

## **POISONINGS, INGESTIONS AND OVERDOSES**

### **Initial Management**

#### **Overview**

- about 60% of reported poison exposures occur in children less than 6 years of age, but young children account for less than 4% of fatalities
  - iron poisoning and hydrocarbons are the most common cause of mortality
  - usually involve a single substance in small quantities; accidental and acute
- teenage exposure is often purposeful, often involving large quantities of more than one substance, with increased mortality rate
- poisonings occur by ingestion, inhalation, ocular exposure, dermal exposure, mucous membrane involvement, and parenteral exposures
- ingestions account for about 3/4 of exposures, and inhalation 14%

#### **Initiation of Therapy at Home**

Aim is to prevent absorption.

- external exposures:
  - remove clothing; skin exposed to insecticides, hydrocarbons, or acid or alkali agents should be flooded with water and washed with soap
  - if the eyes are involved, they must be washed immediately for 15-20 minutes
- internal exposures:
  - dilute acid or alkali with milk or water; NO EMESIS
  - emesis (syrup of ipecac) for children over 6 months if indicated (10 ml for < 1 yo, 15 ml for 1-12 yo, or 30 ml for > 12 yo); repeat the dose if > 1 yo if no emesis in 20 minutes
  - contraindicated if:
    - (1) child has altered mental status, actively seizing, or has a bleeding diathesis
    - (2) with acid or alkali substances
    - (3) hydrocarbon ingestion that do not contain camphor, halogenated or aromatic products, heavy metals, or pesticides (“CHAMP”)
    - (4) ingestion involves a rapid-acting CNS affecting drug

#### **Initial Management at the Hospital**

##### **ABC**

- assess the airway, ventilation and circulation.
  - oxygen if altered mental status is present
  - intubate if the patient has depressed respirations, depressed or impaired mental status
- IV access should be obtained for serious or potentially serious exposures
- follow blood pressure, perfusion, and heartrate; CR monitoring if indicated

##### **Seizures**

- seizures can occur with a number of ingestions, as well as secondary to trauma (i.e. fall) due to the effects of the ingestion
- rapid dextrostick for glucose determination
  - if hypoglycemia is present, administer glucose (2-4 cc/kg 25% dextrose IV)
- look for any focal neurologic signs (unequal pupils) or evidence of trauma
- benzodiazepine (lorazepam, diazepam) is the agent of choice, followed by phenobarbital or phenytoin

##### **Information**

- identify the type of ingestion, amount consumed, time of ingestion, and current symptoms
- relate the amount ingested to the patient's weight
  - if quantity of liquid ingestion is unknown, the average swallow of a young child is 5- 10 ml and that of an older child or adolescent is 10 - 15 ml
- treatment information can be readily obtained through: Poisindex (computer), Poison Control Center, toxicology textbooks, and pharmacist

##### **Examination**

- particular focus on the cardiopulmonary, respiratory, and neurologic status
- if patient is obtunded and etiology is unknown, look for physical signs such as scalp bruise or laceration (secondary to trauma), needle marks, breath smell, skin (warm, clammy), pupil size, etc.
- REMEMBER: some drugs have delayed onset of symptoms (i.e. acetaminophen)

## Studies

- blood or urine toxicology screens
  - REMEMBER: polypharmacy overdoses and injections are common!
  - drugs requiring emergency quantitative analysis: acetaminophen, salicylates, alcohols (methanol, ethylene glycol), iron, theophylline, lithium and carbon monoxide
  - every hospital has different toxicology screens--know what the screen covers
- other often needed tests: ABG (acid-base status), electrolytes, glucose, CBC with differential and platelet count, clotting studies, LFT's, renal function tests, albumin and total protein
- toxic metabolic acidosis often caused by "MUDPILES": Methanol, Uremia, Diabetes mellitus, Paraldehyde, Isoniazid, iron, Lactic acidosis, Ethanol, ethylene glycol, Salicylates, starvation, strychnine, carbon monoxide, cyanide
- x-rays are useful (to determine presence and location) with: bezoars, bags of illegal drugs (smuggled), chloral hydrate, heavy metals, iodine, iron, phenothiazines, potassium compounds, enteric-coated tablets, batter ingestion

## Prevent Absorption

- external as described above
- internal:
  - emesis: is most helpful within 1 hour, beyond that time is usually not indicated unless the drug delays gastric motility; see above
  - lavage:
    - indicated for toxic ingestions within 1-2 hours of ingestion (unless delayed gastric motility), and for those with mental status changes
    - NOT for caustic or acid ingestions
    - 24-36 Fr tube (36-40 in adults) with patient in Trendelenburg and tilted slightly to the left; lavage with saline or half-normal saline at 100-200 ml per lavage in the adult (less for the child) ; repeat until clear
    - can be helpful in identifying pills
    - intubate before lavage in the patient with mental status changes
  - activated charcoal:
    - indicated for:
      - analgesic/antiinflammatory drugs: acetaminophen, salicylates, nonsteroidals, morphine, propoxyphene
      - anticonvulsants/sedatives: barbiturates, carbamazepine, chlordiazepoxide, diazepam, phenytoin, sodium valproate
      - other: amphetamines, atropine, chlorpheniramine, cocaine, digitalis, quinine, theophylline, cyclic antidepressants
      - does NOT work for: iron, lithium, cyanide, strong acids or bases, and simple alcohols (ethanol and methanol)
    - wait 30 - 60 minutes after emesis (if drug-induced emesis)
    - can be given orally or through NG tube (minimum 12-16 Fr)
    - 1 gm/kg; repeated doses q 2-4 hours may be indicated
    - mixture with sorbitol also works as a cathartic
      - ideally, sorbitol should not be added after the initial dose (hypernatremic dehydration is a documented complication in children)
    - aspiration pneumonia secondary to aspiration of charcoal after emesis is well-documented--give anti-emetics if needed
  - catharsis:
    - controversial efficacy
    - magnesium sulfate, magnesium citrate, bisacodyl, sodium sulfate, sorbitol
    - do NOT use with renal failure, severe diarrhea, adynamic ileus or abdominal trauma
  - whole-bowel irrigation:
    - GoLYTELY or polyethylene glycol
    - used when large amounts of a toxic substance are ingested, a modified-release substance is involved, or the substance is not absorbed by charcoal
    - adults 1.5 - 2.0 L/hr, toddlers 500 ml/hr (until what comes out looks like what went in!)
    - patients must be able to protect their airway

**Enhance Excretion**

- forced diuresis is usually not helpful (only a small number of drugs have a small volume of distribution and are renally excreted)  
indicated for salicylates and phenobarbital (alkalinize the urine)  
goal is 5.0 ml/kg/hr (watch fluids carefully--do not fluid overload)  
for alkaline diuresis:  
want urine pH 7.5  
(1) NaHCO<sub>3</sub> 1 - 2 mEq/kg/dose IV over 1 hour (with K<sup>+</sup> as needed);  
(2) add 2 - 3 adult ampules (44.5 mEq NaHCO<sub>3</sub> / ampule) to 1 liter of D5W  
monitor electrolytes (usually supplemental potassium is needed)  
contraindicated with cerebral edema or renal failure
- dialysis only after other treatments have failed  
useful only in a limited number of drugs: phenobarbital, salicylates, theophylline, methanol, ethylene glycol and lithium  
indicated when patient is unresponsive, significant acidosis is present, renal failure, visual symptoms, or when peak levels are > 50 mg/dl with methanol ingestion
- hemoperfusion is controversial and usually not used

**Diagnostic Trials** (Administration of the antidote can indicate an etiology of toxin.)

- iron  
deferoxamine  
positive if urine turns "vin rose" color
- lead  
Ca-EDTA  
ratio of lead excreted/EDTA given > 0.5
- opiates  
naloxone hydrochloride  
improved consciousness
- organophosphates  
atropine  
pupillary dilation, secretions
- phenothiazine (dystonic reactions)  
diphenhydramine  
resolution of dystonia or oculogyria
- phenothiazine (neuroleptic malignant syndrome)  
dantrolene  
resolution of muscular rigidity and normalization of temperature
- insulin reaction  
dextrose  
improved consciousness
- isoniazid  
pyridoxine  
resolution of seizures and acidosis

**Toxic Syndromes**

These are constellations of syndromes which are indicative of certain ingestions.

**Anticholinergics** (Atropine, Scopolamine, glycopyrrolate)

- peripheral symptoms:  
neurologic: dilated pupils, hyperpyrexia  
CV: tachycardia, dysrhythmias, hypertension, hypotension (late)  
GI/GU: urinary retention, decreased bowel sounds  
other: dry and flushed skin, dry mucous membranes, fever
- central symptoms:  
CNS: delirium: disorientation, agitation, hallucinations, psychosis, loss of memory, extrapyramidal movements, ataxia, picking or grasping movements, seizures, coma  
cardiovascular collapse  
respiratory failure

**Cholinergics** (Acetylcholine, methacholine)

- “SLUDGE”: salivation, lacrimation, urination, diarrhea, GI cramping, and emesis
- CNS: miosis, headache, restlessness, anxiety, confusion, coma, seizures
- CV: bradycardia, tachycardia (also common)
- respiratory: bronchorrhea, bronchospasm
- other: sweating, muscle fasciculations and weakness

**Opiates** (Morphine, Heroin)

- CNS: euphoria, coma, seizures, miosis
- CV: decreased heartrate, hypotension
- respiratory: shallow respirations, decreased respiratory rate, pulmonary edema

**Organophosphates** (Anticholinesterase-Physostigmine, Neostigmine are reversible forms)

- CNS: sedation, coma, miosis
- CV: increased or decreased heartrate, hypo- or hypertension
- respiratory: bronchorrhea
- GI/GU: urination, defecation
- other: muscle twitching, flaccidity, salivation, lacrimation

**Phenothiazines** (chlorpromazine)

- CNS: sedated, coma, miosis, dystonic reactions, ataxia
- CV: hypotension
- other: hypothermic

**Salicylates** (Aspirin, Doan's Pills - methyl salicylate)

- CNS: disoriented, hyperexcitable
- CV: tachypnea, increased depth of breaths
- GI: vomiting
- other: fever, tinnitus, metabolic acidosis, hypokalemia

**Sedative-Hypnotics** (benzodiazepines)

- CNS: sedated, coma, miosis, ataxia, nystagmus
- CV: hypotension
- respiratory: decreased respiratory rate, shallow breathing
- other: slurred speech, hypothermic

**Sympathomimetics** (doapmine, phenylephrine, tyramine, ephedrine)

- CNS: agitated, psychoses, hallucinations, delirium, seizures, dilated pupils
- CV: tachycardia, dysrhythmias, severe hypertension
- GI: nausea, vomiting, abdominal pain
- other: fever, sweating

**Tricyclics** (amitriptyline, clomipramine)

- CNS: agitation, coma, dilated pupils, seizures
- CV: tachycardia, hypo- or hypertension, prolonged QRS interval, ventricular arrhythmias
- other: fever

**Withdrawal**

- CNS: delirium, hallucinations, dilated pupils
- CV: tachycardia, hypertension
- GI: diarrhea
- other: “goose flesh”, cramps

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