

# Poisoning

# Definition

- **A poison is any substance that causes harm if it gets into the body.**
- **A poisoning** occurs when exposure to a substance **adversely affects** the function of any system within an organism.
- **The setting of exposure may be occupational, environmental, recreational, medicinal or suicidal.**

## Routes of Exposure

### *A) Through the mouth by swallowing (ingestion)*

- **Most common poisoning** happens in this way
- **When poisons are swallowed** they go to the stomach from where they are absorbed into the blood.
- The longer a poison stays in the gut the more will be **absorbed into the blood** and the **worse the poisoning will be.**

***B) Through the lungs by breathing into the mouth or nose (inhalational poisoning)***

- **Poisons** in the form of **gas, vapour, dust, fumes, and smoke or fine spray** droplets may be breathed into the **mouth and nose** and go down into the **lungs**.

***C) Through the skin by contact with liquids, sprays or mists***

## ***D) By injection through the skin(parenteral)***

- **Poisons** can be **injected** through the skin from a **syringe, or during tattooing, or by the bite or sting of a poisonous animal, insect, or snake.**
- **The injection may go directly into the blood stream or under the skin into muscle or fatty tissues.**

# ❑ General approach to poisoned pt

- We should have **a consistent & systematic** approach to **evaluation & management of poisoned patients.**
- **Diagnosis** and **resuscitation** proceed simultaneously
- **The first step is always to fix the ABCs.**

# General Management

The clinician should take a **brief history, examine the pt** thoroughly and rapidly and then do the following:

1. Ensure a **clear airway** and **support respiration**.
2. Treat **shock** if present.
3. Remove poison from the body before it is absorbed, by inducing **vomiting or doing a gastric lavage**.
4. Reduce absorption by administering **activated charcoal** which **absorbs many toxins** and prevents subsequent absorption.

5. **Anti-dotes** should be used.

6. **General supportive** measures are important to ensure *adequate hydration, temperature control, fluid and electrolyte balance, nutrition intake and control of convulsions and cardiac arrhythmia.*

# For Comatose pts...

- ❑ For Hypoxia, Opioid intoxication, hypoglycemia, and Wernicke's encephalopathy.
  - ❑ COMA Cocktail
    - Supplemental oxygen for **hypoxia**,
    - Naloxone 2mg (for symptoms of **opioid toxicity**),
    - **GLUCOSE** 30ml of 50%DW glucose for **hypoglycemia** and
    - **THIAMINE** 100mg of thiamine for **Wernicke's encephalopathy**
    - known as the '**coma cocktail**' can be administered.

# ❑ **Universal Antidotes**

❑ **TONG** mnemonic antidotes for comatose pt.

- **Thiamine**
- **Oxygen**
- **Naloxone**
- **Glucose**

# ❑ Decontamination

- Remove all contaminated cloths from the patient and dispose it.
- **Wash skin and hair** with soap and water while wearing glove.
- **Eye exposure: irrigate** with copious amounts of water or **saline for 10 - 15 minutes.**

# **❑ Decontamination Principles**

- **Activated charcoal**
- **Naso / Orogastric lavage**
- **Whole bowel irrigation**
- **Urine alkalization**

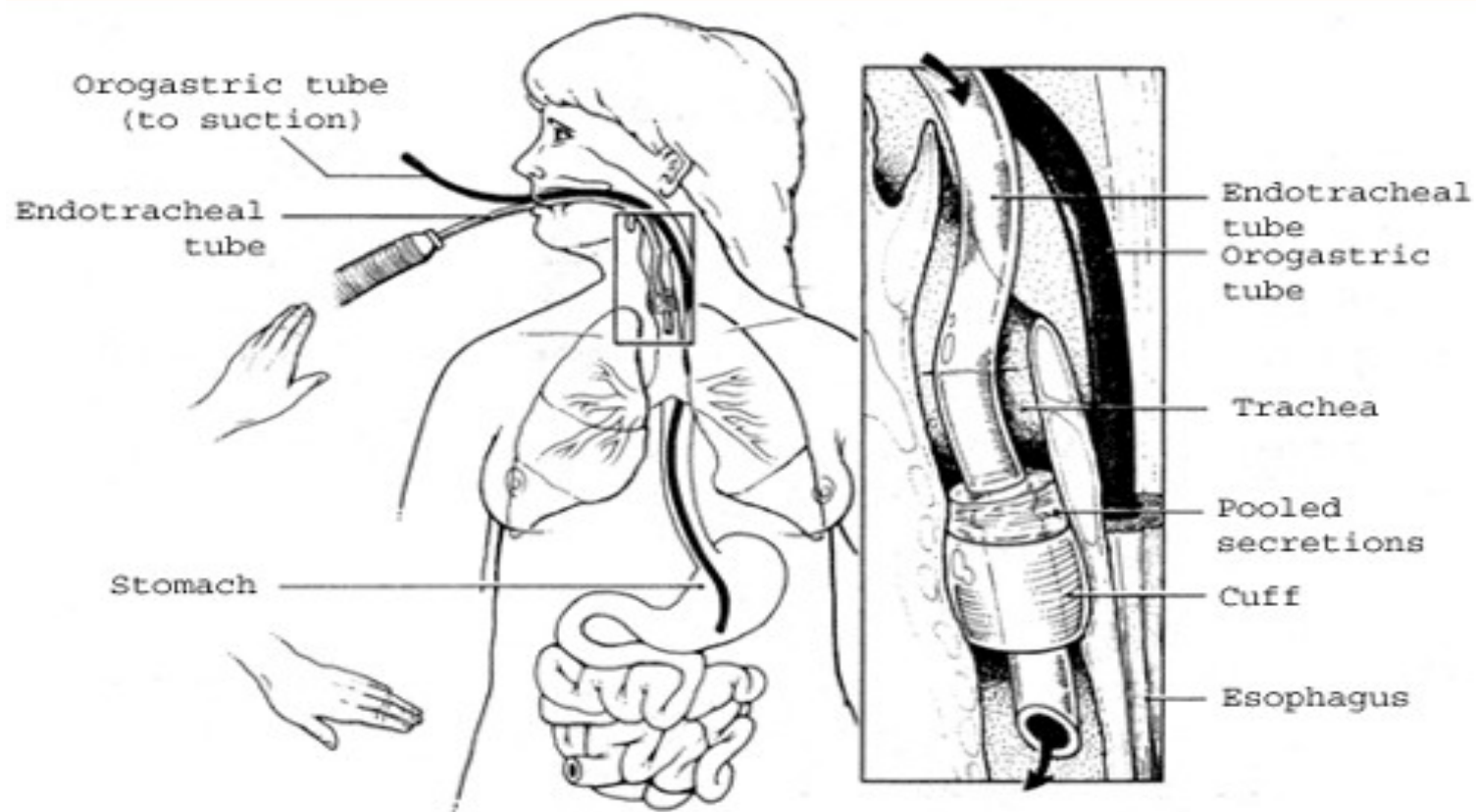
# 1 Gastric lavage

- **Indicated** for ingestion of large amounts of **tablets and capsules** with **a high inherent toxicity within 2 hrs.**

# ❑ Orogastric Lavage

- **Intubate** patient, if they **can't** protect their airway
- **Place in left lateral decubitus position.**
- **Head tilted 20 degrees downward**
- **Insert 40F orogastric tube/NGT (24F peds)**
- **Instil 200- 300ml N/S for adults**

# Gastric Lavage



# **C/I(Contraindications)**

- **patients with decreased LOC, unprotected airway,**
- **Ingestions of corrosive agents, hydrocarbons, kerosene**
- **patients at risk of gastrointestinal hemorrhage.**
- **Esophageal polyp**

## 2 Activated Charcoal

- Minimizes systemic absorption from the GIT.
- Consider use if **within 1 hr** of ingestion of the poisonous substance.
- Given **orally or via NG tube, 1-1.5g/kg or 50g** as slurry in **200-300ml of water**.

# Activated Charcoal

- **Has no value in strong acids, alkali, corrosives, heavy metals, lithium, paraffin, methanol , ethylene glycol ingestion & Iron .**

# Activated Charcoal

- **Contraindications(C/I):**
  - Known or suspected **GI perforation**
  - GCS <8 or declining rapidly (**risk of aspiration**)
  - Decreased LOC or unprotected airway
  - **Known ingestion** of substance that **charcoal does NOT adsorb.**

## ❑ **Multiple Dose activated Charcoal**

- **Multiple doses** can **enhance elimination** of drugs already absorbed into the body by **interrupting enterohepatic circulation** of drugs **excreted into the bile.**
- **It is given in repeated doses 50g in 200-300ml** of taped water **every 4hrs** to **increase elimination of some drugs from the blood.**
- **Carbamazepine, phenobarbitone, dapsons, quinine, theophyllines & sustained release formulations.**

# 3 Whole Bowel Irrigation

- **Instillation** of large volumes of **polyethylene glycol** in **osmotically balanced electrolyte** solutions **to induce liquid stool** .
- **Promotes rapid, mechanical elimination of ingested toxins.**
- **Dose 1500- 2000 ml for adults.**

# 4 Urinary Alkalinization

- **Infusion of sodium bicarbonate to raise urinary pH** to enhance clearance of toxins **excreted by kidneys**.
- **1-2 mEq/kg NaHCO<sub>3</sub> IV push**
- **3 ampules of NaHCO<sub>3</sub> in 850 ml of D5W at 1.5X maintenance fluid rate.**
- **Target urinary pH 7.5-8.5.**
- **Monitor electrolytes**

**Risk for volume overload , CHF, hypokalemia , PH shift**

# 1 Organophosphate poisoning

- **Organophosphates & carbamates** are potent **cholinesterase enzymes inhibitors** capable of **causing severe cholinergic toxicity**.
- Route of exposure can be **cutaneous exposure** through the **skin**, **inhalation or ingestion through the mouth**.
- **Examples** include **Malathion & Parathion**.

# Organophosphate poisoning (Cont.)

- They inhibit the enzyme cholinesterase in the **nervous system leading** to accumulation of **acetylcholine in the CNS, Autonomic nervous system & neuromuscular junction.**
- **Toxic dose: depends on substance characteristics**
- **Patients** will also have **characteristics garlic like odor** that may **assist in diagnosis.**

# Organophosphate poisoning (Cont.)

- **The clinical features**

- **SLUDGE**: Salivation, Lacrimation, Urination, Defecation, Gastric Emesis
- **DUMBELS**: Defecation, Urination, Miosis, Bronchorhea, Emesis, Lacrimation, Salivation
- **Killer 3 B's**: Bradycardia, Bronchorhea, bronchospasm.

# Treatment of organophosphate poisoning

- Treatment consists of airway control,
- intensive respiratory support, general supportive measures,
- decontamination, prevention of absorption, &
- **the administration of antidotes.**
- Protective clothing must be **worn** to prevent secondary contamination of health care workers.
- Early post ingestion **activated charcoal** is indicated for patients presenting within an **hour**.

# Antidotes

**1 Atropine IV:** used for reversal of **Muscarinic effects** including **pulmonary symptoms**.

- **Initial IV test dose of 1mg** provides a measure of severity, followed by **2- 4mg every 15 mins** until full **atropinisation** is achieved.
- **Maintenance therapy: continuous IV infusion of 0.05mg/kg/hr.**
- **To discontinue, taper the dose to prevent rebound bradycardia.**

**2, Pralidoxime** : A cholinesterase reactivating agent is used **to treat both Muscarinic & nicotinic symptoms** in severe poisoning.

# 2 Corrosives

- **Corrosives** are chemicals primarily **acids** and **alkali** that **cause tissue injury to a burn.**
  - **Acids** cause **coagulation necrosis** with **eschar formation** that **limits penetration and depth of injury.**
  - **Alkali** cause **liquefaction necrosis** and **penetrate more deeply.**
  - **Some corrosives** can cause **severe systemic toxicity** and **profound electrolyte disturbance.**
- example** of corrosives are **berekina, petroleum, .....**

# Corrosives (cont.)

- **Gastrointestinal symptoms:** Chemical burns of oral cavity, esophagus or gastric mucosa with associated **nausea and vomiting**, epigastric pain, **dysphagia or odynophagia** (painful swallowing in mouth).
- **Significant injury: airway compromise or gastrointestinal perforation** complicated by **peritonitis, mediastinitis, sepsis and shock**.

# Treatment

- **Endoscopy** indicated within **24- 48 hrs** **severe or deliberate ingestions.**
- **C/L** Gastric lavage & induction of vomiting, activated charcoal are **contraindicated.**
- Consider small **amounts of milk or water** orally to dilute corrosive.
- **Antacids** are used for subsequent ulcer treatment; **use of steroids & antibiotics has no benefit.**

# 3 Carbon monoxide poisoning

- **CO** is an odorless, tasteless, colorless, non irritating gas formed by HC combustion.
- **Atmospheric concentration** is generally **below 0.001%**, but higher in urban areas & closed environment.
- **Smoke inhalation** is responsible for **most cases of CO Poisonings.**

- **CO** binds to **Hb** with much higher affinity than oxygen (240 X) forms **carboxyhemoglobin & tissue oxygenation is impaired.**
- Patients may manifest symptoms ranging from **mild confusion to coma.**
- **Dx:** is based on a compatible **Hx and physical** exam in addition with an **elevated carboxyhemoglobin** level **measure by cooximetry** of a blood gas sample.

- **Management**: The most important interventions in the management are **removal from the CO source** & **administer oxygen by face mask** with **high flow/concentrations**.
- **Comatose patients** should be **intubated & mechanically ventilated using 100% oxygen**.
- **Hyperbaric oxygen**= patient breathes 100% oxygen at a pressure **greater than one Atmosphere Absolute (1ATA)**.

# 4 Barbiturates

- From the group of '**sedative - hypnotics**' that lower excitement & **induce sleep**.
- **Clinical features** of acute intoxication includes **slurred speech, incoordination, & impaired attention or memory**.
- **Severe overdose leads to coma.**

# Barbiturates cont`d

- **Most common vital sign abnormalities of barbiturate poisoning are:**
  - **Hypothermia**
  - **Respiratory depression**
  - **Hypotension**

# Barbiturates (Cont.)

## □ **TREATMENT**

- **Airway stabilization, intubation in severe overdose before GI decontamination.**
- **Volume expansion** by rapid infusion of **1-2L of isotonic fluid.**
- **Gastric lavage if within 1hr of ingestion.**
- **Activated charcoal** in multiple doses **to reduce serum concentration.**

- **Forced diuresis with fluid loading and diuretic therapy is **most effective for phenobarbitone**.**
- **Hemodialysis** is used to maximize barbiturate elimination for patients with **severe poisoning and in deterioration.**

# 5 TCA

## Poisoning

- Associated with **more drug related deaths** than any **other prescription drugs**.
- **Myocardial Na antagonism** leads to **life threatening arrhythmias**,
- **Life threatening ingestions usually require 10mg/kg**
- **Significant ingestions will present with sign & symptoms in 6hrs.**

## **❑ Signs and symptoms**

- Hypotension, respiratory depression,
- cardiac dysrhythmias, dilated pupils, dry mucosa, seizures,
- decreased bowel sounds, urinary retention and mental status changes.
- ECG changes with **QRS prolongation**, or
- right axis deviation **indicates impending life threatening arrhythmias.**



# Treatment

- **NaHCO<sub>3</sub>** is indicated for arrhythmias **due to TCA toxicity,**
- **Hypotension refractory** to fluids also responds to **NaHCO<sub>3</sub>.**
- **1-2 mEq/ Kg**
- **Norepinephrine infusion**

# 6 Phenytoin

- **Acute oral overdose is (olde)typically dose related**
  - **Manifests(S/S)**
    - **nystagamus, nausea, vomiting and ataxia.**
    - **Dysarthria, CNS depression or Excitation,**
    - **CVS toxicity includes hypotension,**
    - **bradycardia, conduction delay,**  
**Ventricular tachycardia.**

# ❑ Management

- **Hypotension** corrected with IV fluids,
- **For acute oral overdose multiple oral activated charcoal** should be given.
- **Atropine 0.5mg for bradyarrhythmia.**
- **Benzodiazepine for seizures.**

**THANK YOU**

# Case scenario 1

- A 15 years old girl from Aweday brought to ER by family on bus. She was found behind barn 6 hours ago, has decreased LOC, drooling, tears streaming, covered in vomit and urine, feces. Her Vital signs are as follows:
  - Heart Rate, 60
  - Respiratory Rate, 16
  - Blood Pressure, 90/60 mmHg
  - Temperature, 36.5 c

- How should you proceed?
- What management options are there for this patient?

## Organophosphate poisoning

Answer: stabilize airway, secure ABCs, decontamination, activated charcoal to prevent absorption,

**Atropine 1mg** for test and **2-4 mg** every 15 minutes till **full atropinization** is achieved.

Finally add cholinesterase enzyme reactivating agent **pralidoxime** which treats both muscarinic and nicotinic effects.

# Case Scenario

- A 28 yrs old woman is brought to the ED by her parents. She has been unresponsive for 8 hrs and has the following vital signs,
- Heart Rate, 118
- Respiratory Rate, 10
- Blood pressure 90/60 mmHg
- Temperature 34c

- What history would you like to know?
- What universal antidote would you consider for this patient?
- What Lab tests you want to do for this patient?
- What decontamination strategy would you choose for this patient?
- What are the management priorities after you identify the toxin she took?