomatic, get serial EKGs for 6 hours.
- NGT, lavage with 2 Liters NS, **Ipecac contraindicated**
- Activated charcoal 1g/kg within 2 hours of ingestion
- Alkalinize urine with 1NS & 2amps NaHCO₃/l at 10-15 cc/kg/hr until urine output good, then D5W + 1-4 amps NaHCO₃/l + 200 mEq KCl/l at 1-3x maintenance to give serum pH 7.5-7.55
- **Do NOT use quinidine, procainamide if VT occurs. High risk for Torsades.**

References:

1. Hospitalist Handbook, iPhone App
2. UpToDate -- TCA

Cocaine Overdose

- Call Poison control
- ABCs, vital signs, Tele monitor

Diagnosis

- EKG, CXR, head CT if suspect cerebral hemorrhage.
- Labs: Urine toxicology, CBC, electrolytes, glucose, CPK, UA for myoglobin, lactic acid, Troponin, Pregnancy test.

Management

- For tachyarrhythmias, follow ACLS guidelines. Do best to avoid Beta-blocker but if needed, give IV esmolol.
- For HTN, give Benzodiazepine. If this does not work then consider Beta-blocker (esmolol), but never alone. Always give with either vasodilator (nitroprusside) or alpha blocker (phentolamine, intravenous (IV) bolus. The usual dose is 5 to 10 mg IV every 5 to 15 minutes as necessary.)
- For agitation and psychosis, Benzodiazepine(Diazepam be given in an initial dose of 10 mg IV, then 5 to 10 mg IV every 3 to 5 minutes until agitation is controlled), Haldol, chlorpromazine, or droperidol prn
- For seizures give diazepam (0.1-0.2 mg/kg IV q10-15 min for total of 30mg), but if status epilepticus, consider other causes such as continued drug absorption (broken bag of cocaine in GI tract)
- Decontaminate with gastric lavage, charcoal and cathartic if indicated.
- If need to intubate, avoid succinylcholine since this can cause further rhabdomyolysis

Source: [Uptodate: Cocaine Overdose](#)

Hospitalist Handbook

Opiate Overdose

Effects

- CNS - sedation and respiratory depression, seizures w/ meperidine, propoxyphene and dextromethorphan (Esp. in renal insult)
- Pulmonary - acute noncardiogenic pulmonary edema

Diagnosis

- H&P (pinpoint pupils, CNS and resp. depression)
- Response to naloxone
- Labs: urine tox (will not show fentanyl), CBC, electrolytes, glucose, ABG, CXR, consider acetaminophen/ASA levels if combination drugs ingested

Treatment

- ABCs, oxygen
- Naloxone 0.2-2mg IV, may repeat dose q2-3 min up to total of 10-20mg IV. Necessary to monitor at least 3-4 hours after last naloxone dose which has half-life of 1 hour. Opiates have longer half life. Recommend 6-12 hour observation after opioid-induced coma and monitor for acute withdrawal syndrome in opiate dependent patients.
- If patient is intubated for airway protection/hypercarbia, naloxone is not necessary
- Decontaminate via gastric lavage, charcoal, cathartic.

Source: [Uptodate: Opiate overdose](#)

Carbon Monoxide Inhalation

Symptoms depend on CO level (carboxyhemoglobin)

- CO: 20-40%: Dizziness, headache, weakness, disturbed judgement, decreased visual acuity
- CO: 40-60%: Tachycardia, tachypnea, ataxia, syncope, seizures
- CO: >60%: Coma, death

Diagnosis

- To get CO level, get ABG with carboxyhemoglobin
- Standard pulse oximetry (SpO₂) **CANNOT** screen for CO exposure, as it does not differentiate carboxyhemoglobin from oxyhemoglobin
- ECG, troponin if CO intoxication confirmed.

Management

- Treat with 100% O₂ by tight-fitting mask or ET tube
- Intubation can be considered in severe cases (carboxyhemoglobin > 25%)
- Hyperbaric Oxygen if CO>25%
- Measure CO level q2-4h until <10%
- Must continue treating until carboxyhemoglobin is <5%
- Call Poison control

Source: [Uptodate: CO poisoning](#)