

general management of poisoned patient



Golden rules

- Treat the patient not the poison
- Best Antidote = Good Supportive Care



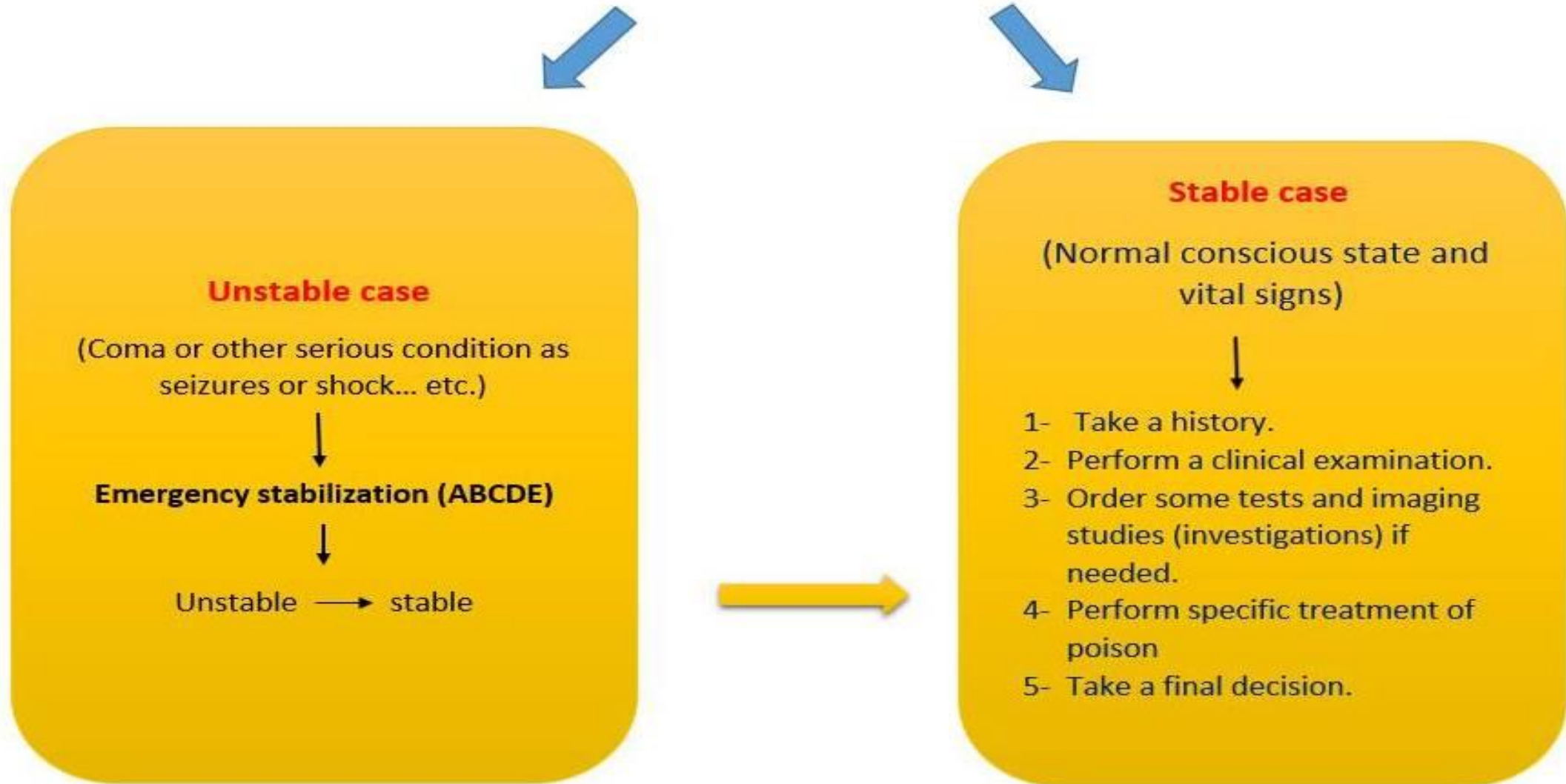
- So, before start management of poisoned patient as your self an important question:

Is my patient stable or unstable?

- Unstable patient is patient in coma or has another **serious condition** (seizures, serious dysrhythmias, metabolic acidosis, hyperthermia, shock, etc.) and these are **life threatening conditions**.
- So, the first priority of emergency physician in case of unstable patient is **emergency stabilization**



Step by step approach to poisoned patient



Causes of coma (altered mental status)

- Decreased **O₂** supply to brain (airway , breathing or circulation problems)
- Decreased **glucose** supply to brain
- Direct CNS depression



Emergency stabilization of comatose patient

initial resuscitation (ABCDE)

- **A: airway** patency
- **B: breathing** assessment
- **Circulation** assessment
- **Dextrose and Drugs:** coma cocktail
- **Emergency therapy:** treatment of serious complications

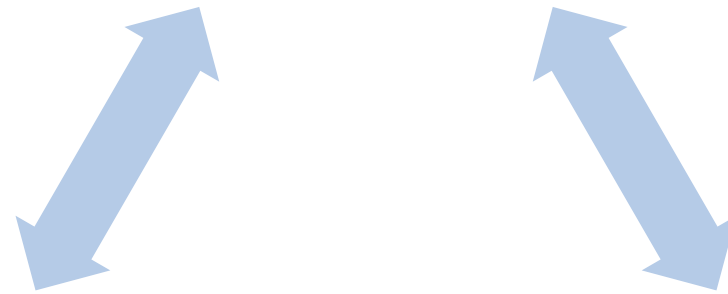


Airway patency

- **Is airway problem, cause or result of coma?**
- **Airway problems is a still the major cause of morbidity in toxicology as in other aspects of emergency.**



**Airway
protection**



**Insurance of
patency**



**Treatment of
airway problems**



To ensure patency

I. Evaluate laryngeal reflexes (cough reflex), how?

cough reflex is indirect index of the patient's ability to protect the airway. How test ????? → evaluate Conscious state (GCS) → < 8 → insert a tube.

II. Put patient in proper position

III. Examine for airway obstruction



Put the patient in proper position

Aim:

- 1- to maximize airway
- 2- to prevent back falling of tongue
- 3- to help secretions to drain out

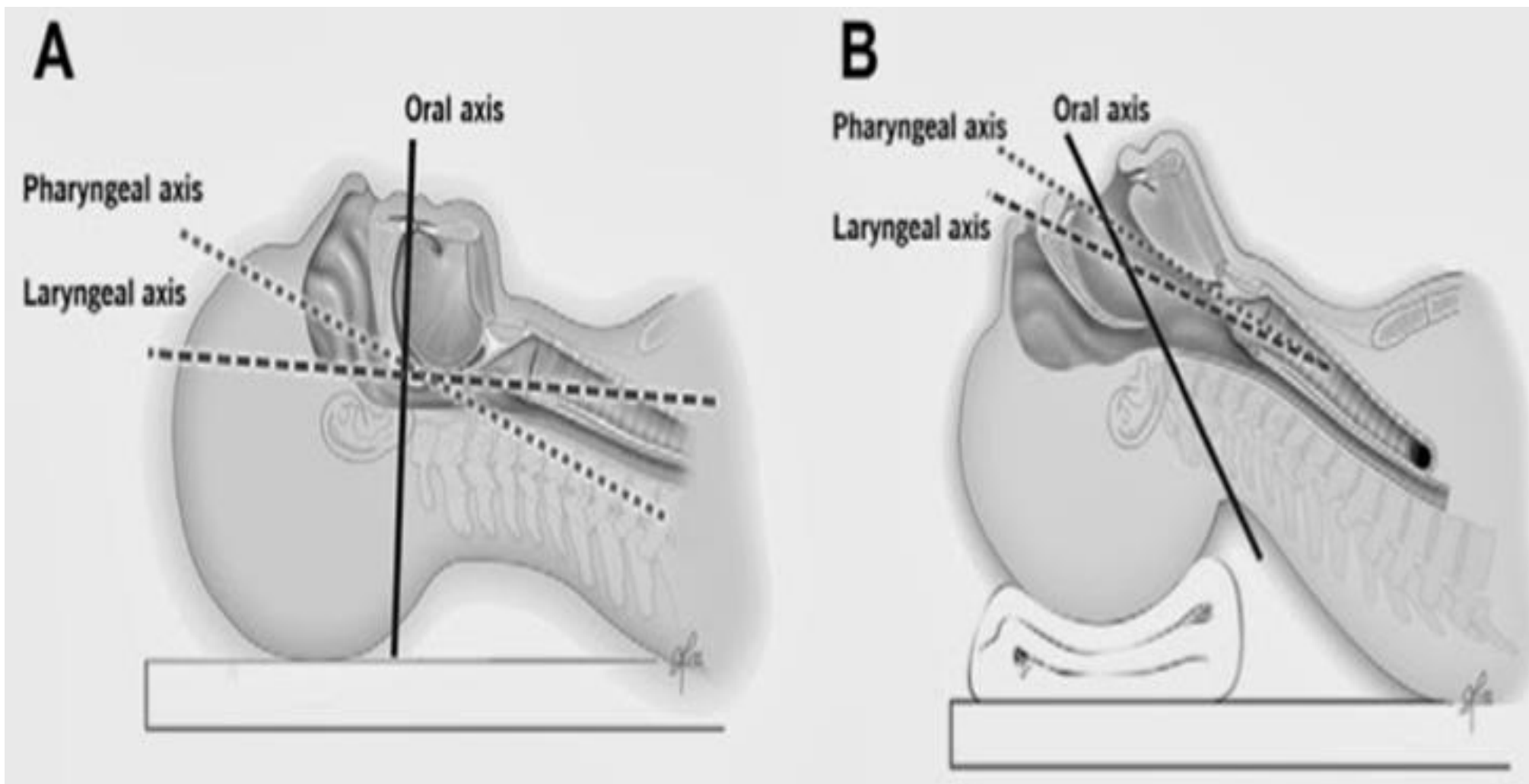
methods (positions):

- sniffing position
- jaw thrust.
- a face-down, left-sided position**

N.B: Before changing body position, better to stabilize cervical spine until excluding cervical injury as a cause of coma



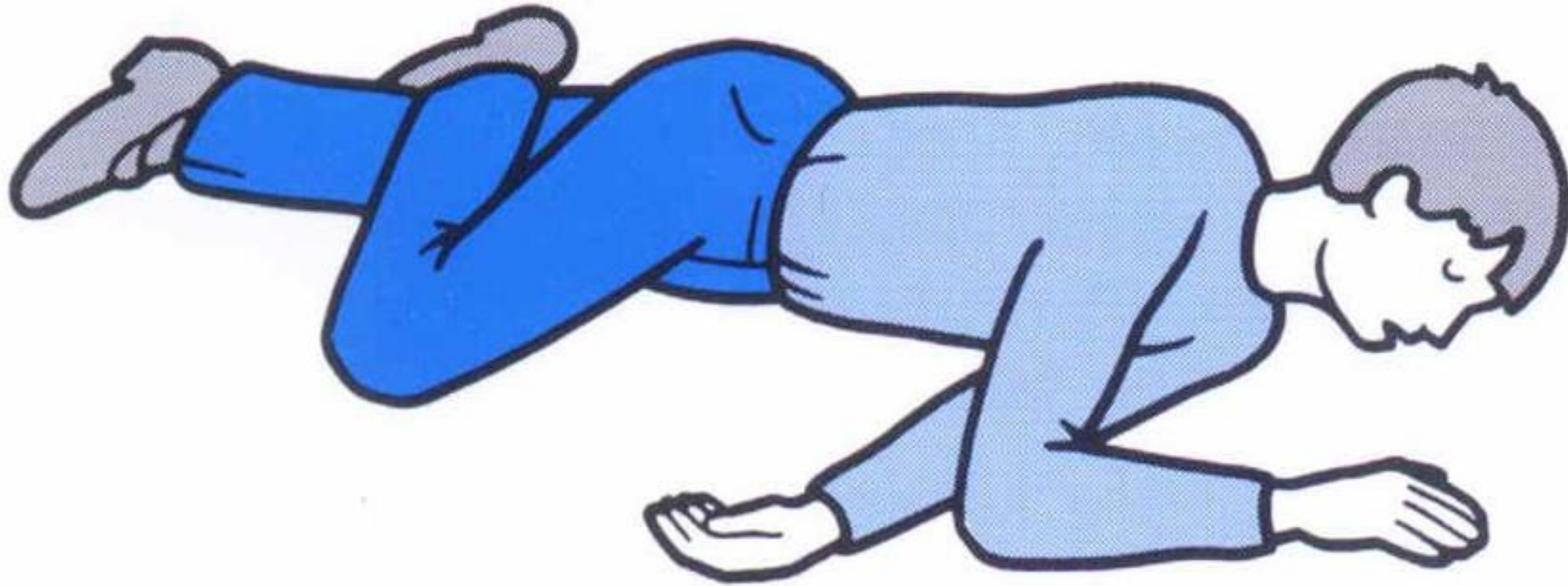
Sniffing position



Jaw thrust



Left sided position



Examine airway for obstruction

Examine airway for (causes of obstruction):

1. Back falling of tongue (flaccid tongue in coma).
2. Aspiration of foreign body as food & vomitus.
3. Accumulated secretions (as OPC poisoning).
4. Laryngeal edema (as corrosives or irritant gases).



Treat the cause of obstruction

- a. Pulling of tongue and supporting jaw.
- b. Suction of secretions.
- c. Removal of foreign body.
- d. intubation:
 1. **Airway piece:** keep tongue in position.
 2. **Endotracheal tube:** the most reliable protection of the airway, preventing aspiration and obstruction and allowing for mechanically assisted ventilation.
 3. **Tracheostomy tube:** cricothyrotomy, performed in cases where endotracheal intubation are impossible (airway obstruction by a foreign body, laryngeal edema).



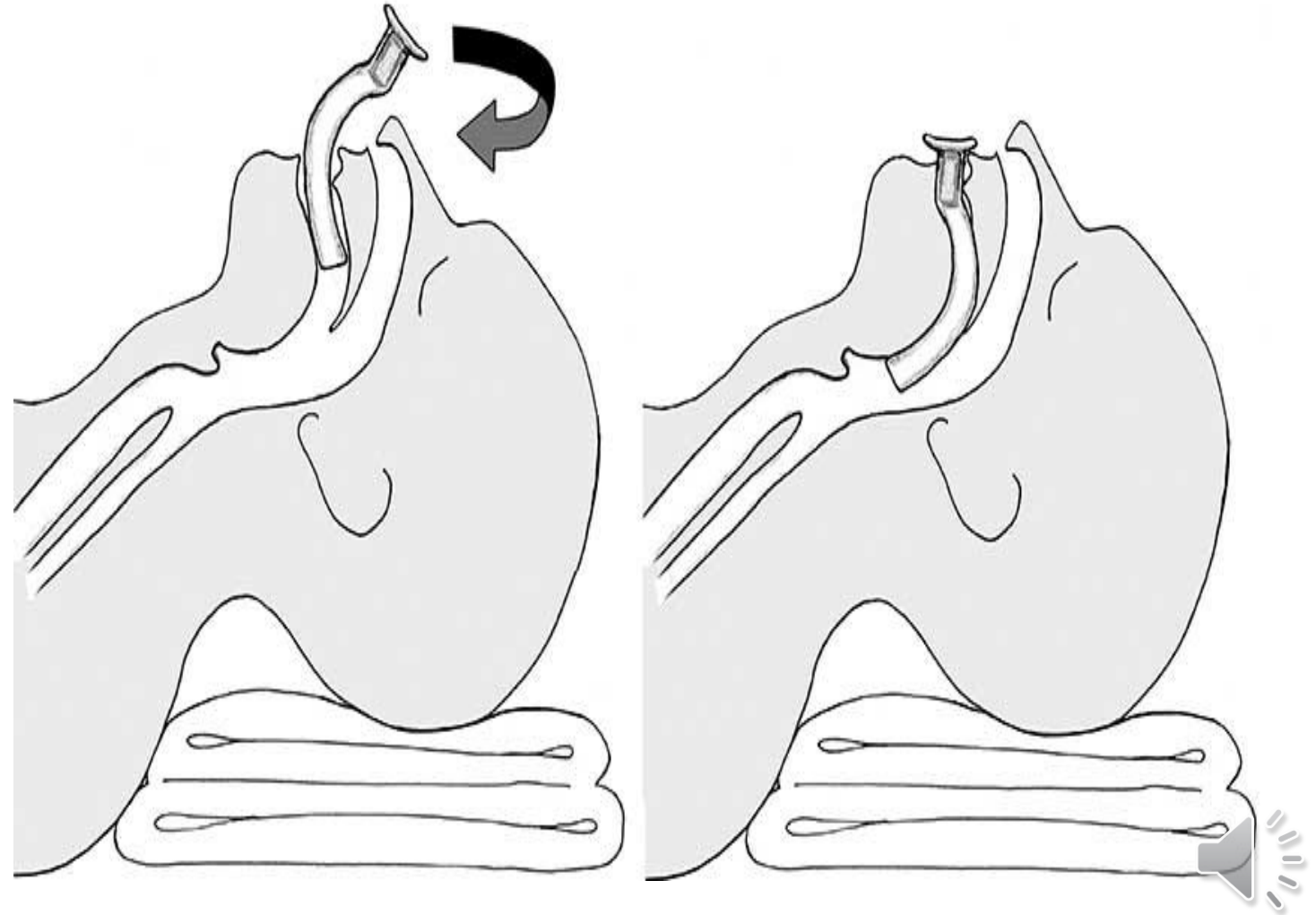


Suction apparatus



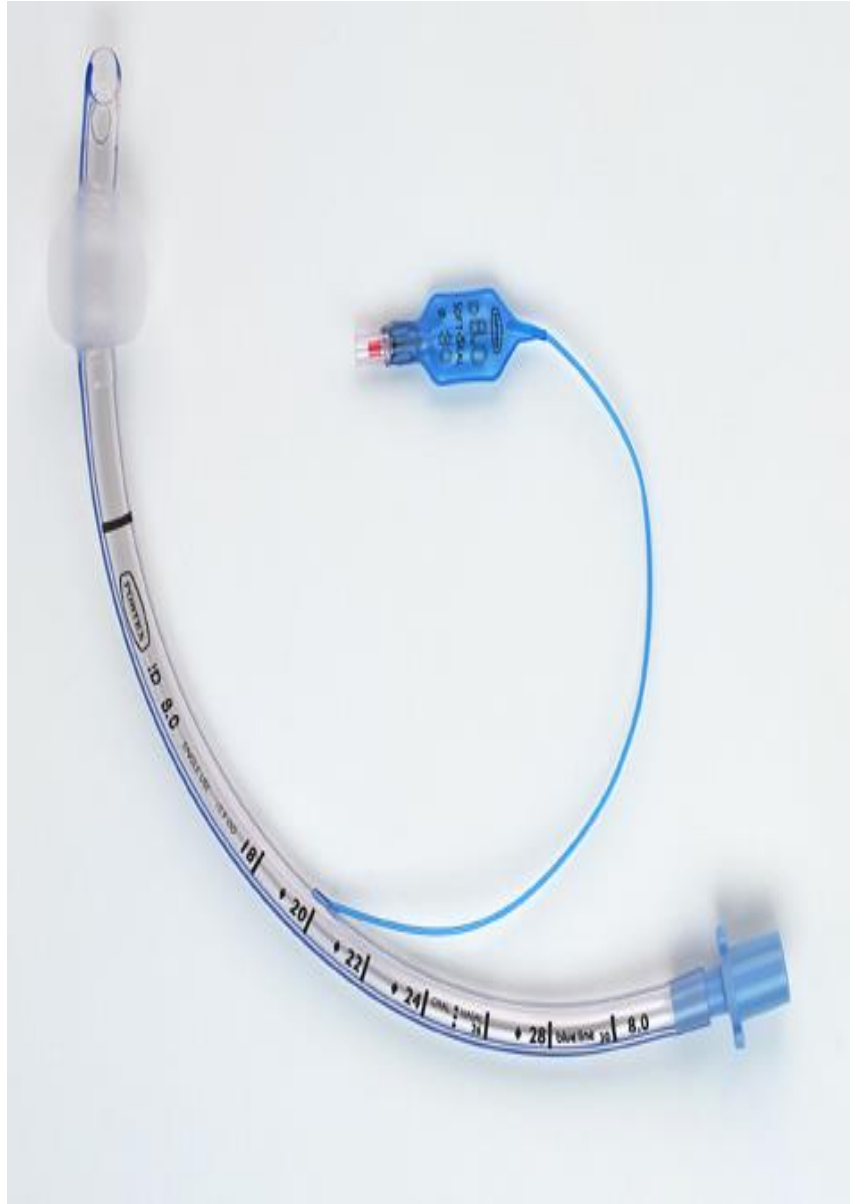
Airway piece

oropharyngeal tube

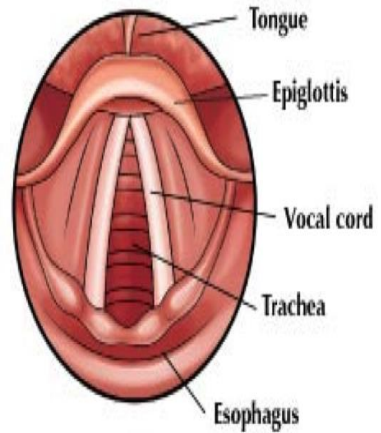
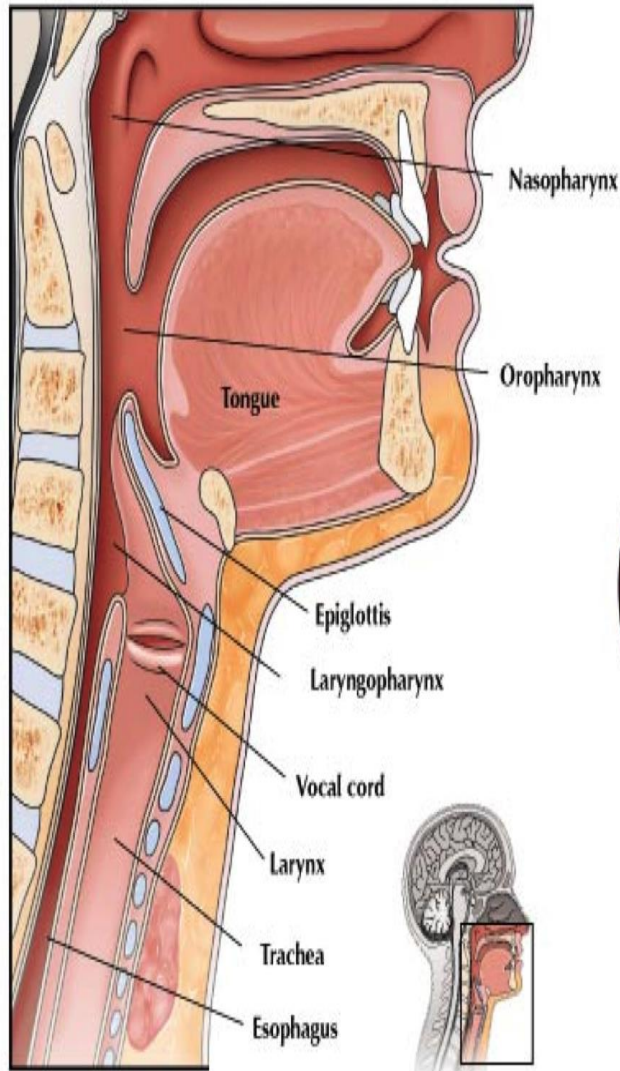




Cuffed endotracheal tube



ANATOMY OF THE LARYNX

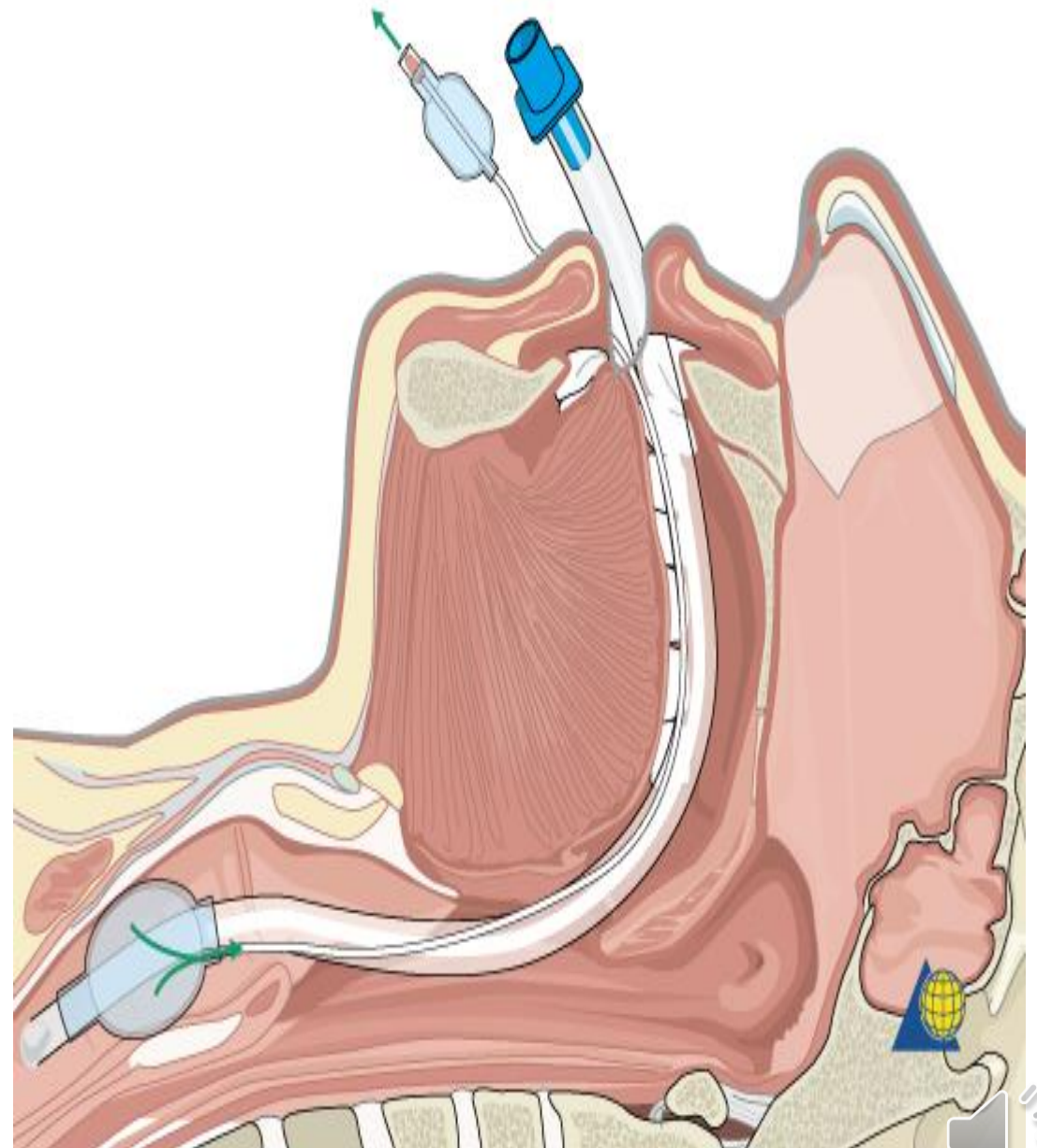


LARYNGOSCOPIC VIEW

MID-SAGITTAL VIEW

FOR SAMPLE USE ONLY

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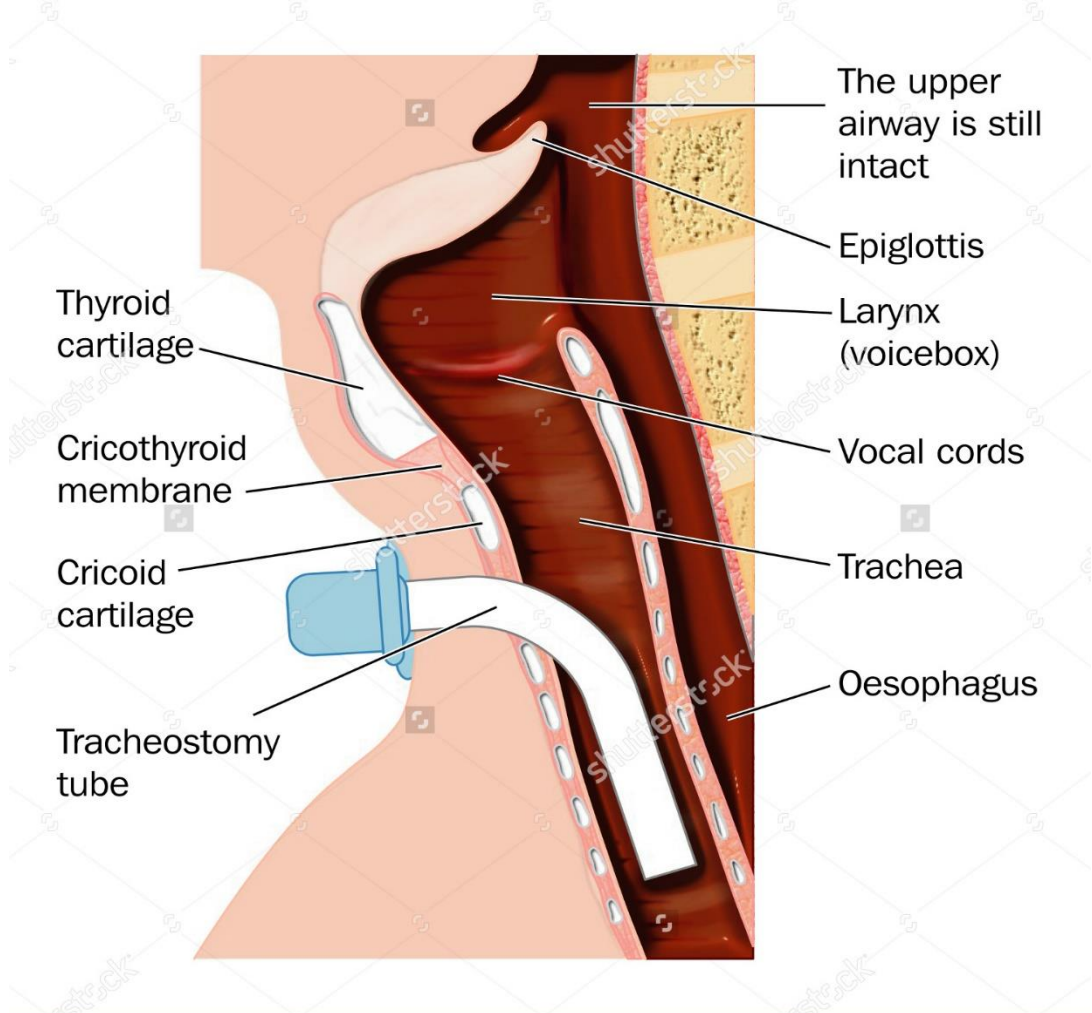




CyberLink
by PowerDirector



Tracheostomy tube



Breathing

Many poisons affect patient breathing by

1. Toxins causing ventilatory failure:

- a. Depression of respiratory center: as morphine & OPC.
- b. Paralysis of respiratory muscles: OPC, botulism & neurotoxic snake bite

2. Toxins affecting Broncho alveolar system:

- a. Toxins causing bronchospasm: as OPC and b-blockers
- b. Toxins causing non-cardiogenic pulmonary edema: salicylate & heroin.

3. Toxins causing cellular hypoxia: toxic gases as CO & cyanide and hydrogen sulphide.



ABG analysis

Normal Values

pH	7.35-7.45
CO₂	35-45
pO₂	80-100
HCO₃	22-26
O₂ Sat.	95-100%



Assessment of breathing (gas exchange)

Insurance of adequate breathing

Clinically: no signs of respiratory distress as

- Tachypnea
- Cyanosis

Laboratory: obtain **measurements of arterial blood gases (ABG):**

a. To insure adequate oxygenation of blood:

1. Measure PO₂ (normal 75-100 mmHg).
2. Measure O₂ saturation (normal 95-100%).

b. To insure adequate alveolar ventilation:
measure PCO₂ (normal 35-45 mmHg).

Give supplemental O₂ inhalation by

Without intubation:

- Oxygen mask & cannula.

With intubation:

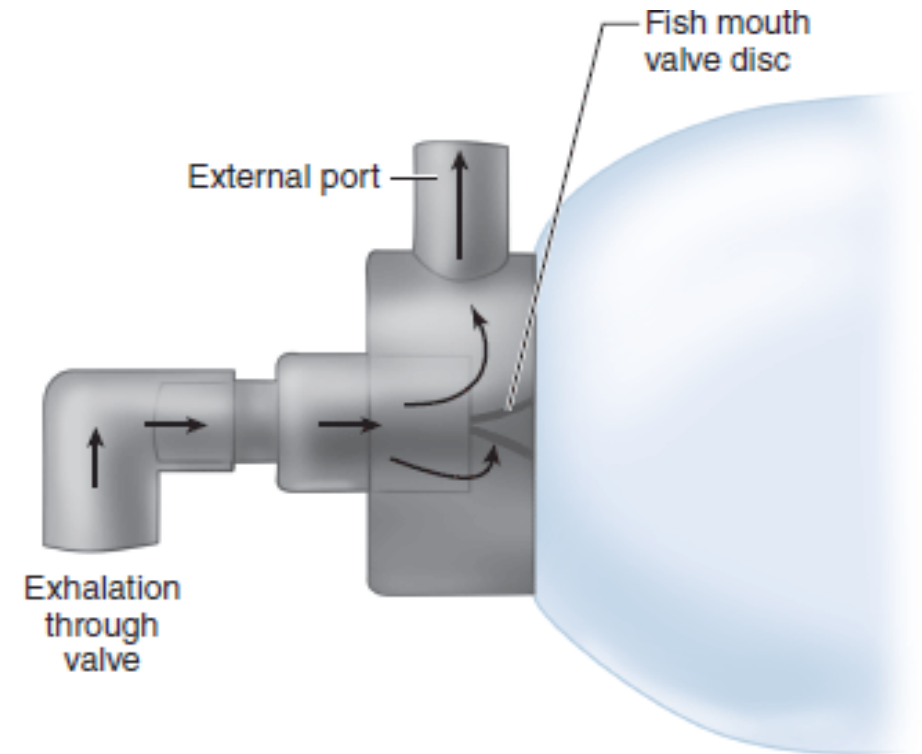
- Bag – valve – mask device.
- Mechanical ventilator indicated in:
 - GCS < 8.
 - PCO₂ > 45 mmHg or
 - PH < 7.1 (spontaneous respiration cannot correct).
 - Respiratory muscle paralysis.



oxygen mask and cannula

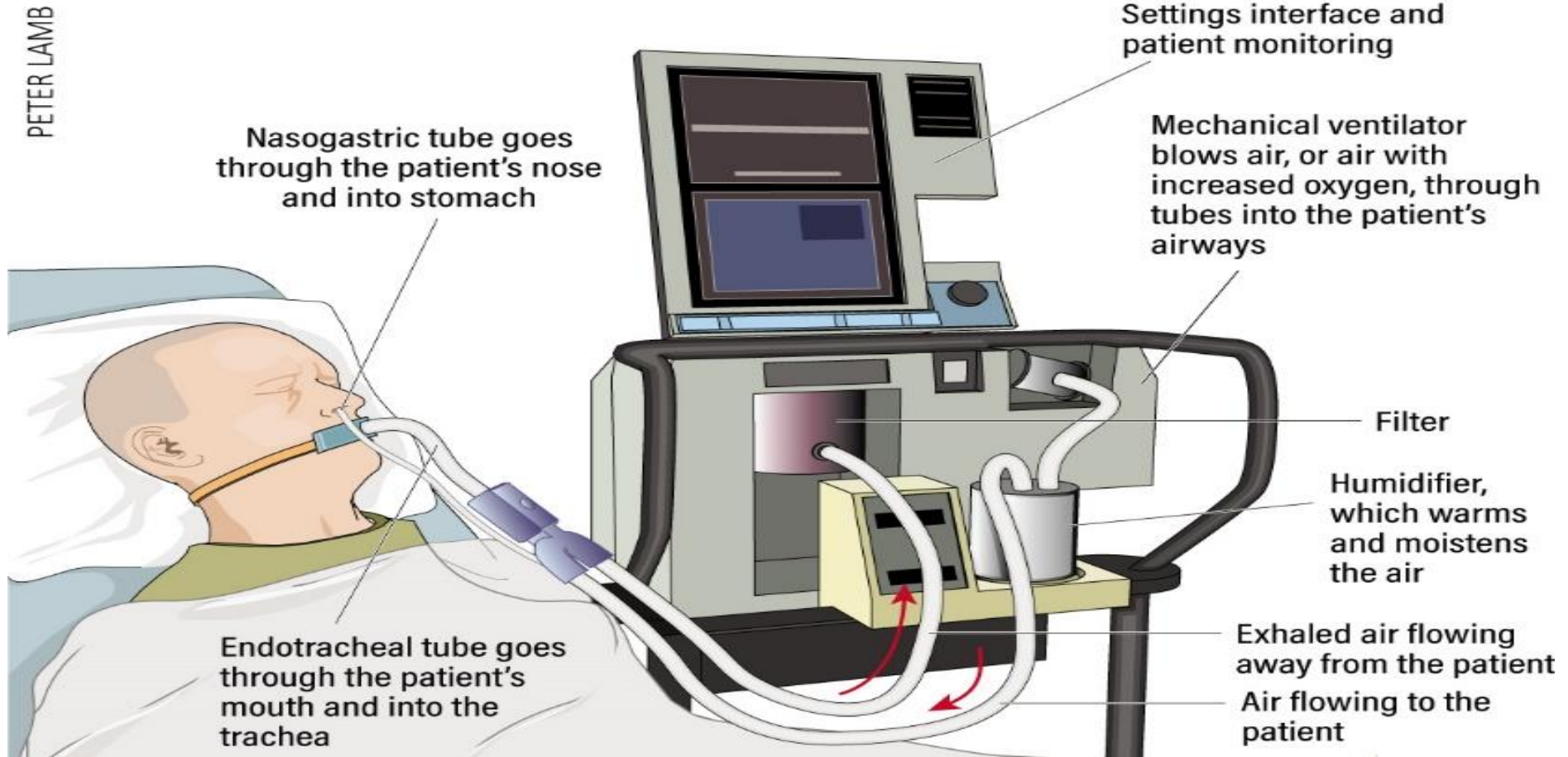


Bag – valve – mask device



Mechanical Ventilator

Figure 1. Mechanical ventilator for positive pressure ventilation



Assessment of circulation

Insure adequate circulation

- Measure **blood pressure** by sphygmomanometer (if hypotension, ABG).
- ECG monitoring to detect arrhythmias

Correction of hypotension

- if blood pressure low, correction by
- IV fluids (saline)
 - Vasopressor as noradrenaline
 - inotropic agents (dobutamine).



Cardiac monitoring & pulse oximeter



Dextrose & Drugs coma cocktail

Empiric antidotes include **DON'T** → **D**extrose, **O**xygen, **N**aloxone, **T**hiamine.

	Dextrose	Thiamine	Naloxone
Aim	Diagnose and treat or exclude hypoglycemia .	Diagnose and treat or exclude Wernicke`s encephalopathy in alcoholics.	Diagnose and treat or exclude morphine overdose .
Dose	0.5 – 1 g/kg Adult → 50 % dextrose in water (D50W) Children → 10 % (D10W) or 25 % (D25W).	100 mg I.V to adult.	0.4 mg I.V repeated up to 2 mg (5 ampoules) for adults & children or reverse of coma and cardiopulmonary depression.

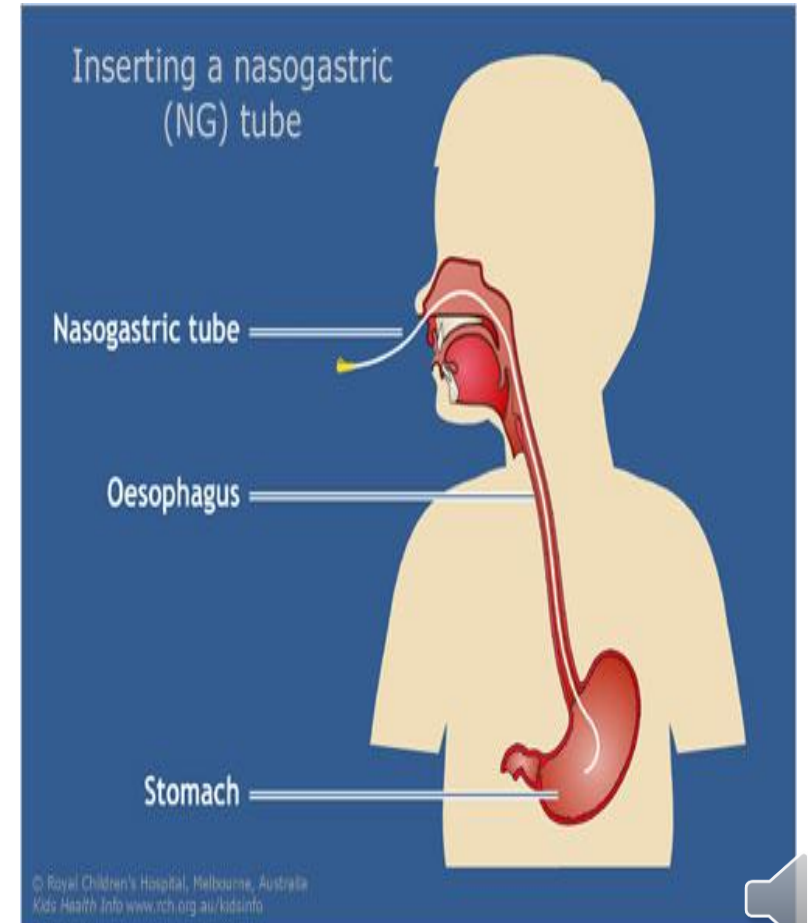
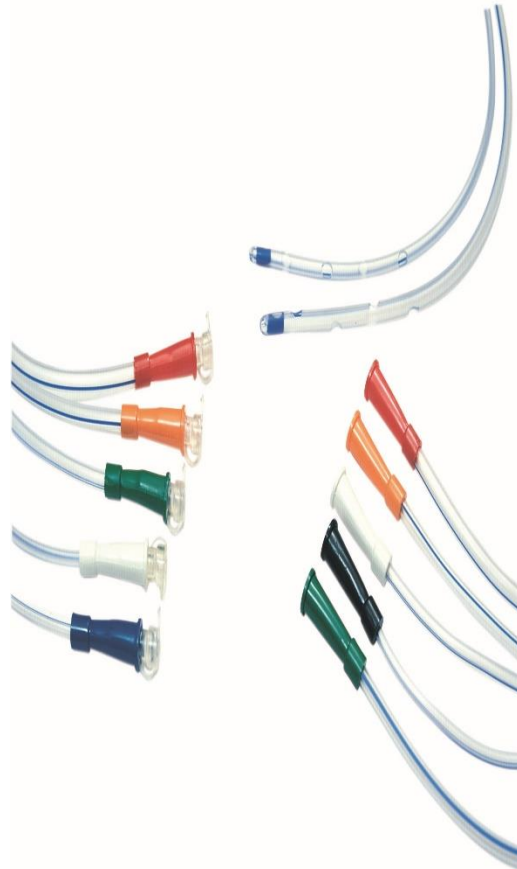


In case of prolonged coma

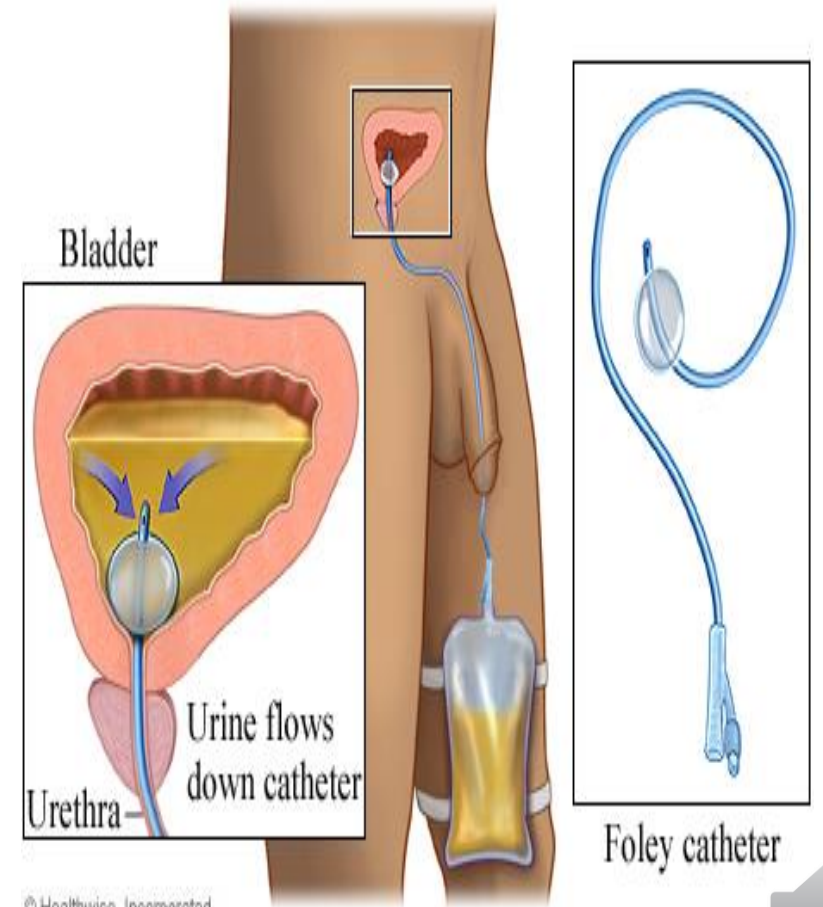
- Maintain of **body temperature** by blankets
- Avoid **bed sores** by continuous changing of body position and prophylactic antibiotic.
- **Feeding** of patient using Ryle tube (nasogastric tube).
- Catheterization to avoid **urine retention** using Foley's catheter.



Ryle tube feeding tube – nasogastric tube



Foley's catheter rubber urinary catheter



© Healthwise, Incorporated



Urinary bag



2- approach to stable poisoned case

History (4 W)	Examination
<ol style="list-style-type: none">1) What: name and dose of medication.2) When: time of ingestion, single vs. multiple ingestions.3) Where: route of ingestion.4) Why: intentional vs. unintentional.	<ol style="list-style-type: none">1) conscious state (grading of coma, agitation, hallucination).2) vital signs3) Pupil (normal, miosis or mydriasis)4) Systemic examination from head to heel.



4-diagnosis

- medical history (not reliable)
- physical examination (clinical picture)
- lab investigations (most accurate)

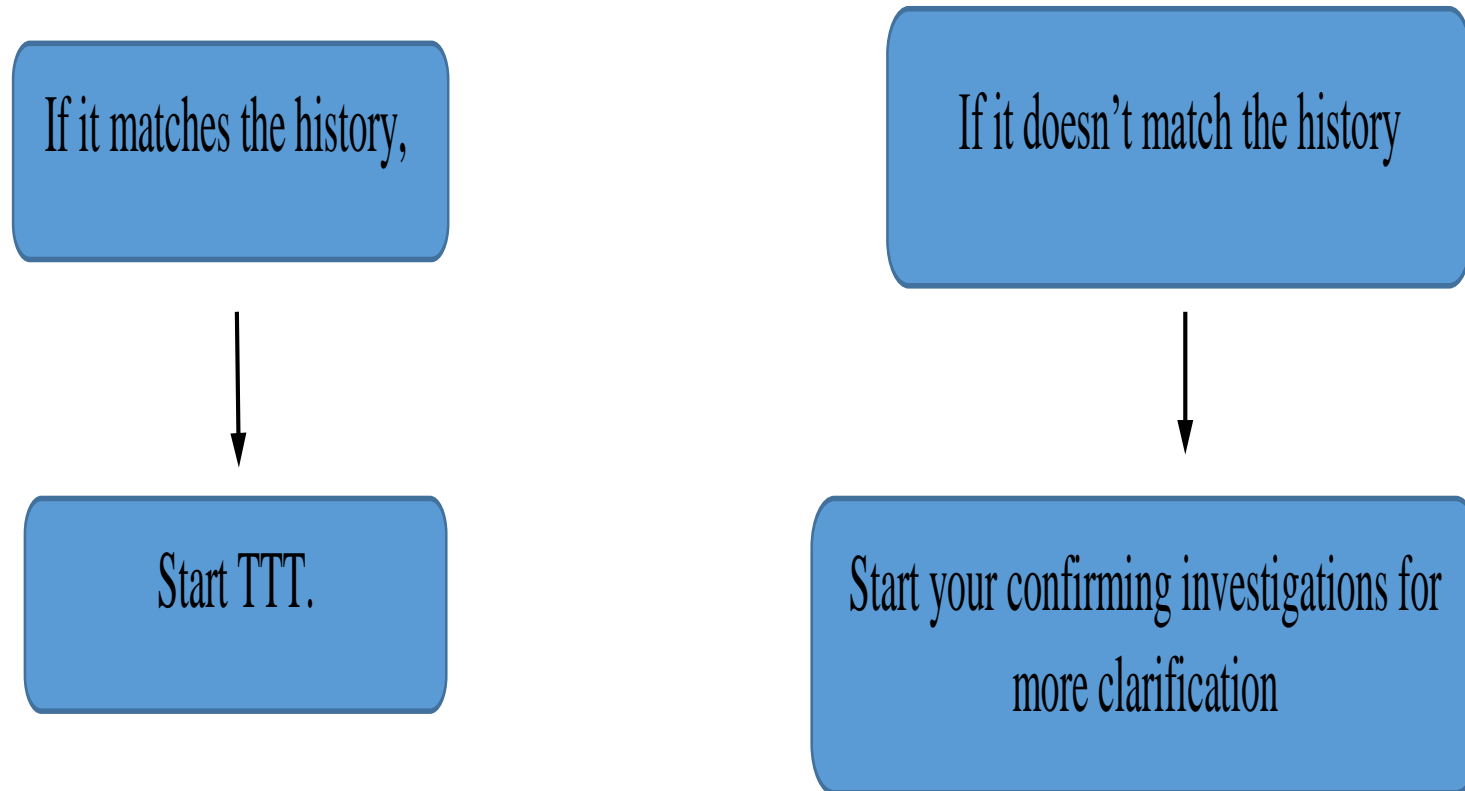


Clinical picture

- many poisons give clinical picture simulate pathological disease (Co simulate flu, botulism simulate Guillen Bare) making clinical picture alone not helpful in diagnosis except:
 - 1- sudden appearance in symptoms in healthy person.
 - 2- appearance of the same symptoms in group of persons.
 - 3- presence of group of symptoms and signs occur with certain poison (**Toxidrome**) as coma , miosis, hypoventilation is toxidrome of opioids.



Trust your objective findings NOT the subjective pt.'s history.



Treatment of poisoning

Treatment of (dealing with) poison (specific treatment)		Treatment of symptoms (non specific treatment)
Before absorption	After absorption	As treatment of hypotension, vomiting, diarrhea,
<ul style="list-style-type: none">• Removal (decontamination)• Modulation (destruction)	<ul style="list-style-type: none">• Enhanced elimination (diuresis, dialysis)• Antidote	



Treatment of (dealing with) poison (specific treatment)

Before absorption		After absorption
Removal (decontamination)	Modulation (destruction)	<ul style="list-style-type: none"> • Enhanced elimination (diuresis, dialysis) • Antidote
<ul style="list-style-type: none"> • Remove the patient from the toxin (external decontamination) or • remove the toxin from the patient (internal decontamination) 	<ul style="list-style-type: none"> • Physical: <ul style="list-style-type: none"> - Binding - Dilution - Demulcent • Chemical: <ul style="list-style-type: none"> - Neutralization - Oxidation - Reduction 	



Decontamination



Decontamination

Removal of toxin from the patient **or removal** of the patient from the toxin before absorption.



Methods

Decontamination method of choice depends on route of exposure:

- 1- **skin** decontamination.
- 2- **eye** decontamination.
- 3- **environmental** decontamination.
- 4- **Gastric** decontamination.



Skin decontamination

Contact toxins	Injected toxins or bites
<p>Steps:</p> <ol style="list-style-type: none">1- Remove contaminated clothes.2- Washing body with copious amount of water or saline until:<ol style="list-style-type: none">a- Disappearance of odor.b- Disappearance of color.c- Multiple times if toxin has no color nor odor.3- The washer should protect himself by wearing gloves, gown.	<p>Slow rate of absorption by:</p> <ol style="list-style-type: none">1- Apply cold foment (v.c).2- Immobilization of limb.3- Apply proximal tourniquet (controversial).4- Incision and suction (better avoided).



Eye decontamination

- **Steps**

- 1- Apply drops of **local anesthetics**.

- 2- **Washing both eyes** with copious amount of saline until:

- a- Disappearance of color.

- b- Multiple times (each eye 4-6 liters) if toxin has no color.

- c- PH of eye between 6.5 to 7.5.



Environmental decontamination

Steps:

- 1- **Remove patient** from polluted environment to fresh air.
- 2- **Supply 100% O₂.**



Gastric (internal) decontamination

- Gastrointestinal decontamination is the process of **preventing or reducing absorption** of a substance after it has been ingested.
- Absorption of most ingested toxins occurs in intestine while toxin is **naturally delayed in stomach** for variable period (average 1 hour) until pyloric emptying occurs.
- **Many techniques** used to reduce absorption of ingested toxin and **Individual circumstances determine which technique is the most appropriate** in each clinical situation.



Gastric decontamination

Gastric emptying	Toxin binding	Enhance elimination from gut	Surgical removal
<ul style="list-style-type: none"> Remove toxin while in stomach and prevent or reduce its passing to intestine. Better done in first 60 minutes (unless toxin known to delay pyloric emptying. Including: <ol style="list-style-type: none"> Gastric lavage. Emesis. 	<ul style="list-style-type: none"> Binding agents used to trap toxin in the gut making it unavailable for absorption. Including: <ol style="list-style-type: none"> Activated charcoal (the most widely used) is universal binding agent (bind most toxins) some other binding agents used for certain poisons <ul style="list-style-type: none"> ✓ Cholestyramine resin (digitalis) ✓ Sodium bicarbonate (iron) 	<ul style="list-style-type: none"> To enhance gastrointestinal transit of the toxin reducing its absorption. Including: <ol style="list-style-type: none"> Cathartics Whole bowel irrigation. 	<p>Open surgery or GIT endoscopy.</p> <p>Used in:</p> <ul style="list-style-type: none"> Drug filled packets (as cocaine filed packets). As may obstruct lumen or rupture causing serious toxicity. Concretions: In cases of sustained release, tablets (as aspirin, theophylline or iron) which coalesce forming large masses adhere to GIT wall and resist aggressive gastric lavage



	Emesis	Gastric lavage	Activated charcoal
Role	<p>Has little role as:</p> <ol style="list-style-type: none"> Little evidence of efficacy (ingestion of water may hasten pyloric emptying). High risk of complications especially aspiration pneumonia. 	<p>Has little role as:</p> <ol style="list-style-type: none"> Little evidence of efficacy (ingestion of water may hasten pyloric emptying). High risk of complications especially aspiration pneumonia. Difficult technique (invasive procedure). 	<p>The best method of decontamination as:</p> <ol style="list-style-type: none"> Highly effective as <ol style="list-style-type: none"> Adsorbing most of toxins in the gut forming charcoal toxin complex, which is excreted in stool. Gut dialysis: when charcoal given with repeated doses in some toxins, enhance back diffusion of toxin from blood to gut lumen then excreted. Bind to toxins secreted in bile interrupting enterohepatic circulation Easy and safe method (rare complications).



Emesis

Method

1- Syrup of ipecac: potent emetic compound as has two active substances (emetine and cephaline).

2- Others emetic compounds which not further used nowadays as:

- **Salty water:** causing hypernatremia.
- **Magnesium sulphate:** inducing seizures.
- **Apomorphine:** very potent emetic.



Syrup of ipecac

mechanism of action

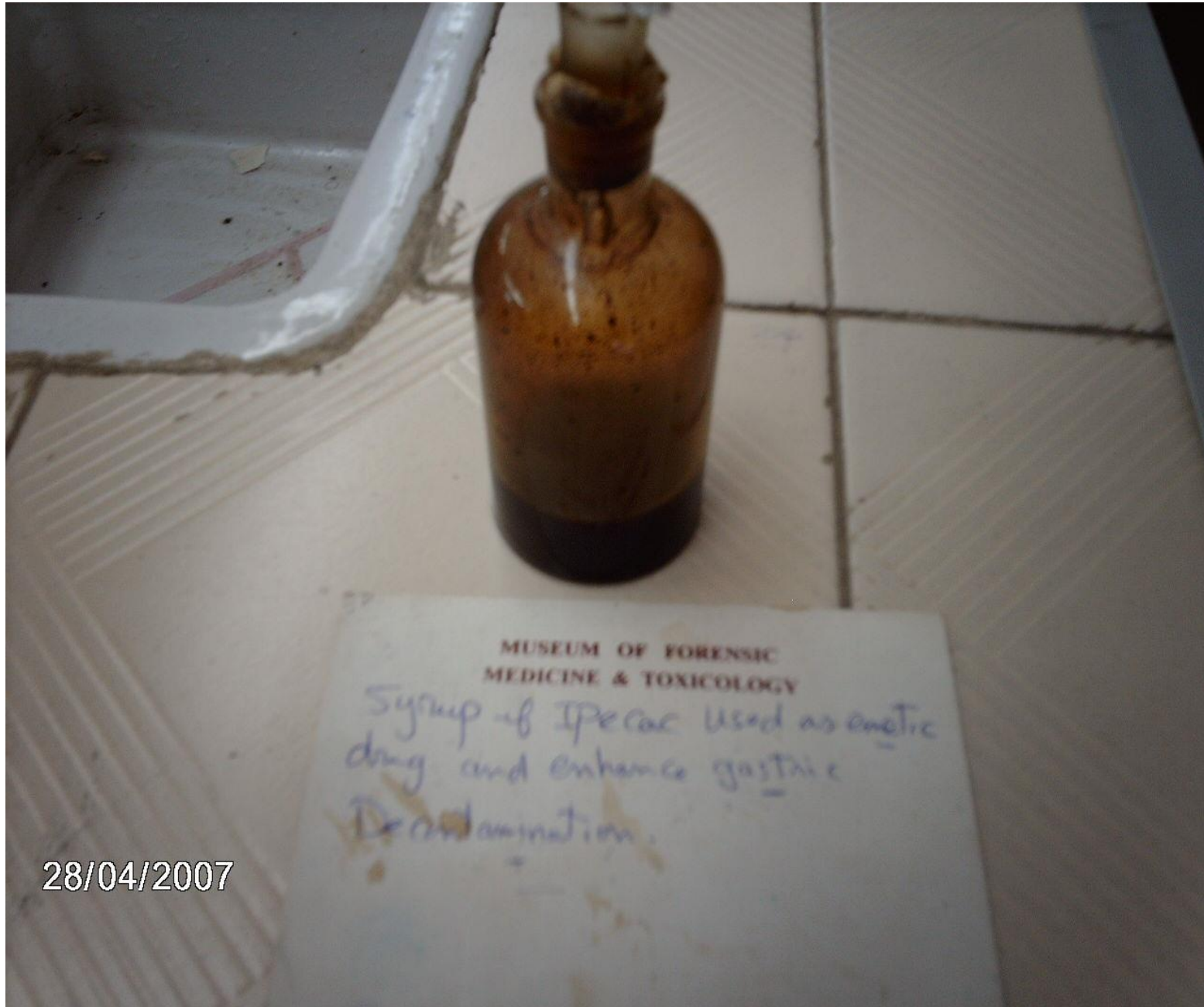
- a- **Local effect** by irritation of gastric mucosa.
- b- **Central effect** by stimulation of chemoreceptor trigger zone (CTZ).

Dose

- ✓ 30 ml for adults.
- ✓ 15 ml for children from 1-12 years.
- ✓ 10 ml for infant below 1 year (not given to infant below 6 months).

The dose given followed by ingestion of water and vomiting occurs within 20 minutes, if vomiting not occur dose is repeated once.





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Syrup of Ipecac Used as emetic
drug and enhance gastric
Decontamination.

28/04/2007



Syrup of ipecac

Indications

- 1- Early **prehospital** management.
- 2- **Used in emergency department** when activated charcoal is ineffective (toxins not adsorbed to it) and gastric lavage contraindicated (large pills or masses not fit into holes to gastric lavage tube), **with preconditions:**
 - a- Recent ingestion (not more 4-6 hours)
 - b- Intact gag reflex (insure alert patient and exclude substances alter mental status or causing seizures).



Syrup of ipecac

Complications

- 1- **Aspiration pneumonia** (especially during coma or attacks of seizures).
- 2- **Intractable vomiting** (especially toxins already causing vomiting) causing fluid & electrolyte loss.
- 3- **Forcible vomiting** causing esophageal tears and hematemesis.



Gastric lavage

Method

- **Insertion of tube into stomach** and washing it with tap water
- **Instillation of some compounds** to water in certain poisons to reduce absorption as
 - **Sodium bicarbonate** in iron or zinc phosphide.
 - **Potassium permanganate** in cyanide salts.



Lavage tubes



Steps

- 1-**position**: on left side with head down.
- 2-ensure **patent airway** (airway piece or endotracheal tube).
- 3-**lubricate tube** with paraffin oil.
- 4- **gentle insertion** of tube guided by swallowing.
- 5- **if choking or stridor** occurs, withdraw tube
- 6-**insure in stomach** :
 - Mark (on 50 cm) become at incisors.
 - Suction of gastric secretions.
 - introducing air forcibly and hearing soufflé.
- 7-**take sample** from gastric content and send for analysis.
- 8- **begin lavage** (by lukewarm water) and continued until clear lavage detected.
- 9-**give activated charcoal**
- 10-**remove with nipping** to avoid aspiration.



Gastric lavage

Indications

- 1- remove gastric contents to minimize absorption
 - especially toxins not adsorbed to charcoal.
 - Life threatening toxins (used in combination with charcoal).
- 2- inject activated charcoal after lavage.



Gastric lavage

Complications

- 1- Insertion of tube into trachea** (especially in comatose, it is better to insert endotracheal tube first).
- 2- Esophageal or gastric perforation** (especially when wall is friable in corrosives).
- 3- aspiration pneumonia**
- 4- Vasovagal attack:** by forcible introducing (especially in toxins increasing vagal tone as digitalis and OPC).



Contraindications of emesis and lavage

emesis	Gastric lavage
<p>1- Patient cannot protect airway as in coma or convulsions.</p> <p>2- In toxins with more pulmonary toxicity more than gastrointestinal as kerosene.</p> <p>3- In corrosive ingestion: risk of gastric or esophageal perforation.</p>	
<p>4- Active vomiting or toxins potentially causing vomiting as theophylline</p> <p>5- Infant less 6 months or pregnant woman</p>	<p>4- Pills known not fit into holes of lavage tube.</p> <p>5- Nontoxic ingestions.</p>



Activated charcoal





Activated charcoal

Method

1- **Single dose activated charcoal** (the usual method): 1 g/kg added to water then shaken to form slurry (given orally or by Ryle tube in comatose).

2- **Multi-dose activated charcoal (MDAC):** سؤال

Initial dose 0.5 – 1 g/Kg then 0.25 – 0.5 g/Kg every 1 – 4 hours.

Cathartics only given with 1st dose only to avoid fluid & electrolyte loss.

Indications:

1-very large dose.

2- Life threatening toxicity.

3-toxins sustained released tablets.

4-toxins forming large lumps "bezoar or concretion".

5-toxins slow gut motility.

6-toxins undergo enterohepatic or enteroenteric circulation.



Activated charcoal

Indication

Appropriate for nearly all toxic ingestions (most toxins adsorbed to it).
Therefore, activated charcoal given to any toxic ingestion (known or unknown).

Complications

Rare complications and occurs in MDAC.

- 1- Aspiration pneumonia.
- 2- Intraluminal impaction (if gut motility is decreased by effect of toxin).



Activated charcoal

Contraindications

1- Bowel obstruction or ileus.

2- Toxins poorly adsorbed to charcoal (**PHAILS**)

Pesticides, **p**otassium

Hydrocarbons, **h**heavy metals

Acids, **a**lkali, **a**lcohols

Iron

Lithium

Solvents

3- Prior to performance of endoscopy in case of corrosive as charcoal will hide lesion area.



Enhanced elimination

Through kidney

Forced diuresis	Urine alkalinization
<ul style="list-style-type: none"> Fluids + diuretics to increase renal outflow 	Fluids + sodium bicarbonate
<ul style="list-style-type: none"> Normal kidney Renal eliminated drug 	<ul style="list-style-type: none"> Normal kidney Renal eliminated drug Weak acid (aspirin)

Replace kidney

hemodialysis	hemoperfusion	Exchange transfusion
<ul style="list-style-type: none"> Clearance of blood through artificial kidney (machine) 	<ul style="list-style-type: none"> Clearance of blood through artificial kidney (machine) + activated charcoal 	Replace poisoned blood by healthy volumes of blood
Small volume of distribution Free in plasma	Small volume of distribution Bound to plasma proteins	RBCs are hemolyzed



Antidotal therapy

Antidote: Chemical agent that abolish or neutralize harmful effect of absorbed toxin.



	Local (physical)			Systemic				
	Physical			Chemical	Chemical inactivator	Antagonist		
action	Dilution	Dissolvent	Adsorbent	neutralization	Combine with toxin → Nontoxic (or less toxic) compound → excreted in urine.	Physiological	Competitive	
						Stimulate what toxin depress or depress what toxin stimulate but act on separate receptor	There is competition between Antidote and toxin for receptor (antidote replace toxin from receptor)	
examples	As water or milk in corrosive	As castor oil in phenol.	Activated charcoal (universal)	Use acid or alkali in corrosive.	<ul style="list-style-type: none"> Chelating agents in heavy metals. Antidotal therapy of cyanide. Ca in oxalic acid poisoning. 	<ul style="list-style-type: none"> Atropine in OPC. Physiostigmine in atropine toxicity. Benzodiazepines in CNS stimulants. 	<ul style="list-style-type: none"> Naloxone in opiate overdose. Vitamin K in warfarin. 	Oxime in OPC poisoning.



Thank you

