Common Poisonings in Children

Poisoning should be suspected when a patient presents with any of the following –

- Cyanosis
- Shock
- Vomiting
- Diarrhea
- Hypothermia or hyperthermia
- Abnormal behavior, altered mental status or convulsion
- History of ingestion or contact with unusual substances

General Measures

Emergency stabilization

- ABC measures
    - Maintain clear airway
    - Assess and maintain breathing
    - Assess and maintain circulation-if shock
- Convulsion
- Control body temperature

Hyperthermia (>39°c)-Reduce the body temperature by tepid sponging

Hypothermia(<35°C)-Keep the child warm by using blankets, warmer or heater

- Neurological assessment-Use Glasgow Coma Score (GCS)

History

- Identification of the toxin
    - A sample of the substance ingested
    - Interview the patient's family members or care giver
    - Review of drug and chemical databases

    - Route of exposure (e.g. dermal, rectal, ocular or parenteral)
    - Amount of exposure
- Review of symptoms
- Any treatment and attempts at decontamination before arrival to hospital
- Past medical history and co-morbidities
- Intent of exposure-Unintentional or intentional

Physical Examination

- A thorough physical examination beginning with vital signs
- Attempt to identify toxidromes (toxicologic syndromes)

Toxicological Clues

Respiration

- Bradypnea – Opiates, alcohol, benzodiazepines, barbiturates
- Tachypnea – Salicylates, sympathomimetics, methanol, theophylline, cocaine
- Wheezing – Organophosphates
- Kussmaul breathing – Salicylates, methanol

Pulse

- Bradycardia–Beta-blockers, calcium channel blockers, clonidine, digoxin, sedative hypnotics, opiates, organophosphates
- Tachycardia–Anticholinergics, sympathomimetics (cocaine, amphetamines) theophylline, caffeine, iron, salicylate, Tricyclic antidepressants (TCAs), levothyroxine
- Arrhythmias–Anticholinergics, TCAs, phenothiazines, beta-blockers, organophosphates, carbon monoxide (CO), cyanide (CN)

Blood pressure

- Hypotension–Beta-blockers, calcium channel blockers, opiates, iron, TCAs. CO, CN
- Hypertension: phenylpropanolamine (OTC cold remedies), sympathomimetics, cocaine, amphetamines, anticholinergics, antihistamines

Temperature

- Hypothermia–Alcohol, opiates, benzodiazepines, barbiturates, TCAs, CO, antidepressants, hypoglycemic agents
- Hyperthermia–Sympathomimetics, anticholinergics, salicylates, TCAs, cocaine, amphetamines, theophylline

Skin

- Cherry red–CO, anticholinergics, CN
- Blue/cyanosis–Methemoglobinemia
- Flushing–Anticholinergics, sympathomimetics, alcohol, antihistamines
- Hot, dry skin–Anticholinergics, antihistamines
- Diaphoresis–Sympathomimetics, salicylates, cocaine, PCP, organophosphates. Barbiturates
- Jaundice–Paracetamol, mothballs (naphthalene), heavy metals

Odor

- Acetone–Methanol, salicylate
- Alcohol–Ethanol, isopropyl alcohol, methanol
- Garlic–Oreanophosphates, arsenic
- Mothballs–Camphor, naphthalene
- Petroleum–Petroleum distillate

CNS

- Extrapyramidal signs (rigidity, dysphonia, torticollis, oculogyric crisis) Phenothiazines, metoclopramide
- Myoclonus/rigidity-Phenothiazines, anticholinergics, haloperidol
- Nystagmus–Phenytoin, alcohol, barbiturates, sedative-hypnotics, carbamazepine, CO
- Psychosis/delirium–Anticholinergics, cocaine, heroin, sympathomimetics, marijuana, ethanol, antihistamines
- Ataxia–Alcohol, phenytoin, barbiturates, benzodiazepines, CO
- Fasciculations–Organophosphates

- Paralysis–Organophosphates, botulinum toxin, heavy metals
- Blindness–Methanol

Blood glucose level

- Hyperglycemia–Salicylates, iron, isoniazid
- Hypoglycemia–Hypoglycemic agents, alcohols, salicylates

Investigations

If clinically indicated, for diagnosis or to guide therapy

- Serum electrolytes including glucose, urea, creatinine and electrolytes
- Toxicology screens (either urine or serum)
- Gastric aspirate/vomitus: note appearance, pills, odor (e.g. camphor)
- Test for occult blood in the stool
- Radiographic studies
    - Chest Xray–Pulmonary edema or aspiration pneumonitis
    - Plain Xray abdomen–Radiopaque substances

(The absence of visible tablets does not exclude ingestion)

Removal of Poisons

Aim–To reduce the absorption of poison

Eye decontamination

- By copious irrigation with neutralizing solution (e.g. normal saline or water) immediately for at least 30 minutes

Dermal decontamination

- Absorption of organophorous and related compound through cutaneous route is also fatal
- Remove all contaminated clothes
- Irrigate the whole body with water or normal saline for at least 15 minutes

Gastrointestinal decontamination

- Orogastric lavage
    - Possible indications include potentially life-threatening ingestion of a poison in which a definitive antidote is lacking.
    - The greatest benefit is likely to be seen in the patient who presents within 60 minutes of ingestion.
    - Patients presenting after 60 minutes may also benefit because of delayed gastric emptying.
    - Contraindications
        - Ingestion of caustics, hydrocarbons (Petrol, Kerosene, Paint thinner and foreign bodies
        - Bleeding diathesis
        - An unprotected airway (Comatose child, convulsion and poor gag reflex)
        - Shock
        - Strychnine poisoning
    - Complications
        - Aspiration pneumonia
        - Gastrointestinal perforation
        - Laryngospasm
        - Emesis
- **Emesis**: Do not use when there has been caustic ingestion and if the child has altered consciousness or is at risk of seizures

Syrup of ipecac–induced emesis: Useful within 30 min of ingestion

- Use 10 ml for infants >6 months
- Use 15 ml for children 1-2 years
- Use 30 ml for child >12 years

After taking ipecacuanha, the child should be placed in the prone or lateral position

- Activated charcoal
    - Administration may be considered if a patient has ingested a potentially toxic amount of a poison that is known to be absorbed by activated charcoal
    - It is likely to be most effective if administered within 60 minutes of ingestion

- It does not adsorb acids, alkalis, lithium, iron (most metals), alcohols, or hydrocarbons
- It is given orally as slurry in water or fruit juice (also by nasogastric or orogastric tube)
- Usual single dose-1 to 2 g/kg up to 50 g or 10:1 ratio of activated charcoal: drug is ideal
- Contraindications
    - Intestinal obstruction or perforation
    - Altered sensorium (absent gag reflex/unprotected airway)
    - Caustics
        - Complications
        - Pulmonary aspiration
        - Intestinal obstruction
        - Constipation
        - Charcoal bezoars

TAPIOCA POISONING

Diagnostic Clinical Features

- History of eating tapioca (Pa-Law-Pe-Nan)
- Poisoning is due to cyanide that is contained in the root
- Blue lips (cyanosis), shock, respiratory difficulties and nausea or vomiting

Management

- Severe case should be hospitalized (cyanosis, shock) Keep airway clear
- Give oxygen if cyanosis is present
- Gastric lavage when indicated
- Treat shock by intravenous fluid
- Record vital signs and manage accordingly

- **Antidote**–IV sodium nitrite, 10 ml of 3% solution (300 mg) followed by sodium thiosulphate, 50 ml of 25% solution

PARACETAMOL POISONING

(Considered being more than 150 mg/kg in children younger than 12 years)

Diagnostic Clinical Features

- History of ingestion or high index of suspicion
- Anorexia, nausea, vomiting, malaise, pallor, right upper quadrant abdominal pain and tenderness
- Peak liver function abnormality, resolution of hepatic dysfunction or complete liver failure

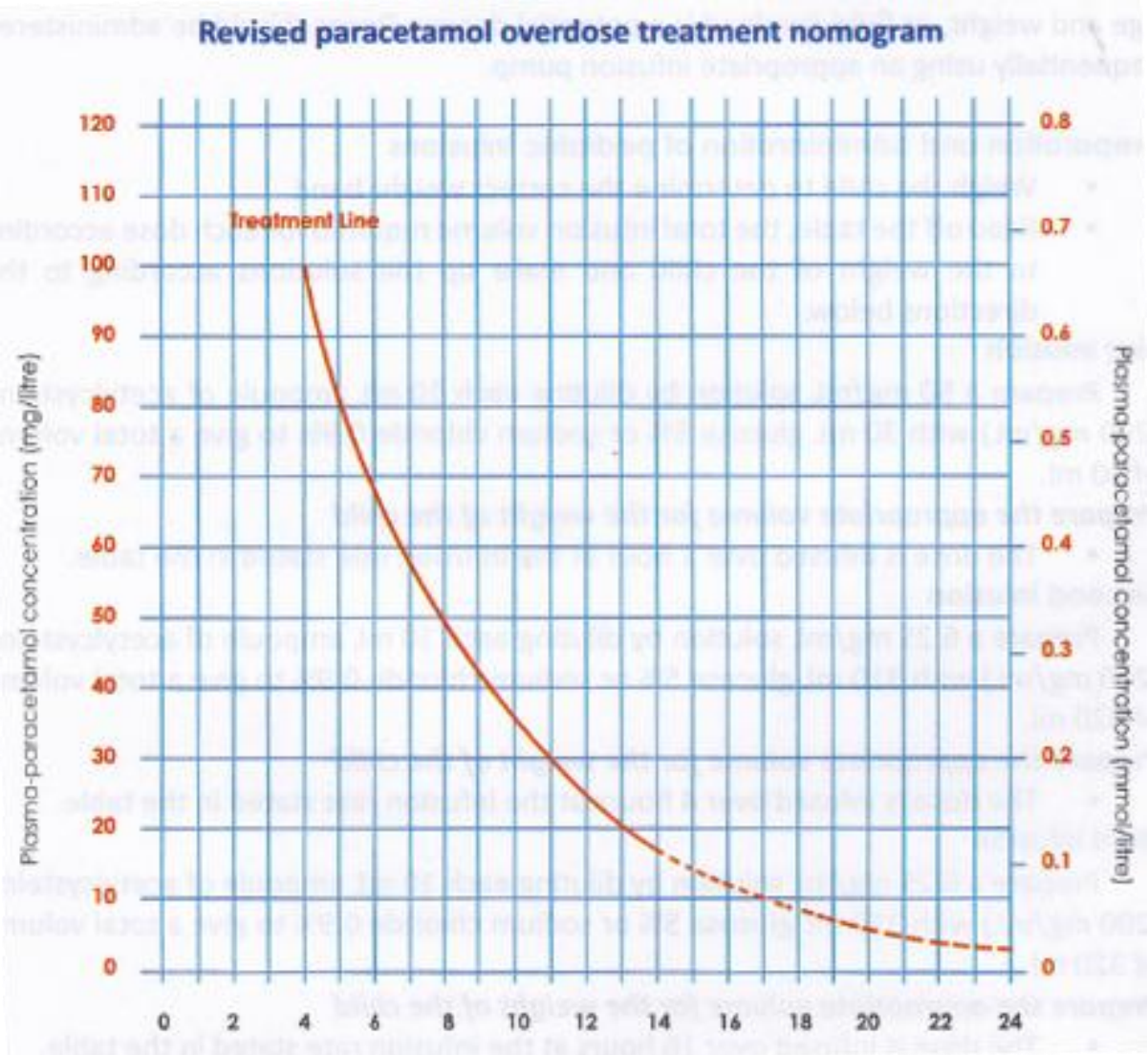
Table 15.1 Diagnostic clinical features

Stage	Time following ingestion	Characteristics
I	½-24 hours	Anorexia, nausea, vomiting, malaise, pallor diaphoresis
II	24-48 hours	Resolution of above; right upper quadrant abdominal pain and tenderness, elevated bilirubin, prothrombin time, hepatic enzyme Oliguria
III	72-96 hours	Peak liver function abnormalities, anorexia, nausea, vomiting, malaise may reappear
IV	4 days-2 weeks	Resolution of hepatic dysfunction or complete liver failure

Investigations

- Measure plasma level-4 hours or more after ingestion
- Plot on the Revised paracetamol overdose treatment nomogram whether antidotal treatment is indicated
- Measure plasma level of hepatic enzymes and bilirubin
- Prothrombin time should be measured daily in patient with toxic level
- Renal function should be monitored

Management



Management

- Used of activated charcoal-if admission within 4 hours of ingestion (dosage described above)
- Antidote-V/ Oral N-acetylcysteine (NAC or mucomyst) as soon as possible after ingestion, or in severe case, up to 24-36 hours after ingestion
- A loading dose of 140 mg/ kg diluted to 5% solution with soda or fruit juice, followed by 70 mg/kg 4 hourly for 17 doses
- It may be given directly into the stomach or intestine by tube
- Monitoring

The quantity of intravenous fluid used has been modified to take into account age and weight, as fluid overload is a potential danger Doses should be administered sequentially using an appropriate infusion pump.

Preparation and administration of pediatric infusions

- Weigh the child to determine the correct weight band
- Read off the table, the total infusion volume required for each dose according to the weight of the child and make up the solutions according to the directions below.

First infusion

Prepare a 50 mg/mL solution by diluting each 10 mL ampoule of acetylcysteine (200 mg/mL) with 30 mL glucose 5% or sodium chloride 0.9% to give a total volume of 40 ml.

Prepare the appropriate volume for the weight of the child

- The dose is infused over 1 hour at the infusion rate stated in the table.

Second infusion

Prepare a 6.25 mg/mL solution by diluting each 10 ml ampoule of acetylcysteine (200 mg/mL) with 310 mL glucose 5% or sodium chloride 0.9% to give a total volume of 320 ml. ***Prepare the appropriate volume for the weight of the child***

- The dose is infused over 4 hours at the infusion rate stated in the table.

Third infusion

Prepare a 6.25 mg/mL solution by diluting each 10 mL ampoule of acetylcysteine (200 mg/mL) with 310 mL glucose 5% or sodium chloride 0.9% to give a total volume of 320 ml.

Prepare the appropriate volume for the weight of the child

- The dose is infused over 16 hours at the infusion rate stated in the table.

E.g. For a child weighing 12 kg, the first infusion would be 38 ml infused at 38 ml/hr over 1 hour, the second infusion would be 100 ml infused at 25 ml/h over 4 hours and the third infusion is 208 ml infused at 13 ml/h over 16 hours.

Table 15.2 Paediatric Dosage

Paediatric acetylcysteine prescription (each ampoule-200 mg/mL acetylcysteine)				Please circle appropriate weight and volume		
Regimen	First Infusion		second Infusion		Third Infusion	
Infusion	50 mg/mL for 1 hours		6.25 mg/mL for 4 hours		6.25 mg/ml for 16 hours	
Infusion rate	3 mL/kg/h		2 ml/kg/h		1 mL/kg/h	
Patient weight[1]	Total Infusion Volume	Infusion Rate	Total Infusion volume	Infusion Rate	Total Infusion Volume	Infusion Rate
Kg	mL	mL/h	mL	mL/h	mL	mL/h
1	3	3	8	2	16	1
2	6	6	16	4	32	2
3	9	9	24	6	48	3
4	12	12	32	8	64	4
5	15	15	40	10	80	5
6	18	18	48	12	96	6
7	21	21	56	14	112	7
8	24	24	64	16	128	8
9	27	27	72	18	144	9
10-14	38	38	100	25	208	13
15-19	53	53	140	35	288	18
20-24	68	68	180	45	368	23
25-29	83	83	220	55	448	28
30-34	98	98	260	65	528	33
35-39	113	113	300	75	608	38

[1]Dose calculations based on the weight in the middle of each band. If the patient weighs more than 40 kg use the adult dosage table. Figures have been rounded up to the nearest "whole number

INSECTICIDE (ORGANOPHOSPHATE) POISONING

Diagnostic Clinical Features

- Excessive parasympathetic activities, weakness, blurred vision, headache giddiness, nausea and chest pain
- Excessive secretions in the lungs, profuse sweating and marked salivation
- Constricted pupil, papiloedema, muscle twitching convulsion and coma in severe cases
- Reflexes are absent and sphincter control is lost

Management

- If there has been contact with insecticide, skin or eyes, these are thoroughly washed with normal saline
- Gastric lavage
- IV Atropine sulphate 0.05 mg/kg
    - Repeat every 5-10 minutes interval until signs of atropinization appear (Maximum-1 mg/kg in 24 hours)
    - Needed until pulmonary secretions are controlled
    - Titrate atropine dose to clear oral and bronchial secretions
- IV Pralidoxime (2-PAM, Protopam) 25-50 mg/kg given over 30 minutes every8-12 hours in young children till cyanosis is overcome, maximum dose (1 gm/dose) may be given in older children
- Artificial respiration may be necessary

LEAD POISONING

Diagnostic Clinical Features

- History of inhalation of lead fumes, history of ingestion of lead paint chips or repetitive ingestion of inorganic lead compound, from exposed lead plates from old batteries
- History of pica
- May be asymptomatic and detected only on screening
- Gastointestinal

    - Anorexia, nausea, vomiting, abdominal pain, constipation, metalic taste
- Central nervous system
    - Poor concentration, headache, fatigue, malaise
    - Language and speech delay, behavioural problems
    - Encephalopathy: ataxia, seizures, coma
- Musculoskeletal
    - Muscle and joint pain (chronic)
- Other chronic effects
    - Short stature, weight loss, weakness
- Physical Examination
    - Signs of intracranial hypertension, lead lines in teeth, gout
    - Hypertension

Investigations

- Blood CP – Microcytic hypochromic anaemia with punctuate basophilia
- Lead lines at growing ends of long bones in radiological examination
- Blood lead level – Increased (between 50-99 ug/100 ml in asymptomatic patients and >100 µg/100 ml in patient with definite lead poisoning)
- Urinary corprophyrin level – Increased (Normal- 100-200 µg/day)
- Urine-Proteinuria, glycosouria and aminoaciduria (acute poisoning)
- Hepatic injury – Elevated transaminase levels (acute poisoning)
- Others – Hyperuricaemia, hypocalcaemia

Management

- Remove from exposure
- Specific antidote
    - Calcium EDTA (IV/IM 50 mg/kg or 1000 mg/m^2 24 hours x 3 days)
    - D-penicillimine – Oral 20 mg/kg/day
- Treatment of cerebral edema – Mannitol
- Anticonvulsants for seizures

- Fluid and electrolytes replacement
- High calcium, high phosphorus diet and large dose of vitamin D
- Follow up regularly at least until school age to prevent recurrence and to assess the degree of residual brain damage