Forensic Toxicology

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Important Definitions:

- **Toxicology**
- It is the **science dealing** with

properties,
action,
toxicity,
fatal dose,
detection estimation of,
interpretation of the result of toxicological analysis and management of Poisons.

Forensic Toxicology

- It is a branch of Forensic Medicine dealing with Medical and Legal aspects of the harmful effects of chemicals on human beings.

- Forensic Toxicology is the study and practice of application of toxicology to the purposes of the law.

Important Definitions:

Clinical Toxicology:

- Deals with **human diseases caused by, or associated with abnormal exposure to chemical substances.**

Toxinology

- Refers to **toxins produced by living organism which are dangerous to man,**
- e.g.: snake venom, fungal and bacterial toxins etc.

Important Definitions:

Ecotoxicology:

- It is **concerned with the toxic effects** of **chemical and physical agents on living organisms**, especially in **population and communities** within **defined population.**

Paracelsus (1493-1541) once said

- "All substances are poisons; there is none which is not a poison.

  The right dose differentiates a poison and a remedy."

- *It is not easy to distinguish toxic from non toxic substances.*

- A key principle in toxicology is the

  Dose-Response Relationship.

Important Definitions:

- **Poison:**

A Poison is defined as **a substance(Solid, Liquid, Gaseous), which if introduced in living body(ingestion, injection, inhalation) or brought into contact with any part there of ,will produce ill health or death , by its constitutional or local effects or both.**

E.g.: Alphose, Sulphuric acid, Arsenic etc.

Important Definitions:

Drug (WHO 1996):

"**Drug is any substance or product that is used or intended to be used to modify or explore physiological systems or pathological states for the benefit of the recipient.**"

- **e.g.:** Paracetamol,
  Ciprofloxacin
  Salbutamol
  Oestrogen,
  Insulin etc.

Sources of Poison

1. **Domestic or household sources.**
2. **Agricultural and horticultural sources.**
3. **Industrial sources**
4. **Commercial sources.**
5. **From uses as drugs and medicines**
6. **Food and drink**
7. **Miscellaneous sources** -
   snakes bite poisoning, city smoke sewer gas poisoning etc.

1. **Domestic or household sources** - detergents, disinfectants, cleaning agents, antiseptics, insecticides, rodenticides etc.
2. **Agricultural and horticultural sources**- different insecticides, pesticides, fungicides and weedicide.
3. **Industrial sources**- In factories, where poisons are manufactured or poisons are produced as by products.
4. **Commercial sources**- From store-houses, distribution centers and selling shops.
5. **From uses as drugs and medicines** – Due to wrong medication, overmedication and abuse of drugs.
6. **Food and drink** – contamination in way of use of preservatives of food grains or other food material, additives like colouring and odouring agents or other ways of accidental contamination of food and drink.
7. **Miscellaneous sources**- snakes bite poisoning, city smoke, sewer gas poisoning etc.

most frequently reported poisonings	most frequent deaths by poisoning
1 - Pesticides	1 - Pesticides
2 - Household cleaning supplies	2 - Analgesics (aspirin, acetaminophen)
3 – Cosmetics	3 - Street drugs
4 - Cough and cold remedies	4 - Cardiovascular drugs
5 - Plant scrapes and insect bites	5 - Alcohol
6 –Analgesics (aspirin, Acetaminophen)	6 - Gases and fumes
7 - Topical creams and lotions	7 - Asthma therapies
8 - Hydrocarbons (gasoline, kerosene)	8 - Industrial chemicals
9 - Antimicrobacterial soaps	9 -Antidepressant medications
10 - Sedatives/hypnotics/ antipsychotics	10 - Household cleaning supplies
11 - Food poisoning	11 - Anticonvulsant medications
12 – Alcohol	12 - Food, plants, and insects

Manner of Death by poisoning

- **Accidental** poisoning cases are **Most**, but a large number are deliberate.
- **Suicidal** poisoning is probably the **most common** method of self-destruction. E g. Kcn, Hcl, Opium, Barbiturates, oxalic acid, organophosphorus, oleander etc
  - **Corrosive** agents (strong acids or alkalis) are used rarely because less painful substances are available.

- **Homicide** by poison is **rare** nowadays.
  - Such weapons of the old fashioned poisoned as **arsenic**, **strychnine** or **cyanide** are so easily detected that they are rarely used nowadays.

Types of Poisoning

- **Acute poisoning**

caused by an **excessive single dose**,
or **several dose** of a poison
taken over **a short interval** of time.

- **Chronic Poisoning**

caused by **smaller doses** over **a period of time**,
resulting in **gradual worsening**.
e.g.: arsenic, phosphorus, antimony and opium.

Types of Poisoning

Sub acute poisoning

- **features Of** both **acute and chronic poisoning.**

Fulminant poisoning

- produced by **a massive dose**.
- In this **death occur rapidly**, sometimes **without preceding symptoms**.

Classification of poisons

1. **According to the site and mode of action.**
2. **According to motive or nature of use.**

Classification of poisons
According to the site and mode of action

- Local Action
- Remote Action
- Combined local and remotes action

Classification of poisons

According to the site and mode of action

- **Local Action**
- **Corrosive**
- **Irritant**

- **Remote Action**
- **Cerebral Poison**
- **Spinal Poison**
- **Peripheral Poison**
- **Cardiac Poisons**
- **Nephrotoxic Poison**
- **Hepatotoxic Poison**
- **Asphyxiant Poison**

Classification of poisons

According to the site and mode of action

Local Action

Corrosive
Strong Acid:
Mineral acid : H2So4, HCL, HNO3
Organic acid: Oxalic Acid, Carbolic, Acetic.
Strong alkali:
Hydrates and carbonate of NA, K, Hno3
Metallic:
Mercuric/ Zinc Chloride, Agno3, KCN, Cuso4

Classification of poisons

According to the site and mode of action

Local Action

- **Irritant**
- **Agricultural:**
- **Inorganic:**
- **Metallic, Non-metallic, Mechanical**
- **Organic:**
- Vegetable origin, Animal Origin, Chemical preparations,

Classification of poisons
According to the site and mode of action
Remote Action

CEREBRAL

Stimulants:
Cyclic anti depressant ,amphetamine, caffeine

Depressant:
Alcohol, Ga, Opioid analgesic, hypnotic

Somniferous:
opium and its alkaloids, Barbiturates.

Inebriant (Intoxicant):
Alcohol, ether, Chloroform.

Deliriant:
Dhatura, Belladona, Hyocyamus, cannabia indica.

Stupefaciant, Hallucinogens,Convulsant:

Classification of poisons

According to the site and mode of action

Remote Action

Spinal Poison (Convulsant) : Strychnos Nux Vomica

Peripheral Nerves :Local Anaesthetics: Cocaine, Procaine **Relaxants:** curare

Cardiac Poisons : KCN, NaCN, Digitalis, Aconite, Nicotine, Quinine, Oleander

Asphyxiants Poison : Carbon Dioxide(CO_2), CO, hydrogen sulphide(H_2S

Nephrotoxic Poison : Oxalic Acid, Mercury, Cantherides

Hepatotoxic Poison: Phosphorus, Carbon tetrachloride, Chloroform

Miscellaneous: Food Poisons

Classification of poisons
According to motive or nature of use

- Homicidal:.
- Suicidal:
- Accidental:.
- Abortifacient:.
- Stupefying agent:
- Agents used to cause bodily injury:
- Cattle Poison:
- Used for malingering

Classification of poisons
According to motive or nature of use:

1. **Homicidal:** Arsenic, Aconite, Digitalis, Abrus Precatorius, Strychnos nux- vomica.
2. **Suicidal:** Opium, Barbiturate, Organophosphorus, carbolic acid, copper sulphate.
3. **Accidental:** Aspirin, organophosphorus, copper sulphate, snakes bite, Ergot, CO, CO_2, H_2S.
4. **Abortifacient:** Ergot, Quinine, Calotropis, Plumbago.
5. **Stupefying agent**: Dhatura, cannabis, chloral hybrate.
6. **Agents used to cause bodily injury**: Corrosive acids and alkalies.
7. **Cattle Poison**: Abrus precatorius, Calotropis, plumbago.
8. **Used for malingering**: semicarpus anacardium.

Ideal Suicidal poison:

cheap, should be **easily available,**

No bad taste, cause **No pain**

highly **toxic**,

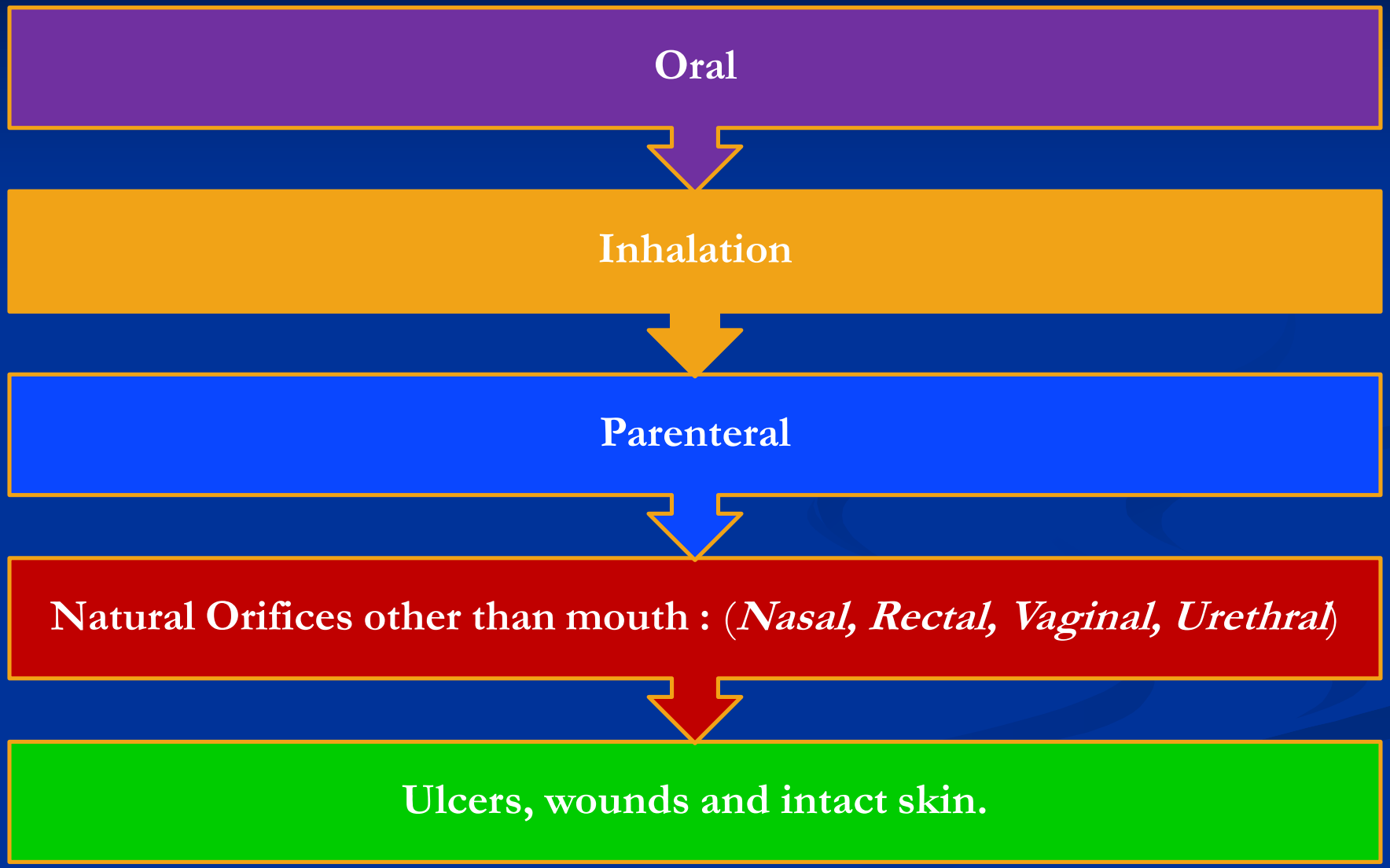
tasteless or **pleasant taste**,

capable of being taken **with food or drink**..

Ideal Homicidal poison:

- **Cheap, easily available,**
- **Colourless ,tasteless ,odourless,**
- Highly **toxic,**
- **No residual product** lest,
- **S/S resembles natural diseases,**
- **No antidote,**
- Shows **no post-mortem changes**
- **capable of being administered with food** or **drink.**

Route of Administration



Factors influencing the actions of a poison in the body

1. Quantity
2. Physical form
3. Chemical form
4. Concentration
5. Condition of the stomach
6. Route of administration
7. Age
8. State of body health
9. Presence of disease
10. Intoxication arid poisoning states
11. Sleep
12. Exercise
13. Cumulative action of poisons
14. Tolerance
15. Idiosyncrasy

Symptoms and Signs

- Sometimes poisoning **is difficult** to **recognise** but there are **signs and symptoms** that may cause **a doctor to think about poisoning**.

They are:

1. **Sudden vomiting** and **diarrhoea**
2. **Unexplained coma** in **children** and **adults** known **to have depressive** illness
3. **Rapid onset** of a **peripheral neuropathy**
4. **Rapid onset** of **neurological** or **gastrointestinal** illness in persons **occupationally** exposed to **chemical**

Symptoms and Signs

- **The symptoms and signs** may be **different** for **different poisons** and is **responsible** on the **nature *and* action** of the **poison**.

- They can **be local**, **remote** or **combined *and*** are **will be taught** in the **individual poisons**.

Poisons	their Symptoms
Acids (nitric, hydrochloric, sulphuric)	Burns around mouth, lips, nose
Aniline (hypnotics, nitrobenzene)	Skin of face and neck quite dark
Arsenic (metals, mercury, copper, etc.)	Severe, unexplained diarrhea
Atropine (Belladonna), Scopolamine	Pupil of eye dilated
Bases (lye, potash, hydroxides)	Burns around mouth, lips, nose
Carbon monoxide (CO)	Skin is bright cherry red.
Carbolic acid (or other phenol)	Odor of disinfectant
Cyanide	Quick death, red skin, odor of peach

Poisons	their Symptoms
Food poisoning	Vomiting, abdominal pain
Metallic compounds	Diarrhea, vomiting, abdominal pain
Nicotine	Convulsion
Opiates	Pupil of eye contracted
Oxalic acid (phosphorous)	Odor of garlic
Sodium fluoride	Convulsion
Strychnine	Convulsion, dark face and neck

Diagnosis of poisoning

In the Living

In the Dead

Diagnosis of poisoning

In the Living

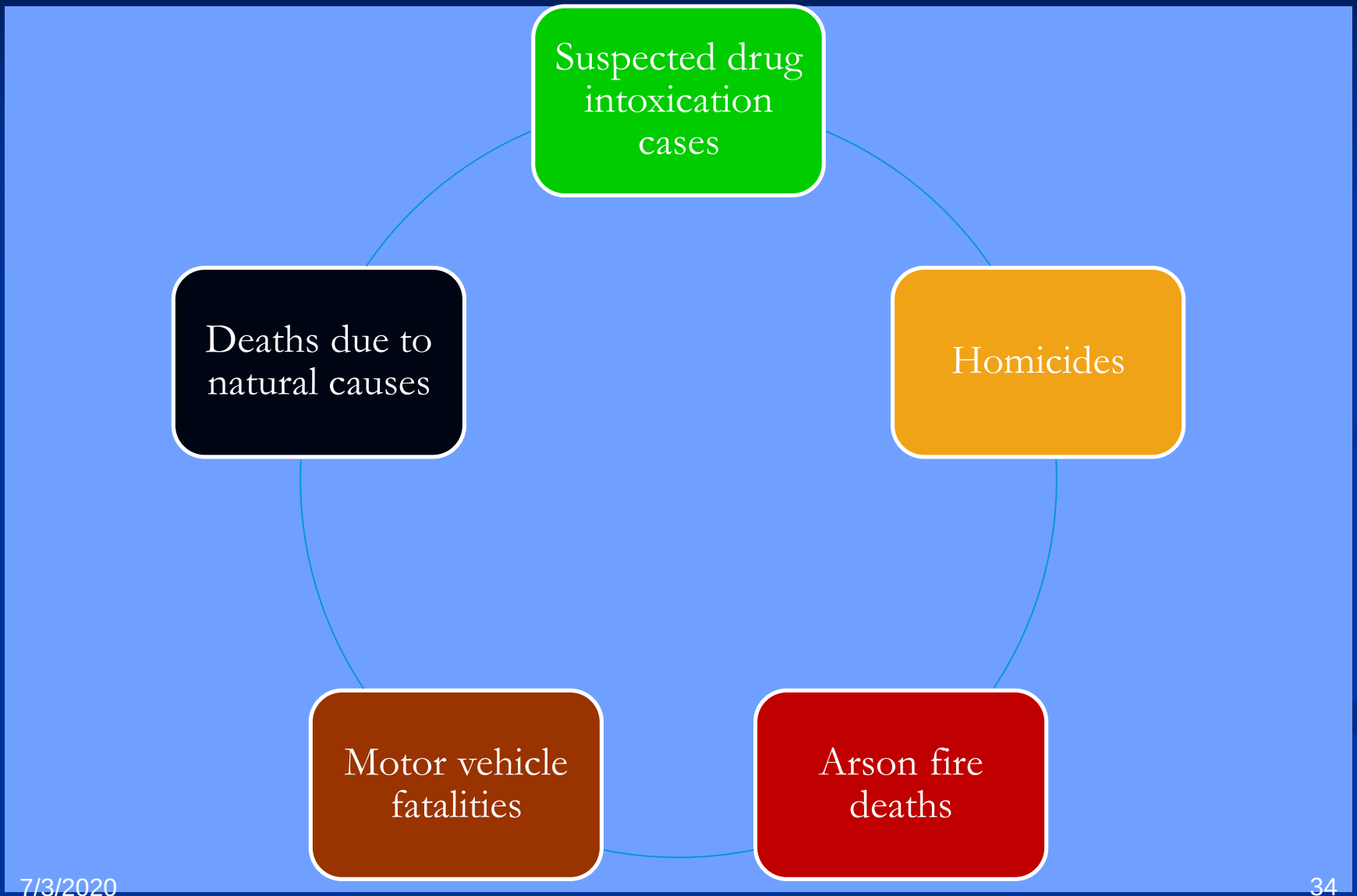
1. **History of the case** as stated by the **patient himself** *and* his/her **relatives** *or* **friend.**

   Full information about **time** of **onset** of the present illness, **Initial symptoms**, **progress**, **relation** with **food**, condition of **other persons** taking **same** food or drink, possible **source**, any **previous** history of poisoning, H/o **depression**, **quarrel**.

   Also **note** down the **colour**, **smell**, **consistency**, **taste** and **quantity** of the possible **poisonous** substance.

2. **Symptoms and Signs.**
3. **Details of examination.**
4. **Preservation** and **laboratory** investigation of **vomitus**, **excreta**, **stomach wash, scraps** from any **stains** area on the body, **blood**, stained part of the clothes, **contents** of a **doubtful container**, left over ant part of food or drink.

Postmortem Forensic Toxicology



Diagnosis of poisoning
In the Dead

1. **History** of the case as stated by **police** or **relatives**. H/o **2** or more **vital points** (**1 how long** the victim **survived after** initial **symptoms**. **2. any treatment**).
2. **Post-mortem Examination** (external and internal)
3. **Chemical Analysis**: **detection** of **poison** in the body **fluids**.
4. **Preservation of viscera** and other **material** for **lab. Examination**.

Post mortem Findings in Case Of Death Due To Suspected Poisoning

External Examination

1. **Postmortem Staining**:

   Deep blue - In case of asphyxiant poisons and aniline.

   Bright red or cherry red - In case of CO and HCN poisoning.
2. **Deep Cyanosis** - With opium and cardiac poisons.
3. **Early Rigor mortis -** With strychnine.
4. **Early appearance of the sign of Decomposition** - With H2S gas.
5. **Detectable Smell** - In case of volatile poisons, opium and HCN, KCN or Na CN.

ost-mortem hypostasis (Liver Mortis):
endent areas of body, blanched areas of buttocks and
re due to compression of vessels by weigh

Postmortem Findings: External Examination

6. **Haemorrhagic spots under** the **skin** and **mucus membrane**: Phosphorus. .
7. **Ulceration on lips** and **near** the angles of **mouth** - Corrosive poisons.
8. **Stain near mouth** and on **hands** - Nitric acid and copper sulphate.
9. **White froth from mouth and nose** – Opium and its alkaloids. .
10. **Blood tinged froth from mouth and nose** Organophosphorus compounds.

Postmortem Findings
External Examination

11. **Alopecia**, **hyper pigmentation** and **hyperkeratosis** - Arsenic poisoning over a long period.
12. **Staining**, **erosion and ulceration** near the **female** *external genitalia* - Use of abortifacient agents or torturing agents.
13. **Injection marks** - Injection of poisons (snake bite or otherwise), sign of treatment.

Postmortem Findings in Case Of Death Due To Suspected Poisoning

Internal findings:

- The **G.I.T.** should be **examined very carefully** ***since*** **signs** of **corrosive** or **irritant** poisons are ***likely*** to be **find** therein.

- These **signs** are **Hyperemia,**
  Softening,
  Ulceration
  Perforation.

Postmortem Findings
Internal findings:

1. ***Corrosion*, ulceration** and **desquamation** of inner aspects of **lips**, mucus membrane of **mouth** and **tongue** - **Corrosive agents**.
2. **Soft, swollen, sodden, translucent, bleached tongue** and mucus membrane of **mouth- Corrosive alkali**
3. **Hardening** of mucus membrane - **Phenol**
4. **Phenol Yellowish** discoloration - **Nitric acid**

Postmortem Findings
Internal findings:

5. **Bluish** discolouration - **Copper sulphate**

6. **Carbonization** and **charring- Conc. Sulphuric acid**

7. **Chalky** appearance and consistency of **teeth - Sulphuric acid**

8. **Blue lining** in the gum **- Chronic lead poisoning**

Postmortem Findings
Internal findings:

9. **Swollen gum**, **loose teeth**, **foetid smell** - Acute **mercuric** chloride poisoning; chronic **phosphorus** poisoning
10. **Corrosion**, **irritation**, **desquamation** and **haemorrhage** in the inner wall of the **oesophagus** - **Corrosive and irritant poisons**
11. **Hardening** and **whitish** discolouration – **Carbolic acid** poisoning
12. **Discoloration** and **staining** of inner aspects of **mouth** - With coloured poisons
13. **Oesophageal stricture** - A complication of sulphuric acid ingestion

Postmortem Findings
Internal findings:

14. **Stomach**

a) **Thickening** and **softening** of the **wall** - **Corrosive** and **irritant** poisons

b) **Hard wall- Carbolic acid**

c) **Hard** and **leathery** wall- **Formaldehyde**

d) **Hyperemia haemorrhage and desquamation** of mucus membrane.- **Irritant** poison

e) **Laceration** and **sloughing** – **Corrosive** poison

f) **Perforation** - **H_2SO_4** and **HN_3**

g) **Yellowish** discolouration of **mucus membrane** - **HNO_3**; **Bluish** - **$CuSO_4$**;

Slaty grey – **$HgCl_3$**

Postmortem Findings
Internal findings:

14. **Stomach**

h) **Stomach content** –

Blood - Corrosive and irritant;

Yellowish – HNO_3

Bluish - $CuSO_4$

Luminous in **dark** - Phosphorus;

Detectable tablet - Soneryl; Powder **oxalic acid**, white **arsenic**;

Detectable smell - kerosene, alcohol, chloroform, organophosphorus compounds, chlorinated hydrocarbons, opium, cyanogen, formaldehyde, phosphorus;

Detectable liquid - kerosene.

Postmortem Findings
Internal findings:

15. **Small intestine** –

    May show **irruption**, sometimes may show presence of **poisonous remains**.

16. **Large intestine** - May show **ulcerations**, as in case of **HgCI3** similar in appearance of ulcers of bacillary dysentery. It ***particularly*** **involves** the **ascending** and **transverse colons**.

Postmortem Findings
Internal findings:

17. **Liver –**

- **Different degenerative** changes occur in cases of poisoning with poisons like **phosphorus, carbon tetra-chloride, chloroform, tetrachlorethylene** and many other poisons.
- The **type** and **extent** of the **degenerative** changes occur **depending** on the ***type*** of **poison**, ***dose***, ***duration*** of the exposure and ***physical condition*** of the patient.

Postmortem Findings
Internal findings:

18. **Kidneys –**

- **Swollen**, **reddish**, **soft**, sometime **greasy** in touch with **haemorrhage** in **calyces** and other **degenerative changes** - cases of poisoning with mercury, oxalic and carbolic acid, phosphorus, cantharides, viper snake venom and many others.

- In case oxalic acid poisoning, **white powder** of **oxalate crystals** are present in the tubules and the calyces .

Postmortem Findings
Internal findings:

19. **Urinary bladder – Haemorrhage** in cases of abrus precatorius, viper snake bite, cantharide poisoning.
20. **Larynx and trachea – Hyperaemic, inflamed** -In cases of **inhalation** of irritating gases leaking of corrosive agents *while* ingestion vomiting;
21. **froth** in the lumen of trachea and larynx in case of opium and organophosphorus poisoning.

Postmortem Findings
Internal findings:

21. **Chest cavity** -**Smell** of volatile poisons cyanogen, opium etc. can be detected.

22. **Lungs** - **Voluminous**, **congested**, presence of **Tardieu's spots** - In case of asphyxiants and inhaled poisons.
    Cut section gives **blood stained frothy-fluid** in case of opium and other asphyxiants.

23. **Heart**- **Presence** of **subendocardial haemorrhagic** spots in cases of arsenic, phosphorus, mercuric chloride etc.

Postmortem Findings
Internal findings:

24. **Brain and spinal cord** –

- **Congestion** and **edema** of **brain** and **spinal cord** in cases of cerebral and spinal poison (e.g. **strychnine)**
- **Brain** – may be **congested**.
- **oedematous** with occasional **haemorrhagic** points at places in cases of asphyxiant poisons.

25. **Uterus and vagina** –

- **Staining, congestion haemorrhage, ulceration** in cases of attempted abortion by use of local abortifacient agents.

Postmortem Forensic Toxicology

- Specimens
  - Blood – from the heart and from the femoral or jugular veins
  - Vitreous humor
  - Urine
  - Bile
  - Liver
  - Other – lung, spleen, stomach contents or brain

Preservation of viscera and other materials

Stomach with its full contents.	A loop of Small Intestine	Half of Liver or 500 gms whichever is more.
Half of Each kidney.	Some portion of Spleen.	Sample of Blood

In some particular poisons

Blood 100ml: in cases of absorbed poisons.

Urine 100ml in all cases where blood is preserved.

Part of **both lungs** in cases of Volatile poisons.

Heart in case of cardiac poisons.

Brain in cerebral poisons.

Spinal in spinal poisons.

Bones in arsenic and lead.

Hair in arsenic and copper.

Nails in arsenic.

Skin-scrap from areas stained with a suspected poison.

Stained areas of dress, suspected packet of poison, strips of tablets recovered from pocket.

Preservative used

- **For Viscera: Saturated salt solution, absolute alcohol** or **rectified spirit.**

  Exception: alcohol, chloroform, chloral hydrate, formaldehyde, ether, phosphorus.
  (alcohol prevents the luminosity of phosphorus in dark) etc.
- **Blood** should be preserved in **fluoride, oxalate, E.D.T.A., gold chloride** or **citrate**.
- **Urine** and **clothes**: **without any** preservative.

Management of a case of poisoning

- **Immediate resuscitative (Basic Management) measures** in comatose patient should be adopted to ***stabilize*** **respiration, circulation** and the **correct CNS depression.**

A. **Airway: Opening Up** and **Cleaning** the **Airways** (oral cavity, Nostrils) of secretions, vomit or any foreign body. **Pull Tongue forward**

B. **Breathing**: Supplemental **Oxygen Therapy** should be administered

C. **Circulation**: **I.V. Fluid** administration

D. **Depression** of **CNS** should **be corrected**.

Specific Management

- **Removal of patient** from source of exposure.
- **Removal of the unabsorbed poison.**
- **Diluting the poison**
- **Elimination of absorbed poison**
- **Use of specific antidote**
- **Symptomatic treatment.**

Specific Management

1. **Removal of patient** from source of exposure:
2. **Removal of the unabsorbed poison**.

In case of **contact** poison **washing of** affected area with soap water with gentle rubbing will be helpful.

In cases of **ingested** poisons

Gastric lavage

Emesis (physical or by drugs like Ipecacuanha 1-2 gm, mustard oil 1 tsf in a glass of water, concentrated salt solution 6%, Zinc Sulfate 1-2gm in water, apomorphine hcl 1-2ml o 3 mg /ml).

In case of **injected poison ligature** is applied **above** the **wound**.

In cases of **inhaled** poison the patient should be **immediately removed** to **fresh air**.

Gastric lavage

Indications

Rarely indicated in 2012

- Poor efficacy
- Significant nasal trauma from large bore tubes

Historically used in severe ingestion cases

- Overdose or Ingestion within 1 hour
- Extraordinary overdose with a potentially toxic amount of medication
- Specific overdose after 1 hour
  - Ingested drug slows peristalsis
    - Anticholinergics
    - Opioids (Narcotics)
  - Ingested drug forms Bezoar
    - Salicylates
    - Iron

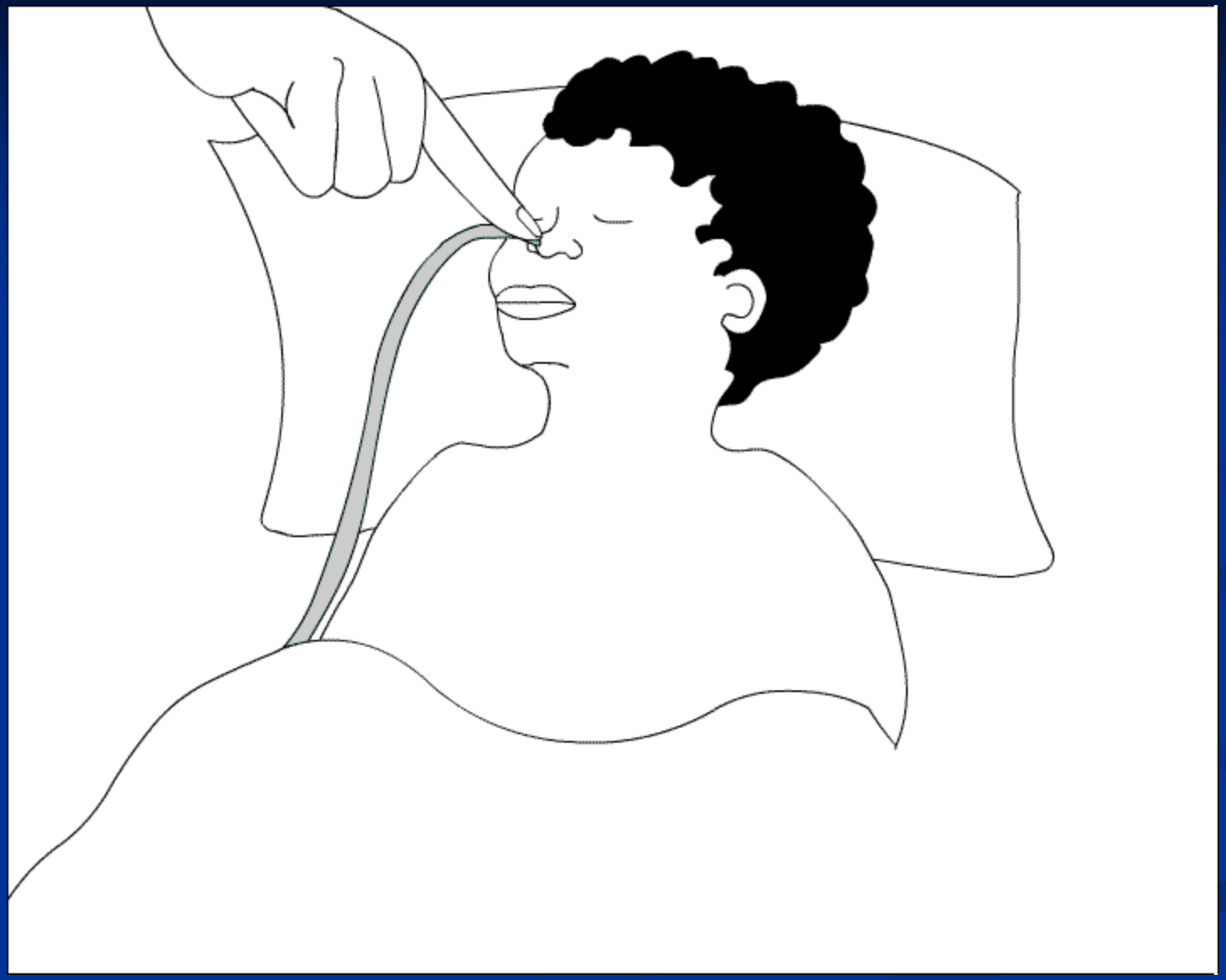
Gastric lavage

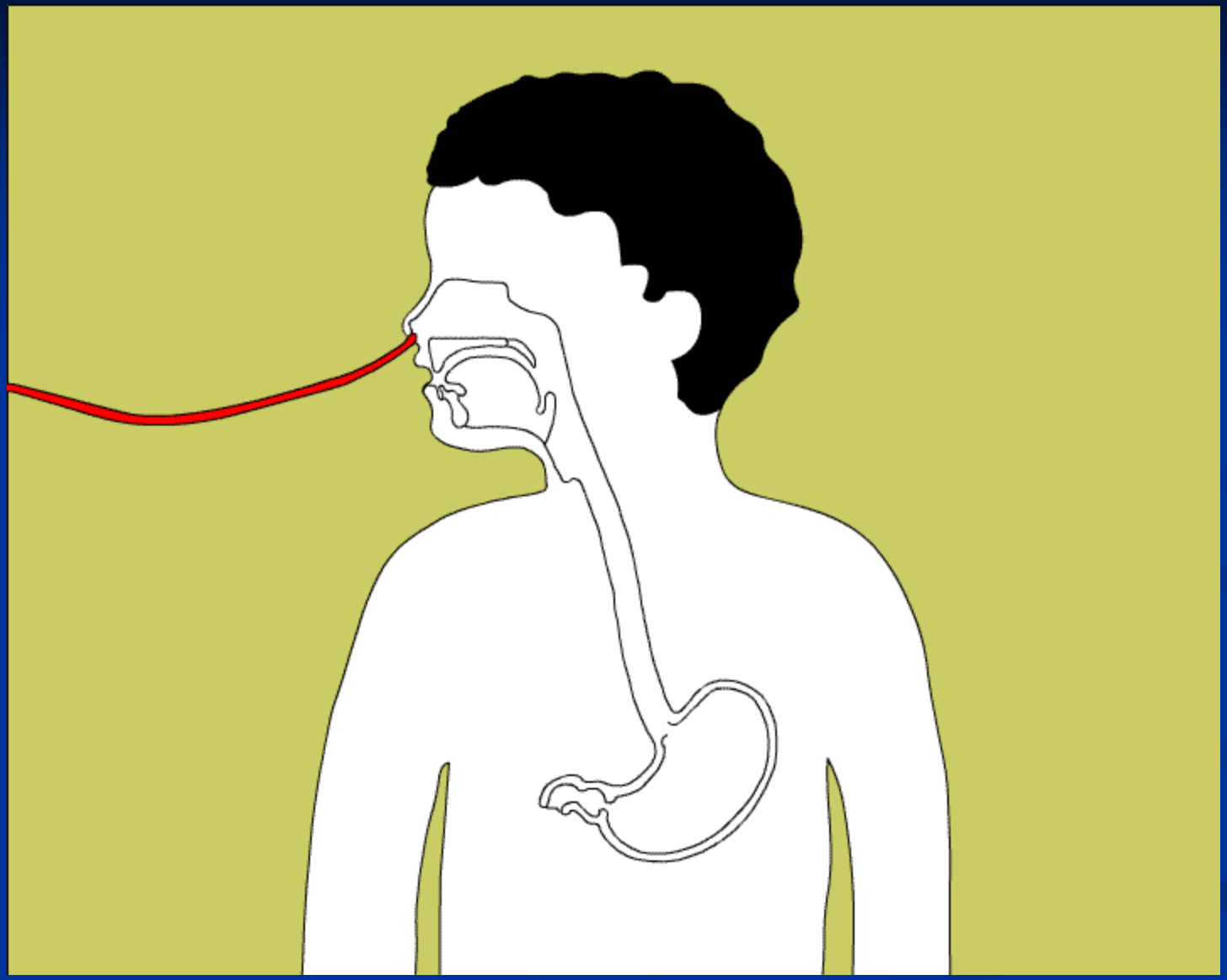
Technique

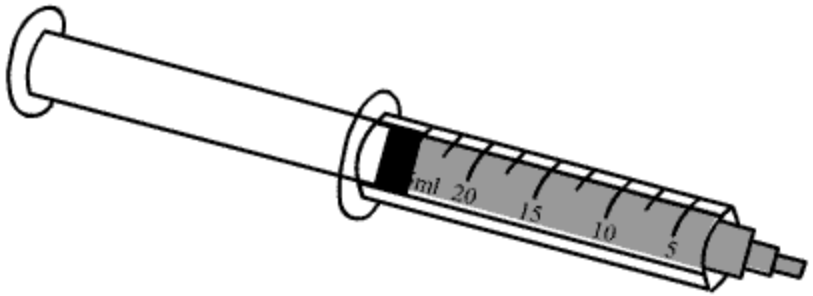
- Consider Endotracheal Intubation in advance
  - Indicated for neurologic Impairment
- Use a large bore tube (28 French Ewald tube)
  - Larger tubes however cause considerable nasal trauma
- Position patient
  - Head down
  - Left lateral decubitus

Lavage tube

Stomach tube



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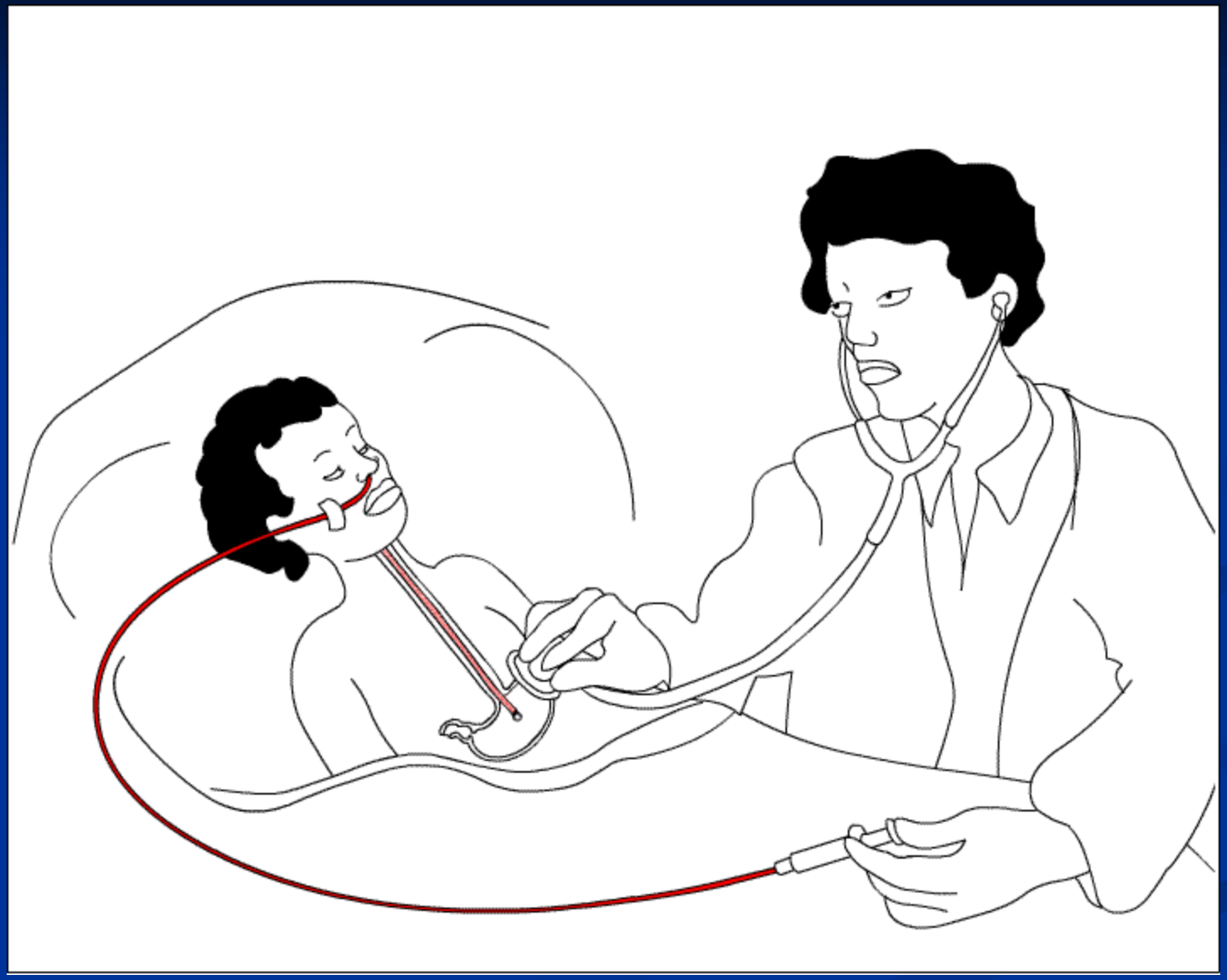
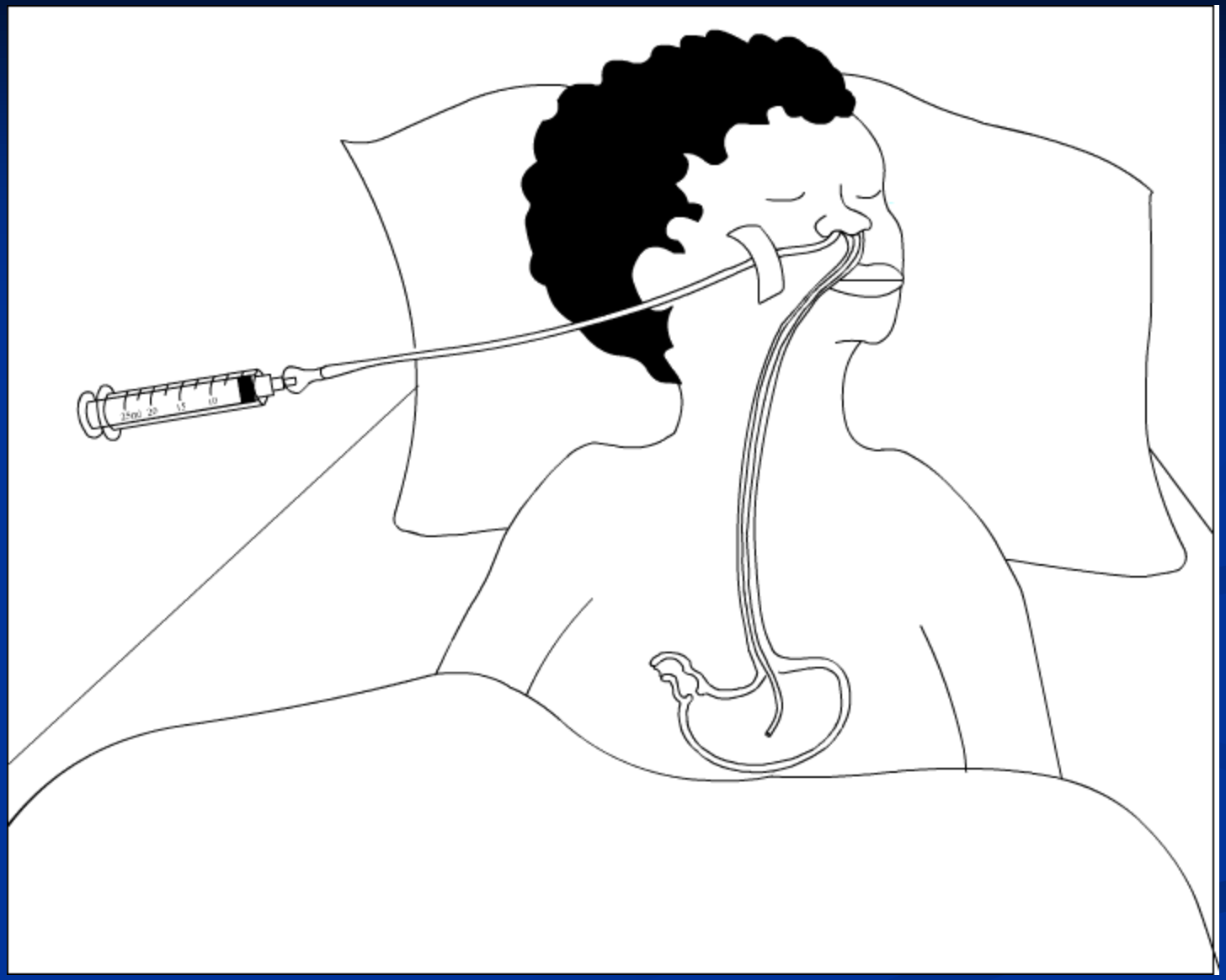




Gastric lavage

Contraindications

- Insignificant overdose
- Corrosive Ingestion (strong acid or alkali)
- Hydrocarbon Ingestion (high aspiration risk)
- Minimally effective if given >1 hour post-ingestion
- Increased risk of Gastrointestinal Bleeding or perforation.
- Unprotected airway (e.g. Altered Level of Consciousness)

- Technique
  - Aspirate first prior to fluid lavage
  - Instill lavage fluid into Stomach
    - Adult 100-300 cc warm water or normal saline per wash
    - Child 10-15 cc/kg warm normal saline per wash
  - Aspirate fluid back and dispose of fluid

- Repeat lavage
  - Repeat until aspirate clears of pill fragments and similar debris of concern
  - Single dose is sufficient in many cases
  - If repeated, alternate aqueous and Sorbitol charcoal preparations every 2 hours

Gastric lavage

Preparations

- Activated Charcoal in aqueous solution (preferred due to lower Emesis, aspiration risk)
- Activated Charcoal in Sorbitol

Complications

- Aspiration Pneumonia
- Laryngeal trauma
- Esophageal Perforation
- Epistaxis
- Electrolyte imbalance
- Hypothermia

Specific Management

1. **Removal of patient** from source of exposure:
2. **Removal of the unabsorbed poison**.

In case of **contact** poison **washing of** affected area with soap water with gentle rubbing will be helpful.

In cases of **ingested** poisons

Specific Management

3. **Diluting the poison** and **delaying** the **absorption by water** or **food**.
4. **Elimination of absorbed poison by** increases **urination** (**diuresis**), increased **perspiration** (**diaphoresis**), **Dialysis**, use of **chelating** agents.
5. **Use of specific antidote**
6. **Symptomatic treatment** including **safeguarding respiration** and **maintenance** of **circulation**

Antidote

- **Antidotes** are **substances** which **counteract** the **effect** of **poison.**

- **They** are **divided** into

  Mechanical (physical),

  Chemical,

  Physiological

  and **specific receptor antagonists.**

Physical or Mechanical Antidote

- It prevents the action of poison mechanically, without destroying or inactivating the damaging actions of the poisons.

- E.g.: Adsorbents like activated charcoal,
  Demulcents like egg albumin, starch or milk,
  Diluents like water or milk, bulky food like boiled rice or vegetables.

Chemical Antidotes

- **They** are **Substances** which **disintegrate**

  and

  inactivate poisons **by**

  undergoing chemical reaction with them.

E.g.: Weak acids and **alkali**,

common salt,

egg albumin,

KMNO4.

Physiological Antidote

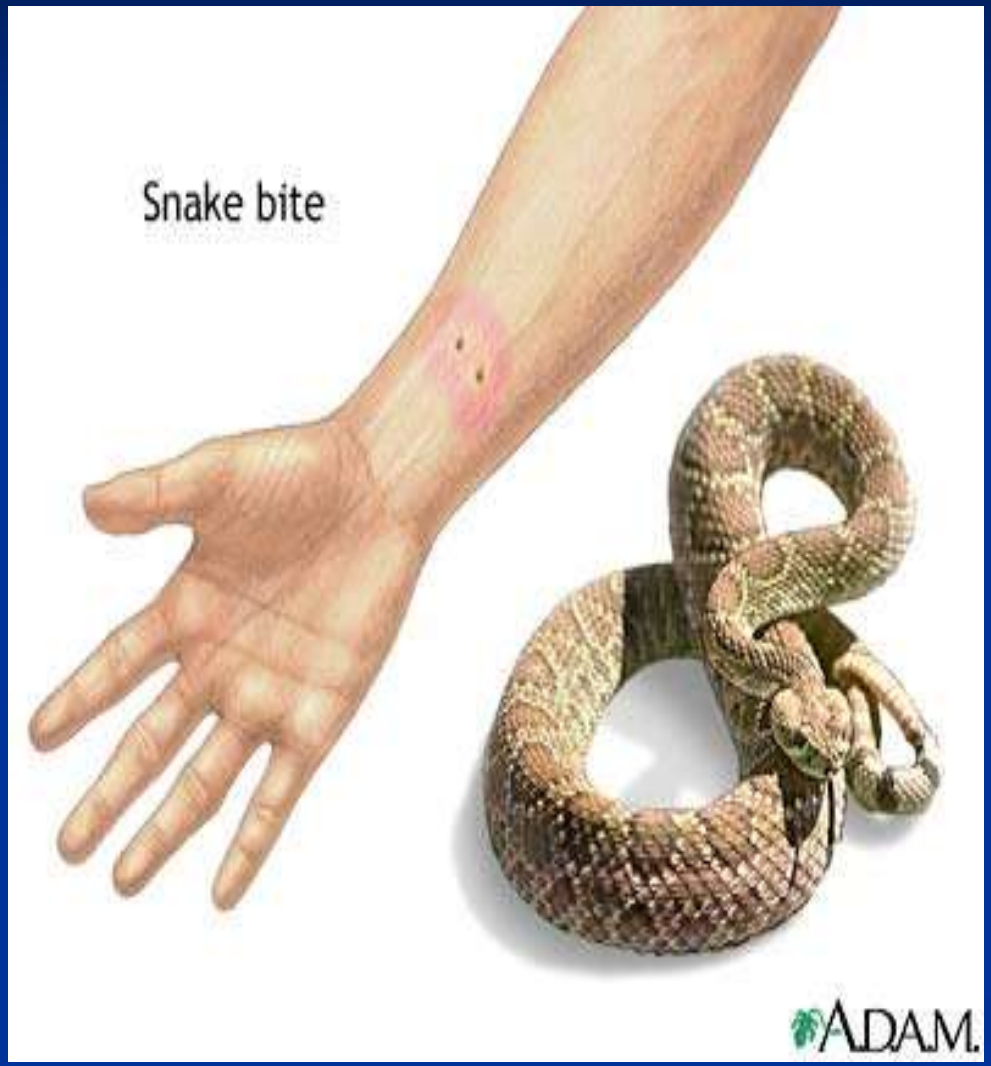
- They have their own action producing signs and symptoms opposite to that produced by the poison.

- E.g.: Naloxone for morphine,
  Neostigmine for datura or hyoscin group,
  Barbiturate for strychnine.

Serological Antidote

- Anti-snake venom serum for snake bites poisoning.

Snake Bite



Universal Antidote

- It is a **combination** of **physical and chemical antidotes.**
  When the **exact nature** of poison is **not known** then **universal antidote** is **used** which **acts against a wide range of poisons.**

- **Constituents Activated charcoal** **2 parts**
- **Magnesium oxide** **1 part**
- **Tannic acid** **1 part**
- **Dose** **1TSF (15gms)** in **a glass water** (can be repeated)

- **Activated charcoal** → **for its adsorbent** action,
  Magnesium oxide → **neutralizes** acids poisons,
  Tannic acid → **precipitates** alkaloids.

Household Antidotes

1. **Strong liquid tea** (contains tannic acid) precipitate **alkaloid** and **metallic** poisons.
2. **Starch** for **iodine**.
3. **Milk** and **raw egg** for **mercury, arsenic, heavy metal**.
4. **Flour suspension** and **mashed potatoes** can be used in place of **activated charcoal**.
5. **Milk of magnesia** or **soap solution** for **acid** poisoning.
6. **Orange, lemon juice** or **vinegar** for **alkali** poisoning.

Chelating Agents

- They are the **substances** which **act on absorbed metallic poisons.**
- They **have greater affinity** for **metals** as compared to endogenous enzymes.
- The **complex of agent and metal** is **more water soluble** ***than*** **metal itself**, resulting in → **higher renal excretion of the complex.**

- **E.g.: British anti-lewisite (B.A.L., dimercaprol),**
  E.D.T.A. (ethylene diamine acetic acid),
  Penicillamine (Cuprimine),
  Desferroxamine etc.

Duties of a Registered Medical Practitioner

in connection with poisoning cases

1) **Try** to **save** the **life** of the patient and give **emergency necessary treatment.**

2) **If** *necessary*, the patient should **be sent** to **a better hospital**, if *possible* **a government hospital**, *if* the *condition* of the patients **demands** and **permits** the shift.

3) **Take** a **detailed history** of the case as to when and how the **symptoms started,**
what is the **progress**;
whether **related** to taking of any **food** or **drink** ;
whether the **number** of **sufferer** is **more** than one,
whether any **treatment** was already **given,**
and whether there is any **history** of **previous poisoning**.

Duties of a Registered Medical Practitioner

4) **The** doctor should himself **record** full **history** of the case, the **signs** and **symptoms** and **progress**.

5) **The** doctor should **collect** and **preserve** the **vomitus**, **stool**, **urine**, **clothes stained** with poison or vomitus, **doubtful container** with remaining part of the poison, if any, and if necessary **blood**, for laboratory investigations.

6) **The** doctor should **arrange** for **a reliable attendant** of his own choice, for the patient.

Duties of a Registered Medical Practitioner

7) **The** doctor should **inform** the **police station** of the area about the case **irrespective** of **whether** the patient **survives** or **dies** and **whether** it appears to be a case of **suicide** or **homicide** or **accident**..

8) **If death** is apprehended then **arrangement** for **recording dying declaration** should be **made**.

9) **In** case of **death**, **death certificate** should **mention** about the **poisoning** or **suspected poisoning** with **recommendation** for **post-mortem examination**.

Thanks for attention