One Pill Can Kill

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Objectives

• Understand the theory behind One Pill Can Kill

• Understand the toxokinetics difference in Children compare to adults

• Recognize the eleven classes of medications which can kill a toddler with one or two standard doses

• Understand the typical presentations, initial stabilization and specific treatment of these ingestions
Background:

Toddlers
- High toxic drug exposure
- Despite childproof containers and educational programs

American Association of Poison Control Centers AAPC (2012):
- Over 1 million cases children < 5 years age
- 21 fatal cases
Gulf area data

Studies focused on pattern of poisoning
  - Household Substances ingestion is common
  - Pesticides

Mortality data very limited
  - Mainly from Unknown substances
History

Koren G et al 1993
- Analyzed medications that could kill a 10kg toddler with 1-2 standard doses
  - 40% of (AAPCC) database fatalities < age 2

Bar-Oz 2004 Update
- Identified 11 groups of Medications that can be fatal for a toddler with one tablet or teaspoonful
  - 45% of (AAPCC) fatalities < 2 years age
  - 72% if iron ingestion excluded
Pre Hospital consideration

- Should be focus on getting child to the hospital early
- Syrup of ipecac not recommended for routine use
- Controversies about Pre hospital administration of Activated charcoal

Tri-Cyclic Antidepressants

Amitriptyline, Imipramine, Desipramine

- Symptoms presents with in six hours
- Minimal potential fatal dose 15mg/kg

Toxic effects include:
  - Sodium channel block & Anticholinergic
  - Ventricular arrhythmia
  - CNS depression and seizure

Management:
  - Proactive care
  - Sodium bicarbonate
  - Observe for a minimum of six hours if symptomatic then discharge
Antipsychotics

Loxapine, thioridazine, chlorpromazine

Toxic effects include:
- Sodium channel block & Anticholinergic
- Ventricular arrhythmia and QRS changes
- CNS depression and seizure

• Management
  - Proactive care
  - Sodium Bicarbonate
Calcium Channel Blocker

Nifedipine, verapamil, diltiazem

Symptoms appear within six hours, 2-14 hours for sustained release

Amlodipine
- Half life 24 hours most Symptoms appear within 3 hours

Toxic effects include:
- Hypotension
- Bradycardia
- Hyperglycemia

Management
- Proactive care
- Calcium and inotropes
- Pacing
- Observation of 24 hours for sustained release

Anti-arrhythmic

Quinidine, disopyramide, procainamide, flecainide

Flecainide class 1 anti-arrhythmic

Toxic effects include:
- Sodium channel blockade
- GI symptoms
- cardiac (hypotension, bradycardia and arrhythmia)

Management:
- Proactive care
- Sodium bicarbonate
- Observation for 24h if ECG changes with serial ECG check

1- D’Alessandro et al. Life-threatening flecainide intoxication in a young child secondary to medication error Ann Pharmacother 2009
Methyl salicylate

Oil of wintergreen
- Uses – liniments, lotion and analgesic ointments
- Contains 90-100% methyl salicylate
- Fewer than 5 ml leaded to death in children under 6 years
- 5 ml equal to 7000 mg of salicylate or 21.7 adult aspirin tablets

Salicylate
- Half-life increases with toxic dose
- Rapidly absorbed in liquid and toxic blood levels are reached earlier than tablets.

Toxics effects include:
- Mixed metabolic acidosis and respiratory alkalosis
- Coma, seizure, encephalopathy and cardiovascular collapse

Management:
- Proactive care, Hydration, alkaliniazation of urine.
- Dialysis

Chan T. The risk of severe salicylate poisoning following the ingestion of topical medicaments or aspirin. Postgrad Med J 1996
Antimalarials

Chloroquine, hydroxychloroquine, quinine

- The most fatal toxic drug ingestion in the malaria epidemic area
- Direct myocardial depression

Toxic effects include:
- Coma
- Seizures
- Myocardial depression, Dysrhythmias and Hypotension
- Hypoglycemia

Management
- Proactive care
- Intravenous glucose
- Inotropes
Oral hypoglycemics – Sulfonylureas

Chlorpropamide, glibenclamide, glipizide

- Facilitate release of insulin from pancreatic beat cells
- An overdose can lead to profound hypoglycemia
- 185 Children of Sulphonylurea ingestion 96% developed hypoglycemia with in 8 h

Toxic effects include:
- Hypoglycemia

Management
- Proactive care
- Intravenous glucose (4ml/kg of D25 or 2ml/kg of D50) then D10
- Octerotide
- if Asymptomatic observe for 8-12h & NEVER discharge patient at night

1-Spiller HA et al, prospective multicentre study of sulfonylurea ingestion in children j Pediat 2000
2-Carr R et al, Octerotide for sulfonylurea induced hypoglycemia following overdose Ann pharmacother 2002
Camphor

Originally derived by distilling the bark of the from camphor tree

Uses
- Analgesic gels
- Cough and Cold
- Cooling gel

Toxicity
- Rapid toxic symptoms within 5-20 minutes
- Death occurred with ingestion of 488 mg (1 teaspoon of 10.8% contain 500mg)
- Mucosal irritation, CNS depression and seizure

Management
- Proactive care
- Seizure management
- Asymptomatic patient can be discharged 4 h post ingestion

Other Herbs

Pennyroyal oil
- Minty odor
- Toxic effects: **hepatotoxicity**, hypoglycemia, coma and seizure
- 10-15 ml of pure Pennyroyal oil caused death
- Management: Proactive care and N-acetylcysteine
- All patients should be admitted for 24 h

Eucalyptus oil
- Uses for cough and cold
- Toxic effects: GI irritation and CNS toxicity
- Death reported from ingestion of 4-5 ml
- Management: mainly proactive
- Asymptomatic patient can discharge 4h post ingestion
Narcotics

Codeine, hydrocodone, methadone, morphine

Methadone
- Exposure in children is becoming more frequent
- Death has been reported

Diphenoxylate-atropine (Lomotil®) is a combination product used as an antidiarrhoeal

Opioid Toxidrome
- CNS depression
- Respiratory depression
- Miosis

Management
- Proactive care
- Nalaxone
- Observation period depend on the potency of the substance

Others

Hydrocarbons
Hydrofluoric acid
Organophosphates insecticide
Selenious acids
Benzcaine
Imidazolines decongestion
Theophylline
Podophyllin 25%
Alcohols
References

- Koren G. Medications which can kill a toddler with one tablet or teaspoonful. J Toxicol Clin Toxicol 1993

- Bar-Oz B, Levichek Z, Koren G. Medications that can be fatal for a toddler with one tablet or teaspoonful: a 2004 update. Pediatr Drugs 2004

- Toxinz website. Available at www.toxinz.com

- David L Eldridge et al. An Evidence- Based review of single pill can and swallow that can kill a child. Pediatric Emerg Med 2010.