MOH CPG for Acute Poisoning Paediatric Poisonings: An Update 2012

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Most common substances involved in toxic exposures

<table>
<thead>
<tr>
<th>All Human Exposures</th>
<th>Pediatric (≤5 years) Exposures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analgesics</td>
<td>Cosmetics/personal care products</td>
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<td>Household cleaning substances</td>
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<td>Analgesics</td>
</tr>
<tr>
<td>Sedative/hypnotics/antipsychotics</td>
<td>Foreign bodies/toys/miscellaneous</td>
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<tr>
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<td>Topical preparations</td>
</tr>
<tr>
<td>Cough and cold preparations</td>
<td>Cold and cough preparations</td>
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<tr>
<td>Topical preparations</td>
<td>Vitamins</td>
</tr>
<tr>
<td>Pesticides</td>
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<tr>
<td>Antidepressants</td>
<td>Plants</td>
</tr>
<tr>
<td>Bites and envenomations</td>
<td>Antihistamines</td>
</tr>
</tbody>
</table>
Local Epidemiology

- Audit KKH A&E of paediatric accidental poisonings from Jan 2005 - Sep 2011
  - Annually ~240 cases
  - Bimodal age distribution
    - 80% are less than 6 years old (almost all unintentional ingestion)
    - Teenagers (majority intentional)
  - Approximately half required admission (47%)
Why do children get poisoned?

• Child Factors
  – Development of fine motor skills
  – Learning to walk (increased mobility)
  – Explore by placing things in their mouth
  – Imitate their parents

• Environmental and Care-Giver Factors
  – No child proofing of house – household products
  – Medications left on table
  – Usually occurs when left unsupervised or distracted
Why do children get poisoned?
A 4 year old view of ‘sweets’
Why do children get poisoned?
A 2 year old view of ‘drinks’
Examples of substances causing life-threatening sequelae when ingested in very small quantities (1 – 2 tablets, 1 – 2 teaspoons)

**Pharmaceutical**
- **Antipsychotics** (thioridazine, chlorpromazine, Loxapine, Clozapine, olanzapine, ?quetiaprine)
- **Tricyclics** (amitriptyline, desipramine, imipramine)
- **Clonidine**
- **Anti-hypertensives**: Calcium channel blockers (diltiazem, verapamil, nifedipine)
- **Anti-arrhythmics** (Quinideine, Disopyramide, Procainamide, Flecanide)
- **Antimalarials** (Hydroxychloroquine, Chloroquine)
- **Opioids** (Narcotics: morphine, methadone, codeine; Anti-diarrhoeals: diphenoxylate)
- **Sulphonyureas** (glyuride, glipizide)
- **Theophylline**
- **(Iron supplements)**

**Non-pharmaceutical**
- Camphor/ Naphthalene
- Ethylene glycol
- Lindane
- Methanol
- Podophyllin
- Selenious acid
1 or 2 swallows can kill?

- **Camphor** – incense for religious ceremonies
- **Methylsalicylate** (Oil of Wintergreen)
- **Oils** (lamp, eucalyptus, kerosene) – aspiration
- **Podophyllin** paint
- **Dibucaine** paste
- **Imidazolines** drops
- **Anti-freeze** (toxic alcohols)
- **Gamma Hydroxybutyrate** and analogues (gamma butyrolactone: nail polish remover, 1,4 butanediol: toy beads)
One chew can kill or once stuck can kill

- **Fentanyl** patches

- **Clonidine** patches
What else?

Look out for drug formulations and social trends

Paediatric Considerations
Recreational Drugs

• Unintentional ingestion
• Case studies
  – Psychoactive drugs
    – Methadone and other opioids
    – GHB
    – Amphetamines, Ecstasy (MDMA)
    – Delta-9-tetrahydrocannabinol (Cannabis)
  – Others: Nicotine patches/gums
• Need for recognition
General approach to the poisoned paediatric patient

- A = airway
- B = breathing
- C = circulation
- D = decontamination
- E = elimination
- F = find an antidote
Clinical Approach

History

• Details are extremely important and will strongly impact management.
• Identify the potential poisons.
• Create an accurate time line.
• How long was the child unattended?
• Medications in the home, visitors?
• Social circumstances
  – Possibility of neglect?
  – Munchausen by Proxy?
General approach to the poisoned paediatric patient

- A = airway
- B = breathing
- C = circulation
- D = decontamination
- E = elimination
- F = find an antidote
<table>
<thead>
<tr>
<th>Antidote</th>
<th>Common Poisoning/Envenomation Indication(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NAC</td>
<td>acetaminophen</td>
</tr>
<tr>
<td>Antivenom</td>
<td>snake, spider, scorpion envenomation</td>
</tr>
<tr>
<td>Atropine</td>
<td>organophosphates, carbamates</td>
</tr>
<tr>
<td>Bicarbonate (sodium)</td>
<td>cyclic antidepressant cardiotoxicity</td>
</tr>
<tr>
<td>Bromocriptine</td>
<td>neuroleptic malignant syndrome</td>
</tr>
<tr>
<td>Calcium</td>
<td>calcium channel blockers, hydrogen fluoride</td>
</tr>
<tr>
<td>Dantrolene</td>
<td>malignant hyperthermia</td>
</tr>
<tr>
<td>Deferoxamine</td>
<td>iron</td>
</tr>
<tr>
<td>Digoxin-specific Fab</td>
<td>digoxin, digitalis</td>
</tr>
<tr>
<td>Dimercaprol (BAL)</td>
<td>lead, other metals</td>
</tr>
<tr>
<td>Diphenhydramine</td>
<td>neuroleptic dystonia</td>
</tr>
<tr>
<td>Edetate calcium disodium</td>
<td>lead, other metals</td>
</tr>
<tr>
<td>Ethanol</td>
<td>ethylene glycol, methanol</td>
</tr>
<tr>
<td>Flumazenil</td>
<td>benzodiazepines</td>
</tr>
<tr>
<td>Folic acid</td>
<td>methanol</td>
</tr>
<tr>
<td>Folinic acid (leucovorin)</td>
<td>methotrexate</td>
</tr>
<tr>
<td>Glucagon</td>
<td>beta blocker-induced bradycardia and hypotension</td>
</tr>
<tr>
<td>Hyperbaric oxygen</td>
<td>carbon monoxide</td>
</tr>
<tr>
<td>Methylene blue</td>
<td>methemoglobinemia</td>
</tr>
<tr>
<td>Naloxone, nalmefine</td>
<td>opioids</td>
</tr>
<tr>
<td>Nitrite (amyl, sodium)</td>
<td>cyanide</td>
</tr>
<tr>
<td>Penicillamine</td>
<td>lead, other metals</td>
</tr>
<tr>
<td>Physostigmine</td>
<td>anticholinergic agents</td>
</tr>
<tr>
<td>2-PAM</td>
<td>organophosphates, carbamates</td>
</tr>
<tr>
<td>Protamine</td>
<td>heparin</td>
</tr>
<tr>
<td>Pyridoxine</td>
<td>isoniazid, ethylene glycol</td>
</tr>
<tr>
<td>Sodium thiosulfate</td>
<td>cyanide</td>
</tr>
<tr>
<td>Succimer (DMSA)</td>
<td>lead, other metals</td>
</tr>
<tr>
<td>Thiamine</td>
<td>Wernicke's encephalopathy, ethylene glycol</td>
</tr>
<tr>
<td>Vitamin K₁</td>
<td>warfarins</td>
</tr>
</tbody>
</table>

*Excludes gastrointestinal decontamination agents, routine supportive pressor agents, sedatives, and anticonvulsants.
General approach to the poisoned paediatric patient

• ABC’s
  – Similar approach in toxicology compared to other medical conditions
  – Some exceptions (cocaine, tricyclic antidepressants)

• Decontamination
  – Activated charcoal (single or repeat dose)

• Elimination
  – Multidose activated charcoal
  – Haemodialysis
  – Urine alkalinization

• Find an antidote: N-acetylcysteine, glucose, bicarbonate
Role of Antidotes in Paediatric Toxicology

• Unfortunately, specific antidotes are infrequently available or indicated for most paediatric poisoning scenarios.
• When available, the clinical effect is seldom dramatic.
• Supportive care remain paramount in emergency clinical toxicology.
• Most poisoned patients derive more benefit from attentive supportive care than from a specific antidote.
What Can I Do?

• Have labeled medications stating drug name and drug concentration
  – Instead of labeling ‘for phlegm’

• Opportunistic parental education on medication and child safety

• Refer to A&E if unsure of nature and dose of toxic ingestion
Case Studies

Methylsalicylate poisoning

• 3 cases in last 2 years
  – 4 year old child
    • Ingested traditional topical ointment (for musculoskeletal pain).
    • Original bottle broken
    • Parents put the rest of medication into a Cetrizine bottle.
    • Months later, maid and parents administered contents to child.
  – 4 year old & 6 year old
    • Unintentionally given a dose of methylsalicylate (topical medication) as parent mistook the medication for “flu” medication
Primary Prevention

• Preventive measures
  – Public education
    • Replacing the container of one medication into another
    • Realising that there are no “child-proof” bottles
    • Creating a safe home environment
  – Family physicians
    • Strongly advise against using ubiquitous bottle especially if topical
    • Prominent labelling
Drugs to avoid in the paediatric patient

• URTI medications
  – Promethazine in the very young

• GE medications
  – Ant-emetics
    • Maxolon (metocloperamide)
  – Anti-spasmodics
    • Hyoscine/buscopan - ileus
  – Anti-diarrhoeals
    • Lomotil
You may be the first contact for the child with accidental poisoning

Knowledge - know what is potentially dangerous
Basic Life Support / First Aid
Referral to A&E
Parental Education
Outpatient management of paediatric accidental poisoning

• Drug – Disease interaction
  – Underlying condition
    • Arrhythmias or congenital cardiovascular disease with anti-hypertensives or TCAs

• Drug-drug interaction
  – Toxic dose may be lower in drug-drug interaction
    • Current medications which may be cytochrome inhibitors eg erythromycin and clarithromycin
Outpatient management of paediatric accidental poisoning

• All unintentional poisoning should be referred to the hospital
  – Includes possibility of NAI

• Do not induce emesis.
  – Consider the oral administration of activated charcoal if it is available and no contraindications are present
  – But do not delay transportation to administer charcoal (if time of ingestion is less than 1 hour).
Pitfalls in Management

“Let’s insert the nasogastric tube because….

She is vomiting so let’s give the activated charcoal through NG………..”

He is too drowsy to take the activated charcoal……………….”
Outpatient management of paediatric accidental poisoning

- Ambulance transportation is recommended for patients who are referred to emergency departments if symptomatic or known drug with potential for life-threatening complications in overdose.
Investigations – To Do or Not to Do?

• Main aim is to stabilise patient
  – Oxygen supplementation if in respiratory distress
  – Blood pressure – hypotension must be corrected
  – CPR if indicated

• Depends on available equipment
  – Hypocount (especially in context of sulphonylureas, salicylate, ethanol poisonings)
    • result in neurological sequelae hypoglycaemia not treated
  – ECG (Tricyclics) but do not wait to do ECG if patient is symptomatic
Back to What’s New and Evidenced Based Management in Poisoning!

New Stuff! (Relatively speaking)
Specific Paediatric Poisonings
Case Study

• A 4-year old just accidentally drank 170mg/kg of paracetamol elixir thinking it was Bandung 1.5H ago
• Vital signs are stable
• She is smiling at you in the clinic
• Parents are anxious and looking at you to do something
• What would you do?
The saga continues.....

- She was previously seen 48 hours ago in your clinic before for fever and was discharged with paracetamol.
- The New Guidelines say that toxic dose for acute paracetamol ingestion is 200mg/kg/day.
- What further history would you ask?
- How would you manage this patient?
Considerations in paracetamol poisoning

• Her parents had been giving her paracetamol 10mg/kg 6H and has taken 3 doses.

• Issues to consider
  – Acute, Single vs Repeated Supratherapeutic Ingestion

• Unknown Dose

• Delayed presentation

• Symptomatic
Case Study

- Grandmother brings a 2 year old to see you because she thinks her grand-daughter swallowed one of her diabetic pills half an hour ago.
- The vital signs are normal, hypocount is 5mmol/L and the child is active and making faces at you.
- Physical examination is normal.
- The pills are identified as glipizide.
- What would you do?
Sulfonylurea Poisoning

• Time of onset of hypoglycemia was 0.5-16 hours with 80% within 0.5-4 hours post ingestion

• A retrospective study showed 4 of 25 patients developed delayed hypoglycemia including 1 at 16 hours post ingestion.

• Even if asymptomatic initially, it is recommended to refer to the emergency department (may need 24 hours of observation)
Case Study

- A father rushed into your clinic with his 4-year old daughter
- He says the child was noted to be very sleepy since afternoon
- No history of head injury or epilepsy
- You just saw the father yesterday for diarrhoea
Case Study

• On examination you notice that the child was very sleepy with GCS 12
• Vital signs were thankfully stable but you noted that the child had pin-point pupils
• What do you think happened?
Lomotil

- Antidiarrheal agent containing both diphenoxylate and atropine.

- Both agents are absorbed by the GI tract and absorption may be delayed in overdose due to inhibitory effects on smooth muscle motility.

- Diphenoxylate is an opioid that is metabolized to difenoxin which is 5 times more potent than the parent compound and has half life of 12-14 hours.
Lomotil

- Patients manifest signs and symptoms of opiate toxicity.
- Respond well to naloxone and supportive care.
- Onset of symptoms may be delayed up to 18hrs.
- Current recommendations are for a minimum of 24 hour observation.
- Refer for admission even if asymptomatic.
Case Study

- A pregnant mother brought his 1-year old boy for vomiting, abdominal pain and diarrhoea
- There is no fever or contact history
- She also mentions that she had lost a bottle of her supplements for her pregnancy
- Any thoughts?
Iron Poisoning

• The most common cause of death in toddlers in USA.
• Classically taught as having five clinical stages.
• Remember prenatal vitamins, supplements, and “natural products”.
Iron

• Toxic doses occur at 10-20mg/Kg of elemental iron.

• Prenatal vitamins typically contain about 65 mg of elemental iron.

• Children’s vitamins contain about 10-18 mg of elemental iron.
Any Questions?
Thank You!

Have a Great Day Ahead!