Decontamination

- Gastric decontamination *(decrease absorption)*
  - Dilution → conc بدنا نخفف الـ → This will increase emesis
  - Emesis → يستفز
  - Gastric lavage → غسيل المعدة
  - Activated charcoal
  - Cathartics → استخدام المسهلات
  - Whole bowel irrigation →

حسب اكثر شي recommended هلا

DILUTION

- Dilution of the poison:
  1. 1-2 cupfuls of water to children
  2. 2-3 cupfuls of water to adult
  3. A better rule to give a quantity comfortable swallowed
- Water??
  1. Reduce gastric irritation
  2. Add bulk to the stomach needed later for emesis
- Carbohydrated beverages??....NO!!
  - CO_2 distension of the stomach....opening pyloric sphincter
- Milk??....NO!!
  - Increase absorption of lipophilic toxicant...&....delay emetic action of ipecac

غازات بتخلي
بيبسي وصودا
ما بنستخدمهم

* .....water is the BEST and ONLY fluid to used when a poison is unknown.

* Excessive water will distend the stomach, pyloric sphincter relaxation, emptying gastric content into the duodenum....more difficult to remove the poison

* Emesis successful only if there is fluid in the stomach....water dissolve the poison and provide a vehicle for expulsion

* الماي بيتساعد على الـ emesis
* بس مشكلتها انه ممكن تسرع الـ gastric emptying
اذا المريض كان يشرب fluids كتير

General consideration

- Fluids should not be forced → ما اعطي over load من الـ fluids
- Excessive liquid may distend the stomach…premature evacuation
- In case of solid form do not dilute
- Nothing administered orally to unconscious patient or if gag reflux absent

مثلاً ← واحد اخذ .. بنادول لما نعطيه fluid احنا هيك بنزيد disintegration للتابليت وهيك لنزيد سرعة الامتصاص

gag reflux → contraction → involentery
بحس بالمنطقة الفوق من البلعوم لمثل لما حد يدخل اصبعه بتمه وبصير بده يستفرغ

- The following modalities of GI decontamination have been used in the past but are no longer routinely recommended.

- **Syrup of Ipecac** — Previously a mainstay of prehospital and emergency department management of toxic ingestions, Syrup of Ipecac (SoI)-facilitated gastric emptying is no longer recommended by the American Academy of Clinical Toxicology (AACT), the European Association of Poisons Centres and Clinical Toxicologists (EAPCCT), or the American Association of Pediatrics (AAP). → معدول حكينا مو للأطفال

EMESIS

- **Do not induce vomiting if the poison is a:**
  - Convulsant, or sedative-hypnotic
  - Hydrocarbon (HCs are viscous and have low surface tension...readily aspirated)
  - Corrosive acid or alkali

- **Do not induce vomiting if the patient:**
  1. Unconscious or comatose
  2. Absence of gag reflex
  3. Have severe CVD or emphysema, extremely weakened blood vessels
  4. < 6 months in age (poorly developed gag reflex)

SYRUP OF IPECAC (1648)

- Indications:

بطلوا يستخدموا هاي الطريقة هلا بس لما كانوا يستخدموها المادة كان لازم تكون معروفة الي اخدها الطفل

  - Children that recently ingested known substances that are not well adsorbed by activated charcoal and for whom transport time to a healthcare facility is delayed....save time
  - Less traumatic than gastric lavage → بس ضررها اكتر → لانو بال gastric lavage لما ادخل Tube ممكن يكون يعمل GIT Bleeding او يدخل بمكان غلط
  - Remove particles of material too large to pass through the opening of a lavage tube → ممكن استخدمها لما يكون ماخد Large tablet مثلاً ، الشي الي ما بقدر استخدمله gastric lavage

SYRUP OF IPECAC

الجرعات X
هو حفظ

- Ipecac induce vomiting has 2 phases:
  - ✓ Early: within 15-20 min....direct stimulation of GIT
  - ✓ Late: after 20 min....direct stimulation of medullary chemoreceptor trigger zone

بالعادة Max ينعطى 2 doses

- The dose may be repeated once if no response within 15-20 min ← اعطينا المريض هره وما استجاب بنقدر نعطيه كمان هره For a single dose
- Repeat the fluid administration → * عشان ممكن يصير مع المريض dehydration
- Have the patient sit up or move around, because this sometimes stimulates vomiting
- If the second dose of ipecac does not induce vomiting, use an alternative method of gut decontamination → * اذا الدوس الثانية ما اعطت response لازم نستخدم طريقة ثانية

طبعا بعد 20 - 15 min اذا ماكان في response بكرر بس هره

الطريقة الثانية بختارها حسب ال poison الي ماخذها المريض

* مثلاً بال gastric lavage ما يفيد اعطي مادة solid

X ما بعطي لمرة

Syrup of Ipecac: side effects

- ① **Drowsiness** occurs in about 20% and ② **diarrhea** in 25% of children
- ③ **Persistent vomiting** may delay administration of activated charcoal or oral antidotes
- ④ **Protracted forceful vomiting** may result in hemorrhagic gastritis
- ⑤ **Intracerebral bleeding** in elderly patients,
- ⑥ **diaphragmatic rupture**, ⑦ **aspiration pneumonia**
- Repeated daily use (**bulimic patients**) may result in
- ⑧ **cardiac arrhythmias** owing to accumulation of cardiotoxic alkaloids
- ⑨ Convulsion, skeletal muscle weakness

SYRUP OF IPECAC

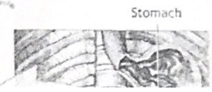
- Contraindications:
  - Loss of airway protection reflexes
  - Caustic or corrosive
  - Toxicant produce abrupt loss of conscious (ethanol, ultrashort BZDs, short acting barbiturate, heterocyclic antidepressant)
  - Seizures (amphetamine, cocaine, ibuprofen >400mg/kg)
  - Petrolium distellate
  - Infant <6 months age
  - Prior significant vomiting or hematoemesis
  - Absence of bowel sound…gastric lavage
  - Special situations (late pregnancy, elderly, HTN)

ال syrup of Ipecac بدو حركة بالجهاز الهضمي وال GIT وال intestine والمليينات ازا مافي حركة بالجهاز الهضمي ما بقدر استخدمها

→ يعني احنا بنعتمد على ال Normal physiological process احنا بنحفز For induction of Emesis

GASTRIC LAVAGE → الطريقة

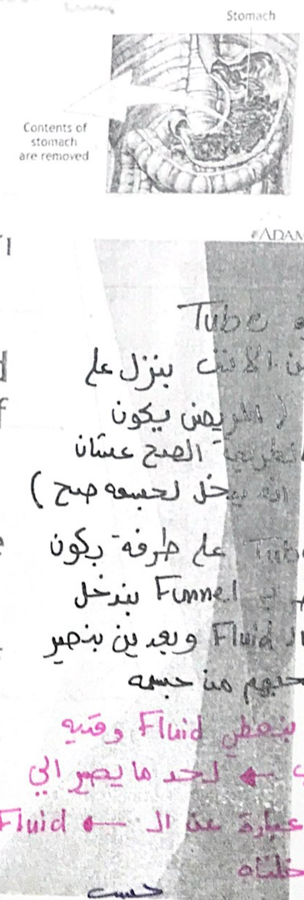
Stomach



حركة بالجهاز الهضمي ما بقدر استخرجها

For induction of Emesis احنا بنحفز

GASTRIC LAVAGE → الطريقة Comment



- Process of washing out the stomach with various solutions including lukewarm water, saline, sodium bicarb.
- Gastric lavage **should not be employed routinely**, if ever, in the management of poisoned patients
- Effective within 30-60 minutes of the ingestion.... Usefulness decrease with time ← بهاي الفترة بضمن انه ال poison لسا موجود بالمعده
- Still useful several hours after ingestion of agents that slow gastric emptying (eg. anticholinergic drugs)

* الأدوية الي الها delayed gastric emptying → exp: anticholinergic drugs

ال GIT Motility بيكون very slow → فصيلح بكون معنا وقت أطول لنعمل gastric Lavage

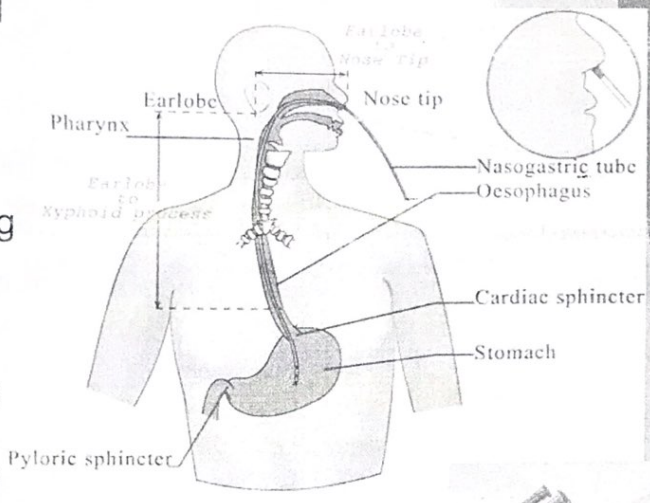
لبس كمان الحجم حسب الحبة. ازا very large Tablet → بكون صعب نعمل gastric lavage → لانه ال Tube صغير

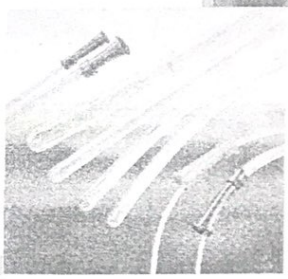
Tube رفيع ← صغير لتدخل من الانف بنزل على ال GI (المريض يكون قاعد بالطريقة الصح عشان نضمن انه يدخل لجسمه صح)

ال Tube على طرفه بكون مربوط ب Funnel بندخل منه ال Fluid وبعدين بنصير نسحبهم من جسمه

قديه بنعطي Fluid وقديه بنسحب ← لحد ما يصير الي بطلع عبارة عن ال Fluid ← الي دخلناه

The patient is placed on the left lateral decubitus position (pylorus pointed up) to reduces the chance for emptying into the small intestine and to permit pooling of gastric contents with head lower than the rest of the body. The largest catheter is inserted into the stomach





GASTRIC LAVAGE

- Attempt to aspirate as much of the stomach content as possible then...
- Lavage fluids should be introduced into the stomach (50-100ml aliquots for children) and (200- to 300-ml aliquots for adults)
- Lavage till clear
- **Complication** (3%) aspiration ① pneumonia, esophageal perforation ②, electrolyte imbalance ③
- **Advantages:** prepare the stomach for endoscopy

مشاكل صحاي الطريقة يتحمل صدول

GASTRIC LAVAGE

- Do not perform in any patient with an impaired level of consciousness unless the airway is protected by a cuffed endotracheal tube....prevent aspiration
- In patients < 2 years
- A specific antidote is then given if available; otherwise, a slurry of activated charcoal is given
- Do not perform if ingestion of tablets (especially big in size) → *parecatamol → *تعبير Big

GASTRIC LAVAGE

- CONTRAINDICATION:
  - Unprotected airway (حتى مابستخدم صمام الطريق)
  - Caustic ingestion (due to risk of exacerbating any esophageal or gastric injury) ← المواد الحارقة
  - Hydrocarbon ingestion (due to high aspiration risk) ← زي البنزين
  - Patients at risk of GI hemorrhage or perforation (recent surgery, underlying anatomic abnormality or pathology, coagulopathy) ← مثلاً المريض عنده peptic ulcer ماسحنا له صمام الطريق

ACTIVATED CHARCOAL

- ✓ Is a highly adsorbent powdered material produced by the superheating of wood pulp
- ✓ Form of carbon that has been processed in order to make it very porous with a large surface area to adsorb chemicals
- ✓ .....it is highly effective in adsorbing most toxins when given in a ratio of approximately 10 to 1 (charcoal to toxin)

هاي النسبة ← Toxin بـ 1 من الـ Charcoal ← 10
كتير منيحة

- ✓ Only a few toxins are poorly adsorbed to charcoal and in some cases this requires a higher ratio (eg, for cyanide a ratio of about 100:1 is necessary)

* في مواد مثل الـ cyanid بكونوا poorly adsorbed
بدحتاج فيها ← 100 particle of charcoal
حتى تسحبلي 1 particle of cyanide

هيك → لح اعطي كمية كبيرة

ACTIVATED CHARCOAL

X dose

- ✓ Indications: whenever an emetic (1) cannot be used, following successful chemical induction of emesis, or when the patient is unconscious (2) → ازا المريض هو واي لهيك استخدمه عادي

- ✓ Give activated charcoal aqueous suspension orally or by gastric tube. Initial dose (1 g/kg)
- ✓ Then 0.5g/kg every 2-6hrs

ACTIVATED CHARCOAL

efficacy → Within 30min of ingestion

- ✓ Should not be given within 30 min of syrup of ipecac unless the victim has already vomited (adsorbed on charcoal)
- ✓ In the stomach and intestine, poisons diffuse through the numerous pores on the charcoal surface and form tight chemical bonds
- ✓ This charcoal-chemical complex then passes out of the body
- ✓ Risk pulmonary aspiration due to loss of airway reflex

Substances poorly adsorbed by activated charcoal

1. Alkali
2. Iron
3. Lithium
5. Ethylene glycol
7. Mineral acids
8. Fluoride
9. Potassium
10. Heavy metals
11. Cyanide*
12. Rapid onset

ACTIVATED CHARCOAL

- CONTRAINDICATION:
  - ✓ Absence of bowel sounds
  - ✓ Sign of intestinal obstruction
  - ✓ Lack of airway protection
  - ❖ May decrease the absorption of the antidote given later

Decontamination

- Gastric decontamination *(decrease absorption)*
  - Dilution
  - Emesis
  - Gastric lavage
  - Activated charcoal
  - Cathartics
  - Whole bowel irrigation

Cathartics

اطلينات

Cathartics – (eg, magnesium citrate, magnesium sulfate, sorbitol, mannitol) are intended to decrease poison absorption by enhancing rectal evacuation of toxins or the poison-AC complex.

Charcoal-toxin

Toxicoloists advise against the use of cathartics as single agent therapy.

The combination of a cathartic and AC (eg, sorbitol and AC) should be used sparingly in adults, if at all, and should not be used in children.

If the only available formulation of AC contains sorbitol, it may be necessary to give it to a child, but treatment must be limited to a single dose in such cases

ازا ماضل بخيار غير صاق الطريقة بستخدم single dose

* ال activated Charcoal يرتبط بال toxic و ال Sorbitol بساعد على طرحها من الجهاز الهضمي ← enhancing rectal evacution بعمل

لا يُفضل اعطاءه للأطفال

Cathartics

Adverse effects associated with cathartic use include:

- increased abdominal pain,
- nausea,
- vomiting,
- excessive diarrhea,
- dehydration, and
- electrolyte abnormalities.

Decontamination

- Gastric decontamination *(decrease absorption)*
  - Dilution
  - Emesis
  - Gastric lavage
  - Activated charcoal
  - Cathartics
  - Whole bowel irrigation

Whole Bowel Irrigation

- WBI: aggressive form of GIT decontamination attempt to cleanse the bowel by the enteral administration of large volume of an osmotically balanced nonabsorbable polyethylene glycol electrolyte solution (PEG-ES) which induces a liquid stool

زي ما بحضر المريض لـ abdominal surgery

هاد باخدوه اللي برهم يعملوا تنظير

* by osmotic effect can induce GI Motility → dhiarea

- Contains the osmotically active sugar (PEG) with sodium sulfate, sodium chloride, sodium bicarb and potassium chloride to maintain electrolyte balance

salts +

لازم اتاكد قبل ما اعمل اي الطريقة If it will save his life or it would cause Further risk

- Rarely performed because risk-benefit analysis reserves this intervention for **life-threatening indication:**
  1. Ingestion of sustained-release or enteric coated preparations (valproic acid, verapamil or diltiazem) لازم اتاكد انه بجدها موجودة بالـ intestine
  2. Agent that do not bind to charcoal (iron, other heavy metals, lithium)
  3. Ingestion of illicit drug packets
     - No good clinical outcome is expected with antidote administration and the patient presents before established severe toxicity
- Complications such as: N, V

Contraindications

- Ileus, bowel obstruction, or intestinal perforation
- Clinically significant GI hemorrhage
- **Hemodynamic instability** (concern for sequestration of bowel and worsening of shock)
- Intractable **emesis** مستمر

Intractable emesis + diarrea → dehydration

بس اي تكرر بالسلايدات القبل

Table 5 *Gastrointestinal Decontamination*

Method	Advantages or Disadvantages	Uses
Syrup of ipecac	Typically induces vomiting within 20 min. Effectiveness questionable if given more than 30-60 min after ingestion. Vomiting may delay administration of activated charcoal and in an obtunded patient may lead to pulmonary aspiration of gastric contents.	Limited to use at home in children discovered within a few minutes of selected ingestion. Should not be given if the child has ingested a corrosive agent, most hydrocarbons, or if the child is drowsy.
Gastric lavage	May be performed without delay or patient cooperation. Decompresses the stomach, reducing the risk of vomiting and aspiration. Efficacy questionable if initiated more than 1 hour following ingestion. Not likely to remove intact pills, especially sustained-release products.	Rapid removal of recently ingested liquids; decompression of distended stomach; ingestion of massive quantities of drug, especially if the drug delays gastric emptying *(eg,* aspirin, anticholinergics).

Gastrointestinal decontamination

Activated charcoal (AC)	A highly refined powdered charcoal with enormous surface area, can adsorb most drugs and toxins. Ideal ratio of AC to drug is about 10:1 by weight. Ineffective for lithium, iron, other highly polar or low molecular weight substances	Administer AC alone in uncomplicated oral ingestions. Obtunded patients may be given the AC by nasogastric tube after gastric decompression and suctioning; cathartic may hasten gut transport and elimination
Whole-bowel irrigation	Balanced electrolyte-polyethylene glycol solution is iso-osmotic, can flush out gut contents without significant fluid shifts or electrolyte changes. May be mixed with AC if poison suspected to be adsorbed.	Ideal for ingestions of iron, lithium, sustained-release products, drug or poison-filled packets or other foreign bodies.

Methods to ENHANCE Elimination of Toxic Agent

Enhanced Elimination

- 3 critical questions must be answered:

A. Does the patient need enhanced removal?

1. Severe or critical intoxication with a deteriorating condition despite maximal supportive care (eg, phenobarbital overdose with intractable hypotension)
2. The normal or usual route of elimination is impaired (eg, lithium overdose in a patient with renal failure)
3. The patient has ingested a known lethal dose or has a lethal blood level (eg, theophylline or methanol)
4. The patient has underlying medical problems that could further complicate the situation

Enhanced Elimination

Vd ↓ = Cl ↑

B. Is the drug or toxin accessible to the removal procedure? The drug 'poison' should be located primarily within the bloodstream or in the extracellular fluid.....If extensively distributed to tissues, it is not likely to be easily removed

1. The volume of distribution (Vd) provides info on the accessibility of the drug:
   - Very large Vd.....Small Vd???
2. Protein binding.....highly protein-bound drugs have low free drug concentrations.....difficult to remove by dialysis

↓ Protein Binding = easly to be Cleared

Enhanced Elimination

C. Will the method work?.....Does the removal procedure efficiently extract the toxin from the blood?

1. The clearance (CL) is the rate at which a given volume of fluid can be "cleared" of the substance

CL = extraction ratio x blood flow rate

- Extraction ratio across the dialysis machine or hemoperfusion column

2. Total clearance.....If the contribution of dialysis is small compared with the total clearance rate, the procedure will contribute little to the overall elimination rate

قديم دح يصير Cl يعتمد على الـ extraction ratio

قديم دح ينتقل Media من High conc → Low conc بيرأ يسحب الـ Toxic الموجودة بالدم

* الـ M.W Charged/uncharged تحدد بحكولي الـ rate of Cl for the material

- Urinary manipulation
- Extracorporeal methods
  - Peritonial dialysis
  - Hemodialisis
  - Hemoperfusion

- Urinary manipulation:

ارتحكم ← بالـ Urine حتى اساعد على الـ Clearanse

These methods require that the renal route be a significant contributor to total clearance

* ازا كانت الـMaterial الي عملت الـ Toxicity ← renaly excreted
بعمل اسرع الـ renal elemination الها

* ازا العادة acidic بدي احمل الـ alkaline Urine حتى احمل الـ Trapping ~~Urine~~ ion وامنع يصير لها reabsorption ← ↑ ble

مثال عليها الـ asprin بدي اسرع الـ ele انه بحول الـ alkaline Urine → ما الها antidote

Forced diuresis

- Increase GFR, used in conjugation with ion trapping to prevent reabsorption
- Administration of enough fluids to establish a renal flow of 3-5ml/kg/hr
- Dangerous due to fluid overdose:
  - CHF
  - RF
  - Electrolyte disturbances
  - Pulmonary edema
  - Cerebral edema

risk of fluid over dose

* شرط هاي الطريقة- انه المريض يكون عنده good renal function
بكون عند ← good GFR ← رح اعطيه Fluid
حتى اسرع ال renal elemination حتى اعمل washing
واسرع ال Toxin elemination

Ion trapping

- Alteration of urine pH prevent renal reabsorption of poison that undergo glomerular filtration and active tubular secretion
- Many substance are reabsorbed in the nonionized form
- Urine alkalization (pH= 7.5-8)
  - NaHCO3 ± acetazolamide
- Urine acidification (PH= 4.5-6) → لو كانت المادة Basic بجعل ال urin acidic
  - Ascorbic acid, NH4Cl, HCl
  - ← اكثر واحد