Poisoning in the home

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• What is the extent of the problem?
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• How to recognize the poison? – Toxidromes
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All substances are poisons;
There is none which is not a poison.
The right dose differentiates a poison from a remedy.

Paracelsus (1493–1541)
Philippus Aureolus Theophrastus Bombastus von Hohenheim
Credited as the founder of toxicology

WHO: Africa - Mortality rates from unintentional poisoning 2012


Pretoria Medico-Legal Laboratory

2005 – 2009:

<table>
<thead>
<tr>
<th>Age (yrs)</th>
<th>Deaths due to drug overdose/poisoning</th>
<th>* Suicidal poisoning/drug overdose</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-5</td>
<td>11</td>
<td>0</td>
</tr>
<tr>
<td>6-10</td>
<td>4</td>
<td>1 (Pv)</td>
</tr>
<tr>
<td>11-15</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>16-20</td>
<td>16</td>
<td>10</td>
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Statistics: evidence base is poor.
• 200 000 - 300 000 child poisoning incidents occur annually in the country.
• < 1% fatal.
• Most cases:
  • 1 – 2 years
  • swallowed a small amount of 1 substance.
• 2nd peak in adolescence: deliberate self-poisoning.
Trends in SA (Cape Town)

2003 to 2008 - Red Cross War Memorial Children’s Hospital:

- 139 single-drug poisonings:
  - 7 tricyclic antidepressant incidents,
  - 7 carbamazepine incidents,
  - 8 salicylate incidents (2 severe) and
  - 18 traditional medicine incidents (3 severe).
- 5 deaths:
  - 4 associated with traditional medicine ingestion and
  - 1 following aspirin ingestion.

- Pesticide incidents (311):
  - 6 deaths (organophosphates, carbamates).

- Trends:
  - Increase in household cleaning products, cosmetics and pesticide incidents,
  - Other decreasing.
  - Paraffin and drugs remain the principal agents.

Continuing Medical Education 2013:31(1):24-25

Tygerberg Poison Information Centre

• Survey - telephonic.
• Most cases not serious.

Our experience

• Salicylate
  - 2014: Reye’s syndrome, 8-year-old boy
  - Previously healthy, 1-day history abdominal pain and vomiting
  - One aspirin
  - Multi-organ failure within 6 days.
  - 2016: Unconfirmed: 3-month-old baby.
  - Diagnosed with sepsis, but no features of that.
  - Gastric bleed.
  - High anion gap metabolic acidosis.
• 2016: Survived: 4-month-old baby, Twin. Malnourished. Sachipreca, high anion gap metabolic acidosis, low CRP. Low salicylate blood level!

• Sylphonylurea (metformin)
  - 2009: 9 yrs female
  - In reaction to mom’s suicide, conversion reaction (pseudo seizures)
  - Delayed persistent hypoglycaemia (Px: octreotide)

• Traditional healer medicine - drug unknown
  - Aug 2016: Acute renal failure, 7 yrs male
  - Uncle spokesperson
  - Sudden unexpected death; no post-mortem (weekend).

• Carbamates
  - 2014/2015: Forensics: reported 3 deaths.

Lethal substances in small dosages

1. Oral hypoglycaemics (sulfonylureas)
2. Beta-blockers
3. Calcium channel blockers
4. Alpha 2 adrenergic agonists (clonidine)
5. TCA’s (Amitriptyline, Imipramine)
6. Opioids (incl Lomotil, Imodium/Narcotics)
7. Hallucinogens
8. Quinine and quinidine (antimalarials)
9. Camphor
10. Carbon monoxide

PLUS
11. Biological toxins
  - Amanita phalloides
  - Cobra/mamba bites
12. Pesticides
  - Organophosphates/ carbamates
  - Paraquat
  - Naphthalene (1 moth ball is considered a toxic ingestion)
13. Other (button batteries, magnets)

From Dr Cindy Stephen, Poison Information Centre, Cape Town
Assessment and Management

Stabilise patient

Goals
• Identify toxin
• Assess the presence and degree of toxicity
• Consider if a non-toxicological condition could be the cause of or contributing to clinical presentation

History
Important but often
• Unreliable
• Unavailable
• Incomplete

Physical Examination
A focused examination to include
• Vital signs
• Arousal levels, Eyes
• Muscle tone, reflexes
• Skin, Odours
• Look for toxidrome or toxic signs

Call for help & Poisons Information Centre

Laboratory
• Selective/Progressive
• Toxicological testing

Management
A Airway
B Breathing
C Circulation
D Drugs (glucose, thiamine, naloxone)
Decontamination (act. charcoal, gastric lavage, whole bowel irrigation)
E Elimination (diuresis), ECG
F Find an antidote
G General Management (complications)

Admission/PICU?
[Notify (organophosphates, lead, food)]

Hypoxia
Hypoglycaemia

Toxin recognition?

Anticholinergic toxidrome - nursery rhyme:
• Blind as a bat
• Mad as a hatter
• Red as a beet
• Hot as a hare
• Dry as a bone
• The bowel and bladder lose their tone
• And the heart runs alone.

Cholinergic state - Organophosphate poisoning inhibits the enzyme acetylcholinesterase.
The patient with “SLUDGE and killer Bs”:
• S = Salivation
• L = Lacrimation
• U = Urination
• D = Diarrhoea
• G = GI distress
• E = Emesis
• K = Killer Bs: Bronchospasm, Bronchorrhea, Bradycardia.

LSD: lysergic acid diethylamide; CNS: central nervous system; MAOI: monoamine oxidase inhibitor; SSRI: serotonin reuptake inhibitor; TCA: tricyclic antidepressant.

I called for help!
### Decontamination – Activated charcoal

**Indications:** (Usually when Palmer with airway intact) -> kg
- A: Antidepressants (MAOIs) / Antihistamines
- B: Anticonvulsants (Phenobarbital) / Beta-blockers
- C: Cathartics (CaChannel-blockers) / Diuretics
- D: Deposits / Deposins (Diltiazem / Phenytin)
- E: Salicylates

**Not for:**
- C: Caustic / Corrosives
- H: Heavy metals (arsenic, mercury)
- A: Alcoholic / Glucose (alcohol, methanol, ethylene glycol)
- F: Rapidly absorbed substances (liquids)
- C: Carbonate / Oxalic acids
- A: Salicylates (aspirin)
- L: Lactase, lact of gas reflex

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### Decontamination - Gastric Lavage

- **No longer routinely recommended**
- **Not more effective than activated charcoal**
- **More complications**
- **Indicated:**
  - < 1 hour of ingestion: 10-15ml/kg saline
  - β-blockers, Ca-channel blockers, TCA, iron, theophylline, lithium
  - Cf: unprotected airway, hydrocarbons (aspiration), corrosives (perforation).

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### Decontamination - Whole bowel irrigation

- With polyethylene glycol (Golytely) – 30ml/kg/h until effluent runs clear.
- Possible indications:
  - Slowly absorbed substances: Iron (>60mg/kg elemental iron ingested);
  - Sustained release (diltiazem, verapamil);
  - Slow release potassium chloride;
  - Massive overdoses
- Cf:
  - Impaired airway reflexes, vomiting
  - Bowel obstruction, ileus, GI haemorrhage

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### Specific drugs

**Salicylates:** how much fatal? 3g
- Ingestions of <300mg/kg: mild symptoms,
- 300-500 mg/kg: moderate toxicity,
- >500 mg/kg lethal.
- One teaspoon (5 mL) of oil of wintergreen contains about 7 g of salicylate, the equivalent of 22 adult aspirin tablets. Ingestion of just 4 mL can be fatal in a child.
- Death typically results from severe central nervous system (CNS) toxicity with complete loss of function of the cardiorespiratory centres.
Discussion of some overdose pitfalls?

Salicylates:
- Stimulate resp. centre...metabolic acidosis resulting in fast breathing...often regarded as pneumonia. Failure of oxidative phosphorylation creates subsequent lactic acidosis.
- High anion gap metabolic acidosis: \( [H^+] - ([Cl^-] + [HCO_3^-]) > 14-16 \) mEq/L or mmol/L (N=8-12)
- Treatment: assessment and stabilization of the airway, breathing, and circulation, gastrointestinal decontamination.
  - Correct fluid and electrolyte imbalance.
  - Monitoring and hemodialysis are the primary methods to enhance elimination of salicylates.
  - No gastric lavage.

...high-anion-gap metabolic acidosis

KEY TAKE-HOME POINT: A good mnemonic is A CAT MUDPILE:
A Aspirin
C Cyanide, carbon monoxide
A Acetaminophen (paracetamol)
T Theophylline
M Methanol, metformin
U Uremia
D Diabetic ketoacidosis (or alcoholic ketoacidosis)
P Propylene glycol
I Iron, RNI
L Lactic acidosis
E Ethylene glycol

Other small items!

Ball magnets
Bowel perforation.

Button Batteries
Devastating injuries
- Swallowed batteries burn through a child's esophagus in just 2 hours.
- Perforations and fistulas: up to 28 days after removal.
- Strictures: weeks and months after removal.
  - The most hazardous
  - Too small to get stuck
  - Smallest

Magnets...
- Spaces between magnets (2 arrows) should be considered highly suspicious for mural entrapment, leading to perforation eventually.
- The likelihood of mural entrapment increases with more than one magnet swallowed.
- Newer magnets:
  - Extremely powerful
  - Very difficult to separate when they attach to one another.
- Surgery is the only option - to prevent bowel perforation.

Button batteries...

Battery lodged at the level of the:
- Cricopharyngeus muscle
- Aortic crossover
- Lower esophageal sphincter

A button battery can cause devastating harm to a child if it gets lodged in their throat. Medical correspondent Fergus Walsh demonstrates what can happen - by using a piece of ham.

The presence of bowel wall between magnets is not always evident on radiographs.

Button batteries: Diagnosis – X-ray

http://www.poison.org/battery/guideline

http://www.poison.org/battery/guideline

http://www.poison.org/battery/guideline

http://pedsinreview.aappublications.org/content/36/10/430.full.pdf
Batteries...

- Two-step profile of a button (disk) battery in the oesophagus.
- Distinctive double-circle appearance, useful to differentiate a button battery from a coin.

Poisons Information Centre

Poisons Information Helpline (24hrs) – Cape Town
0861-555-777
- [http://www.paediatrics.uct.ac.za/poisons-information-centre](http://www.paediatrics.uct.ac.za/poisons-information-centre)

Poison Information Centre – Bloemfontein
- Information / Drug Information (21:00)
  +27 82 491 0160
- Universitas Hospital Dept of Pharmacology

Back to Basics