

INDEX/ INGREDIENTS OF THIS PPT

·
·
·

☺GENERAL ACKNOWLEDGEMENT ☺

☺MEDICAL TOXICOLOGY ☺

☺POISON ☺

☺GENERAL PRINCIPLES IN POISONING MANAGEMENT ☺

☺BIBLIOGRAPHY ☺

☺ GENERAL

ACKNOWLEDGEMENT ☺
WISHING ALL INDIANS A VERY HAPPY AND BLESSED
INDEPENDENCE DAY!! ☺☺

WELL, THIS IS MY FIRST PPT IN TOXICOLOGY FIELD
HAPPY AND PROUD THAT I COULD RELEASE THIS PPT ON
INDEPENDENCE DAY OF INDIA!! ☺☺

SINCERE THANKS TO ALL PHILANTHROPISTS, AND THE
ALMIGHTY

MORE TO GO...MORE TO ROCK....JUST ON THE PATH OF MY
LOVE(SEFLESSNESS)

HAPPY READING !! ☺

☺ MEDICAL TOXICOLOGY ☺ :

DEFINED AS:

“ SCIENCE, ASSOCIATED WITH PATLET OF POISONS/ POISONING”

‘PATLET’ INCLUDES :

P: PROPERTIES

A: ACTION

T: TOXICITY

L: LETHAL DOSE


E: ESTIMATION

T: TREATMENT.....



☺ POISON ☺ :

ANY SUBSTANCE → WHEN INTRODUCED INTO LIVING
BODY BY ANY MEANS / BROUGHT INTO CONTACT WITH
ANY BODY PART → CAUSES LOCAL/ SYSTEMIC EFFECTS/
BOTH → RESULTS IN ILL EFFECTS/ DEATH OF THE
INDIVIDUAL → SUCH A SUBSTANCE IS KNOWN AS
POISON.....





☺ GENERAL PRINCIPLES OF POISONING MANAGEMENT ☺ :

INCLUDES:

1. STABILIZATION AND EVALUATION
 2. GUT DECONTAMINATION
 3. POISON ELIMINATION
 4. ANTIDOTE ADMINISTRATION
 5. NURSING CARE
 6. PSYCHIATRIC CARE
- 

1. STABILIZATION AND EVALUATION :

- Direct initial investigation towards assessment and correction of life-threatening problems (if present) , is the primary focus
- Pay attention to ABCD of RESUSTICATION:

A: Airway

B: Breathing

C: Circulation

D: Depression of CNS

* If patient is not in crisis(normal speech and pulse) → go for complete, thorough and systematic examination

CONTINUED.....

- Treatment should be based on basic supportive measures
- Assess the efficiency of patient's ventilation by measuring blood gases
- Based on above efficacy evaluation → go for assisted ventilation
- If partial pressure of carbon dioxide > 45 mm Hg / 6 kPa & partial pressure of Oxygen < 70 mm Hg / 9.3 kPa (in presence of face-mask oxygen delivery) → proceed for assisted ventilation
- Respiratory status is also measured by using a Wright's spirometer
- To assess coma severity , the following scales can be used :
 - a. GLASGOW COMA SCALE
 - b. COMA RECOVERY SCALE
 - c. REED'S CLASSIFICATION
 - d. COMPREHENSIVE LEVEL OF CONSCIOUSNESS SCALE (CLOCS)

CONTINUED.....

- According to HOFFMANN and GOLDFRANK → For COMATOSE patients in general → where poison is not identified → provide “COMA COCKTAIL”
- “COMA COCKTAIL” consists of 3 antidotes:
 - a. Dextrose (5% soln.) : 100 ml i.v
 - b. Thiamine (Vitamin B1) : 100 mg i.v
 - c. Naloxone : 2 mg i.v
- For METABOLIC ACIDOSIS, calculate “ANION GAP”
- $\text{ANION GAP} = (\text{Na} + \text{K}) - (\text{HCO}_3 + \text{Cl}) = (140) - (24 + 104) = 12 \text{ mmol/L}$
- Normal value = 12=16 mmol/L
- If ANION GAP > 20 mmol/L → Suggests metabolic acidosis

CONTINUED.....

- Poisons cause METABOLIC ACIDOSIS in 2 ways :

- a. GAP ACIDOSIS : Increase in anion gap

- b. NON- GAP ACIDOSIS : No significant alteration in anion gap

- Toxins associated with :

- a. FAILURE OF RESPIRATORY CENTRE:

- Antidepressants - Neuroleptics - Ethanol - Sedatives - Opiates

- b. FAILURE OF RESPIRATORY MUSCLES :

- Succinylcholine - Nicotine - Cobra bite - Organophosphates - Shellfish

poisoning

CONTINUED.....

c. TACHYCARDIA & NORMOTENSION :

- Antihistamines
- Caffeine
- Atropine
- Cannabis

d. TACHYCARDIA & HYPOTENSION :

- CO
- CN (cyanide)
- Theophylline
- Phenothiazines

e. TACHYCARDIA & HTN :

- Amphetamines
- Cocaine
- Phenylpropanolamine

f. ACID-BASE DISORDERS :

Refer the following table :

CONTINUED.....

CULPRITS OF	ASSOCIATED DRUGS/ TOXINS
ACUTE RESPIRATORY ALKALOSIS	SALICYLATES, CATECHOLAMINES, PROGESTERONE
ACUTE RESPIRATORY ACIDOSIS	ORGANOPHOSPHATES, CARBAMATES, PULMONARY EDEMA, DRUGS THAT CAUSE NEUROPATHIES (ISONIAZID)
CHRONIC RESPIRATORY ACIDOSIS	DRUGS THAT CAUSE RESPIRATORY CENTRE DEPRESSION (ALREADY EXPLAINED BEFORE)
METABOLIC ACIDOSIS	NON-GAP ACIDOSIS : CAIs, ALDOSTERONE ANTAGONISTS, BROMISM) GAP ACIDOSIS : METHANOL, PHENFORMIN, INH, SALICYLATES
METABOLIC ALKALOSIS	NORMAL / INCREASED URINARY CHLORIDE: STEROIDS, DIURETICS, ALKALI OVERDOSE DECREASED URINARY CHLORIDE : PAST USE OF DIURETICS. etc..

2. GUT DECONTAMINATION :

- Defined as “Method of poison removal from GIT”
- Methods include :
 - a. Emesis
 - b. Gastric Lavage
 - c. Catharsis
 - d. Activated charcoal
 - e. Whole bowel irrigation (Whole gut lavage).....

CONTINUED.....

A. EMESIS :

- “Method of inducing a poisoned victim to VOMIT”
- Done by syrup administration of IPECAC
- Source of IPECAC: Root of shrub ‘*Cephaelis ipecacuanha*/ *C. acuminata*’
- Found in West Bengal
- Constituents of IPECAC: Cephaeline, Emetine, Psychotrine (traces)
- Used in CONSCIOUS and ALERT poisoned patients, who have ingested poison not 4-6 hrs. earlier.

CONTINUED.....

- ACTIONS of IPECAC include:

- a. Local activation of peripheral sensory receptors in GIT
- b. Central stimulation of CTZ(CHEMORECEPTOR TRIGGER ZONE)
- c. Activation of central vomiting center.

- DOSE:

- a. For adults: 30 ml, followed by 250-300 ml water
- b. For children: 15 ml, followed by 250-300 ml water
- c. Patient should be sitting upright
- d. If vomiting doesn't occur within 30 mins. → repeat same dose → If no response → perform stomach wash and remove poison and IPECAC consumed

CONTINUED.....

- **COMPLICATIONS** associated with IPECAC induced EMESIS include:

- a. Arrhythmias
- b. Myocarditis
- c. Aspiration pneumonia
- d. Mallory-Weiss Tears

- **CONTRAINDICATIONS** :

- a. Pregnancy
- b. Age > 1 yr.
- c. Old patients
- d. Coma
- e. Convulsions
- f. Corrosive poison consumption
- g. Petroleum products consumption
- h. Emetic poison consumption.....

CONTINUED.....

B. GASTRIC LAVAGE (STOMACH WASH) :

- Defined as “GI decontamination technique, that aims to empty stomach of toxic substances, by SEQUENTIAL ADMINISTRATION and ASPIRATION of small volumes of fluid via OROGASTRIC TUBE”
- Used for people, who:
 - a. Have consumed a life-threatening dose
 - b. Exhibit morbidity within 1-2 hours of ingestion
- Beyond 1-2 hours of ingestion, gastric lavage is permitted in the following conditions:
 - a. Sustained release preparations
 - b. Delayed gastric emptying

CONTINUED.....

- PROCEDURE involved in STOMACH WASH:
 - a. Explain procedure of stomach wash to the patient → obtain his/her consent → if he/she does not accept → avoid proceeding with the same
 - b. Perform ENDOTRACHEAL INTUBATION in COMATOSE patients prior to lavage
 - c. Place patient (head down) on his left lateral side → mark length of tube to be inserted (50 cm for adults, 25 cm for children)
 - d. Tube used is called “LAVACUATOR”
 - e. Usually, EWALD TUBE / RYLE ‘S TUBE (for children) is used
 - f. Oral route for insertion is preferred
 - g. Nasal route → damages nasal mucosa → causes EPISTAXIS.....

CONTINUED.....

h. Lubricate inserting end of tube using VASELINE/ GLYCERINE → Pass it through mouth to a sufficient distance → Use mouth gag (to avoid biting of tube by patient) → check position of inserted tube by air insufflation, while listening over stomach / by aspiration ,using PH testing of aspirate (in normal cases, PH: Acidic) → use small quantities of liquid (200-300 ml) of warm saline (at 38 degrees) in adults/ 10-15 ml/kg of body weight of warm saline in children → avoid water to avoid risk of HYPONATREMIA/ WATER INTOXICATION → Continue lavage , until no particulate matter is observed , and efferent lavage solution is clear → pour a slurry of (ACTIVATED CHARCOAL(1g/kg) + IONIC CATHARTIC)through tube into stomach → remove tube.....

CONTINUED.....

- SOLUTIONS FOR GASTRIC LAVAGE:

POISON	SOLUTION USED
MOST POISONS	WATER/ SALINE
OXIDIZABLE ONES (ALKALOIDS, SALICYLATES)	POTASSIUM PERMANGANATE (1:5000)
CYANIDE	SODIUM THIOSULPHATE (25%)
OXALATES	CALCIUM GLUCONATE
IRON	DEFERRIOXAMINE (2g in 1 liter water)

CONTINUED.....

- COMPLICATIONS :

- a. Aspiration pneumonia
- b. Laryngospasm
- c. Vagal inhibition
- d. Cardiac arrhythmias
- e. Stomach/ esophageal perforation

- PRECAUTIONS:

- a. Avoid usage in people who consumed non-toxic agents/ non-toxic doses of toxic agents
- b. Avoid usage as a deterrent to subsequent ingestions

- CONTRAINDICATIONS:

- a. Recent surgery
- b. Advanced pregnancy
- c. Coma
- d. Alkali ingestion
- e. Acid congestion
- f. Convulsant ingestion
- g. Petroleum products ingestion.....

CONTINUED.....

C. CATHARSIS:

DEFINITION:

“Process of INDUCING PURGATION, and thus providing relief from poisons and poisoning effects”

CLASSES:

1. IONIC / SALINE:

- Substance → alters PHYSICO-CHEMICAL forces within intestinal lumen → causes OSMOTIC RETENTION OF FLUID → activates MOTILITY REFLEXES → Enhances EXPULSION

- Doses :

a. Magnesium citrate : 4 ml/kg b. MgSO₄: 30 g (250 mg/kg in children)

c. Sodium sulfate : 30 g (250 mg/kg in children)

CONTINUED.....

2. SACCHARIDES :

- Sorbitol is cathartic of choice
- Avoid in young children to avoid hypernatremia
- Dose : 50 ml. of 70% soln.

EFFICACY OF CATHARTICS:

- Cathartics decrease transit time of drugs in GIT
- No documentation on it decreasing morbidity/ mortality in poisoning.....

CONTINUED.....

D. ACTIVATED CHARCOAL :

PROPERTIES :

- Burning of wood, coconut shell , bone, sucrose/ rice starch → treatment with activating agent (steam, carbon dioxide) → powder like particles called ACTIVATED CHARCOAL formed
- Fine , black, odorless, tasteless powder
- Possess large surface area

MOA:

Charcoal → adsorbs poisons on its surface → prevent their absorption in GIT

DOSE :

1g/kg body weight (For adults: 50-100 g; for children: 10-30 g)

CONTINUED.....

- PROCEDURE:

- a. To activated charcoal → add 4-8 times quantity of water → convert into slurry → administer to patient after lavage/emesis/ solely

- DEMERITS:

- a. Unpleasant taste aspiration
- b. Vomiting provocation
- c. Diarrhea
- d. Pulmonary
- e. Intestinal obstruction

- CONTRAINDICATIONS:

- a. Proven ileus
- b. Small bowel obstruction
- c. Caustic ingestion
- d. Petroleum products ingestion

CONTINUED.....

CHARCOAL ADSORPTION PROPERTIES:

1. WELL-ADSORBED:

- Neuroleptics
- Antihistamines
- Atropine
- BZDs
- Barbiturates
- Beta-blockers
- Chloroquine

2. MODERATELY ADSORBED :

- Oral hypoglycemic agents
- Kerosene
- Paracetamol
- Phenol
- Salicylates

3. POORLY ADSORBED:

- Alcohol
- Cyanide
- Corrosives
- Heavy metals
- Ethylene glycol.....

CONTINUED.....

E. WHOLE BOWEL IRRIGATION (WHOLE GUT LAVAGE):

GENERAL PROPERTIES:

- Defined as “Process of instillation of large volumes of a suitable solution via a NASOGASTRIC TUBE for 2-6 hrs., causing diarrhea”
- Solutions used include:
 1. PEG-ELS (Polyethylene glycol + Electrolytes lavage solution)
 2. PEG-3350 (High molecular weight PEG)

INDICATIONS:

- Ingestion of large quantity of toxic drugs , >4 hrs. post-exposure
- SR preparations overdose
- Ingestion of substances not adsorbed by charcoal (heavy metals)

CONTINUED.....

- Ingestion of miniature disc batteries, cocaine filled packets (BODY PACKER SYNDROME), etc.
- Ingestion of slowly dissolving substances : Iron tablets, paint chips, etc.

PROCEDURE:

- Insert nasogastric tube into stomach → instill solution at room temp. (2 liter/ hr. in adults, and 0.5 liter/ hr. in children) → make patient sit on a commode → use METOCLOPRAMIDE iv. (10 mg in adults, 0.3 mg/kg in children) to reduce emesis → continue procedure, until rectal effluent is clear (in 2-6 hrs.)

COMPLICATIONS: Vomiting, abdominal distension, cramping, anal irritation

CONTRAINDICATIONS: GI obstruction, ileus, hemorrhage, perforation.....

3. POISON ELIMINATION :

- Methods include :

A. FORCED DIURESIS:

- Defined as “phenomenon of increasing urine formation ,using diuretics and fluid, that can enhance excretion of drugs , their overdose, and treat poisoning.”
- Alkaline diuresis is opted
- Examples used for forced diuresis :
 - a. Salicylates
 - b. Barbiturates

CONTINUED.....

B. EXTRACORPOREAL TECHNIQUES:

INCLUDE:

☺HAEMODIALYSIS ☺:

- “Process of purifying blood of a person , whose kidneys are not working properly, using a dialysis machine (artificial kidney)”
- All drugs are not dialyzable
- Before going for this, keep following things in mind:
 - a. Substance should easily diffuse through dialyzable membrane
 - b. Presence of significant portion of substance in plasma water
 - c. Pharmacological effect should be directly related to blood concentration
 - d. Drugs, with extensive PPB, increased molecular weight & decreased water solubility cant be used

CONTINUED.....

- INDICATIONS:

- a. Lithium
- b. Phenobarbitone
- c. Salicylates
- d. Amphetamine
- e. Quinine
- f. Heavy metals
- g. Ethylene glycol
- h. Methanol.

CONTINUED.....

☺HAEMOPERFUSION ☺ :

- “Process, by which large volumes of patient’s blood are passed over an adsorbent , in order to remove toxins from blood”
- More effective than HAEMODIALYSIS
- Indications include:
 - a. Barbiturates
 - b. Chlorpromazine
 - c. Diazepam
 - d. Dapsone
 - e. Paracetamol
 - f. Salicylates
 - g. Phenols
 - h. Digoxin

CONTINUED.....

☺PERITONEAL DIALYSIS ☺ :

- “Process, that involves patient’s peritoneum as a membrane, across which fluids and dissolved substances (electrolytes, urea, albumin, etc.) are exchanged from blood”

☺HEMOFILTRATION ☺ :

- In HEMOFILTRATION → patient’s blood → passes through a set of tubing (filtration via machine) to a semipermeable circuit membrane (filter) → removal of waste products + water (ultrafiltrate) via convection → replacement fluid is added → blood is returned to patient

☺PLASMAPHERESIS ☺ :

- “Process of removal, treatment and return of blood plasma components into blood circulation”.....

4. ANTIDOTE ADMINISTRATION :

There are 6 MOAs of ANTIDOTES:

A. INERT COMPLEX FORMATION:

- Antidote → binds to poison → forms inert complex → excreted from body

- Examples:

a. Dicobalt edetate for CYANIDE poisoning

b. Prussian blue for THALLIUM

B. ACCELERATED DETOXIFICATION:

Example:

a. THIOSULPHATE → accelerates detoxification of CYANIDE into THIOCYANATE

b. Acetylcysteine → shows action of glutathione → combines with hepatotoxic paracetamol metabolites → results in its detoxification.....

CONTINUED.....

C. DECREASE TOXIC CONVERSION:

- Ethanol → competes for ALCOHOL DEHYDROGENASE → Prevents methanol conversion into toxic metabolites

D. RECEPTOR SITE COMPETITION:

- Antidote → displaces toxin from receptor site → antagonizes toxic effects
- Eg: Naloxone → antagonizes opiate effects

E. RECEPTOR SITE BLOCKADE:

- ATROPINE → blocks muscarinic receptor sites → blocks effects of anticholinesterases.....

CONTINUED.....

↳ TOXIC EFFECT BYPASS:

- EXAMPLE: 100% OXYGEN USED IN CYANIDE POISONING.....

SPECIFIC ANTIDOTES AND THEIR INDICATIONS:

ANTIDOTE	ACTIVE AGAINST
ACETYLCYSTEINE	PARACETAMOL, AMANITIN
FLUMAZENIL	BENZODIAZEPINES
DIMERCAPROL	As, Cu, Hg, Ag
DICOBALT EDETATE	CYANIDE
NALOXONE	OPIATES
PENICILLAMINE	Cu, Ag, Pb
SODIUM NITRITE	CYANIDE, HYDROGEN SULFIDE

CONTINUED.....

SODIUM THIOSULPHATE	CYANIDE, BROMATE, IODINE, CHLORATE
TOCOPHEROL	CARBON MONOXIDE
PYRIDOXINE	ETHYLENE GLYCOL, ISONIAZID
PENTETIC ACID	RADIOACTIVE METALS
PRUSSIAN BLUE	THALLIUM
PROTAMINE SULPHATE	HEPARIN
OXYGEN	CYANIDE, CO, HYDROGEN SULFIDE
ETHANOL	METHANOL, ETHYLENE GLYCOL

5. NURSING CARE :

- Mainly applicable for COMATOSE patients
- Includes:
 - a. Attention to pressure points to prevent development of decubitus ulcers
 - b. Hourly attention
 - c. Use of pillow in between legs
 - d. Use of ripple mattress
 - e. In absence of spontaneous blinking → use METHYL CELLULOSE eye drops to prevent exposure keratitis/ secure eyelids with adhesive tape
 - f. Change bed linen frequently if it is soaked in urine/ stained with feces

CONTINUED.....

- g. For urinary incontinence → in males : use sheath urinal; for females : use indwelling silastic catheter, inserted aseptically
- h. To prevent pneumonitis, associated with gastric content inhalation → focus on intubation/ change position of patient into semi prone , with head slightly dependent
- i. Sufficient bronchial toilet, with regular aspiration of secretions, is required
- j. Passive physiotherapy (to prevent stiffness and muscle atrophy)
- k. Prophylactic antibiotics, if necessary.....

6. PSYCHIATRIC CARE :

- Psychosocial assessment and support (based on assessment of patient's sensorium and alertness) for patients, who have taken overdoses/ with suicidal ideation is required
- Careful examination of patient's psychosocial state (depressed, uncooperative, non-responsive, agitated, anxious, violent/ psychotic) → allows focus on psychosocial alternatives (immediate / long term treatment/ disposition, continued follow-up and Out Patient care).....