GENERAL MANAGEMENT OF POISONING
• Toxicom (Greek) arrow poison
• Toxicum (Latin) poison
LAW RELATED TO POISON

S.337-J PPC

WHOEVER ADMINISTER TO, OR CAUSES TO BE TAKEN BY ANY PERSON, ANY POISON OR ANY STUPEFYING, INTOXICATING, OR UNWHOLESOME DRUG OR SUCH OTHER THING WITH INTENT TO CAUSE HURT TO SUCH PERSON, OR WITH INTENT TO COMMIT OR TO FACILITATE THE COMMISSION OF AN OFFENCE, OR KNOWING IT TO BE LIKELY THAT HE WILL THEREBY CAUSE HURT MAY, IN ADDITION TO THE PUNISHMENT OF “ARSH” OR “DAMAN” PROVIDED FOR THE KIND OF HURT CAUSED, BE ALSO PUNISHED.
Acute poisoning

• should be considered if the patient: has
  – symptoms that began shortly after exposure to a known poison
  – has been exposed to a poison known to have caused fatalities
Chronic poisoning

- Determine severity of exposure
- Determine magnitude of organ involvement.
- Careful history and physical examination
MEDICO LEGAL DUTIES OF DOCTOR

• PRELIMINARY PARTICULARS
• TREATMENT
• PRESERVATION OF EVIDENCE
• DYING DECLARATION/DEPOSITION
• INFORM AUTHORITIES
WRITTEN RECORDS

• In any case of poisoning in which there is a possibility of legal action at a later date

• The physician must keep careful written records of all relevant observations and findings.
PRESERVATION OF EVIDENCE

- Specimens should be placed directly in clean containers.
- The bottles used for storing specimens should be clean and free from contamination by chemicals or metals.
- Gloves and instruments should not be contaminated by disinfectants or chemicals which may be transferred to specimens.
- Store the specimens in a frozen state without any chemical preservatives.
• The container should be sealed with a glue-paper label extending over the cover and down onto the jar.

• Avoid using a seal such as adhesive tape, which can be removed and replaced.
• The physician’s signature should be affixed to the label at the juncture between cap and bottle.
Evidence to be saved in non-fatal poisoning

- Prescription paper
- Containers from which the poison was obtained.
- Urine (24-h specimen).
- Blood (10-50 ml).
- Vomitus and first two gastric washings.
- Feces.
- Body fat (obtained by biopsy).
- Hair clippings.
- Clippings of fingernails and toenails.
- Food.
Evidence to be saved in fatal poisoning

- The stomach and contents
- Liver (at least one-half)
- Kidneys (at least one)
- Blood (50–100 ml; should completely fill container)
- Bone (100 g)
- Lung (at least one)
- Brain (at least one half).
Legal chain of custody
SPECIAL PROBLEMS
**Attempted suicide**

*Physician’s Main Responsibilities*

- Give immediate medical care and to prevent further attempts.
- The patient must be placed in quiet, protected surroundings, preferably away from the family.
- After the patient recovers from the immediate symptoms, a careful evaluation should be made, preferably by a psychiatrist, to minimize the possibility of further suicide attempts.
Successful suicide

• If a patient commits suicide
  ▪ the physician is legally responsible for reporting the death to the police.
Homicidal poisoning

- The patient must be hospitalized until recovery.
- The circumstances should be reported to the police.
  - Further proof of attempted homicidal poisoning must be left to the police.
- If a patient dies as a result of a suspected homicidal poisoning, the physician is legally bound to report the death to the police.
Accidental poisoning

• May require 24 hours of observation.
• Food poisoning resulting from eating in a public restaurant or from eating contaminated commercial food must be reported to the local public health officer.
• Fatalities from suspected accidental poisonings must be reported to the police.
If poisoning has resulted from occupational exposure

A report must be sent to the proper authorities if the poisoning is reportable.
Dying declaration and dying deposition
SUPPORTIVE MEASURES

• Airway
• Breathing
• Circulation
• History
• Physical examination
• Decontamination
ALTERED MENTAL STATUS

• Check blood glucose level at bed side
• Seizures
  (Diazepam 0.1-0.2mg/kg over 1-2 min)
• Comma cocktail
  Dextrose (25g -50 ml of 50% solution)
  100mg of thiamine I/M or I/V infusion
  Naloxone 0.4 -2 mg I/V
  Flumazenil (in case of benzodiazepine)
Diagnosis of poisoning

• Toxidromes
  – Cholinergic
  – Anti cholinergic
  – Sympathomimetic
  – Opioids
• Odor of breath
  – Garlic
    • Arsenic, organophosphate compounds
  – Coal gas
    • Carbon monoxide
  – Bitter almonds
    • Cyanide
• Pupil size
• Miosis
  – Opium, organophosphorus compounds
• Mydriasis
  – Atropine
Color of skin and mucous membranes

- **Cyanosis**
  - Aniline, nitrobenzene, nitrates

- **Hyperemia**
  - Cyanide, alcohol

- **Jaundice**
  - phosphorus, carbon tetrachloride, acetaminophen

- **Pallor**
  - Benzene
Heart rate

- Tachycardia
  - Vasodilator
  - Tricyclic antidepressant
- Bradycardia
  - Calcium blocker
  - Clonidine
  - Sedative hypnotic
• **Pulse:**
  - **Rapid**
    - Theophylline, amphetamine, cocaine, ephedrine
  - **Irregular**
    - Insecticides, tricyclic antidepressants
  - **Slow**
    - Morphine
• **Temperature:**
  
  – **Increased**
  
  • salicylates, atropine, cocaine
  
  – **Decreased**
  
  • Chlora hydrate, opiates, barbiturates
DECONTAMINATION
DECONTAMINATION

Inhaled Poison

- Remove from source of poison
- Give oxygen
- Inhalation of water aerosol (help to dilute inhaled irritants)
- Check for hoarseness and singed nasal hairs
CONTAMINATED EYES

• Wash with plain water or normal saline
• Do not use neutralizing solution
• Slowly dribble 50-100ml of saline through I/V tubing
• Check with pH paper
• Careful eye examination
CONTAMINATED SKIN

- Wash with plenty of water and dilute soap solution
- Discard contaminated clothes in a marked plastic bag
- Remove all particulate prior to irrigation
- Immersion of burns in
  - Ammonium salt soln.
  - 10% Calcium gluconate.
  - s/c inj of Calcium deep to burn
GASTRIC DECONTAMINATION

- Dilution
- Emesis
- Demulcients
- Gastric lavage
- Adsorption with activated charcoal
- Catharsis
- Whole Bowel Irrigation
DILUTION WITH WATER

• 1-2 cupfuls for child and 2-3 cupfuls for an adult
• Not universally recommended for solid dosage forms
• Chemicals and household products are best managed by dilution
EMESIS

• Syrup of Ipecac

• Potassium and antimony tartarte, copper sulphate, zinc sulphate, mustard powder, salt solution are NO LONGER recommended
GASTRIC LAVAGE

- Laver (to wash)
- “It is the process of washing out the stomach with solutions, including water, saline, sodium bicarbonate, calcium salts, tannic acid and potassium permanganate.”
COMPLICATIONS

- Epistaxis
- Laryngeospasm
- Hypoxia
- Aspiration pneumonia
- Hyponatremia, hypocalcaemia
- Water intoxication
- Mechanical injury to gut
ADSORBENTS

- Activated charcoal
- Kaolin
- Fuller's earth
- Cholestyramine
- Pectin
- Attapulgite
ACTIVATED CHARCOAL

• Dose
  50-100g in adults
  25-50g in children
  1g/kg in infants

• 'Gut Dialysis' (multiple doses orally)
  Carbamazipine, Dapsone, Theophylline etc

• Less Useful
  Iron, Lithium, Potassium, Alcohol, Cyanides etc
CATHARTICS

➢ SALINE CATHARTICS

- Sodium containing
  - Na$_2$SO$_4$
    - 10% (250 mg/kg children- 15-20 gm in adults)
  - Na$_2$SO$_4$ / (Na)$_3$PO$_4$
    - (20ml in children - 40ml in adults)

- Magnesium containing
  - MgSO$_4$ 10% (250 mg/kg body weight - 5-10g in adults)
  - Magnesium citrate (4ml/kg in children - 250-300ml in adults)

➢ SORBITOL 1-1.5g/kg
Contraindication

• Obstruction, ileus, or electrolyte imbalance.
• Do not use oil based products
  – castor oil increases the absorption and toxicity of chlorinated insecticides.
  – Never use irritant cathartics
• Do not give magnesium-containing or hypertonic cathartics to patients with
  – renal disease or those exposed to nephrotoxins,
  – myoglobinuria or hemoglobinuria
Commonly used solutions are

- Sodium sulfate
- Polyethylene glycol electrolyte solution

Given by N/G tube 1-2 l/h

Never confuse Polyethylene glycol with ethylene glycol
Indication for whole bowel irrigation

- Iron
- Lithium
- Sustained release drugs
- Enteric coated drugs
- Body packers (cocaine)
Contraindication for whole bowel irrigation

• Patient with hemodynamic compromise
• Ileus
Antidote are substances which counteract the effect of poisons without causing appreciable harm to the body.
ANTIDOTES

Based on mode of action:

• Mechanical / Physical Antidotes
• Chemical
• Physiological
• Functional
• Dispositional
• Universal
MECHANICAL ANTIDOTES

• These are the substances which impede the absorption of poison by their presence
MECHANICAL ANTIDOTES

• Demulcents
  fat, oil, milk, egg albumin
  not to be used in fat soluble poisons

• Bulky food

• Activated Charcoal
CHEMICAL ANTIDOTES
CHEMICAL ANTIDOTES

• Formaldehyde poisoning
  • $\text{NH}_3$ converts it to hexamethylenetetramine

• Oxalic acid poisoning
  calcium salts reacts with oxalic acid and produce calcium oxalate

• Mercuric ion
  Sodium formaldehyde converts it to less soluble metallic mercury
• These agents produce effects which are opposite to that of the poison
PHARMACOLOGICAL ANTIDOTES

- Atropine – Pilocarpine
- Morphine – Nalaxone
- Organophosphates – Atropine & Oximes
- Benzodiazepines – Flumazenil
- Cyanides – Sodium Nitrite
  - Amyl Nitrite
  - Sodium Thiosulphate
Dispositional Antidote

Involves alteration of

- absorption
- metabolism
- Distribution
- excretion

- Acetaminophen over dosage
  - Conversion of toxic intermediate compound to non-toxic form by conjugation with glutathione (sulfhydryl donor)
  - N-Acetylcysteine
Functional antagonist

• Acts on one biochemical system to produce effects that are opposite from those produced on another system
  – During anaphylactic reaction after administration of drug intense bronchoconstriction occurs
  – Epinephrine reverses this effect
Chelators

Chela = claw
antidote against heavy metals
• Binds with metal ions to form stable complexes
• Chelate is cyclic complex formed between metal and a compound that contain two or more binding sites
• Five or six membered ring are more stable
Chelators

- British antilewisite (BAL)(dimercaprol)
  - Arsenical gas
- Ethylene diamine tetra-acetic acid (EDTA)
  - Lead, iron, zinc, copper
- Pencillamine
  - Lead, mercury
- Deferoxamine
  - Ferrous and ferric ions
- Succimer
  - Lead
Elimination of absorbed poison
METHODS TO ENHANCE ELIMINATION

• pH alteration
  – Alkaline diuresis
  – Acid diuresis
• Multiple dose activated charcoal
• Dialysis
  -Hemodialysis
  -Peritoneal Dialysis
• Hemoperfusion
METHODS TO ENHANCE ELIMINATION

• Alkaline diuresis
  – Phenobarbitone
  – Salicylate

Check plasma potassium level and RFT’s
I/V bicarbonate 1-2 mEq/kg over 3-4 hours
aiming urine pH -7.5-8.5
METHODS TO ENHANCE ELIMINATION

• Acid diuresis
  – Amphetamines
  – Phencyclidine

ammonium chloride 75mg/kg/24 hours
aiming urine pH 5.5-6
METHODS TO ENHANCE ELIMINATION

• Dialysis
  - Peritoneal Dialysis
Severely intoxicated patients
Governed by laws of osmosis
Increased recovery of water soluble
Chemical by hypertonic fluid
METHODS TO ENHANCE ELIMINATION

• Dialysis
  
  hemodialysis

Low molecular weight
Small molecular size
Low volume of distribution

Complication
  
  hypotension
  convulsions
  infections
Indication for haemoperfusion

Salicylates
Ethylene glycol
Lithium
Theophylline

**Charcoal haemoperfusion**

Carbamazepine
Theophylline
Complications

Hypotension
Air embolism
Sepsis
Bleeding
Thrombocytopenia
General treatment

Oxygen for respiratory failure
Morphine for pain
Diuretics for pulmonary edema
Diazepam for convulsion
Saline infusion
Glucose
Potassium /sodium