

Overview

Very narrow therapeutic window so all overdoses toxic. Both acute & chronic OD may be life-threatening.

Toxic mechanism

Adenosine antagonist, phosphodiesterase inhibitor, and altered intracellular Ca^{2+} transport.

Toxicokinetics

Well abs orally. Sustained release formulation common. Small VD (0.5L/kg). Hepatic cyt-P450 metabolism is saturatable → may have long half life in OD.

Clinical features

General: anxiety, tremor, vomiting, & ↑HR

Severe OD: cardiotoxicity (refractory hypoBP, tachyarrhythmias - SVT, AF, flutter, VT), seizures, metabolic (↑BSL, ↓ K^+ , ↓ Mg^{2+} , ↓ PO_4^- , met. acidosis)

Chronic toxicity: usually in elderly - more CVS & CNS features than metabolic.

Investigations

Screening: BSL, ECG, paracetamol level

Specific bloods: UEC, CMP, ABG, theophylline level q2-4h (correlates with severity in acute OD)

Theophylline Level	Interpretation	Toxicity
55-110 $\mu\text{mol/L}$	Therapeutic level	Should be non-toxic
110-220 $\mu\text{mol/L}$	Up to 2x therapeutic level	Minor
220-440 $\mu\text{mol/L}$	2-4x therapeutic level	Moderate
440-550 $\mu\text{mol/L}$ if acute Or >330 $\mu\text{mol/L}$ if chronic	4-5x therapeutic level >3x therapeutic level	Severe
>550 $\mu\text{mol/L}$	>5x therapeutic level	Life-threatening

Risk assessment

Dose	Effect
5-10mg/kg	Therapeutic loading dose
>10mg/kg	Potential for toxicity
>50mg/kg	Life-threatening

Management

Resus: ABCs. O_2 .

- Treat hypotension with fluid boluses ± NA.
- Treat arrhythmias.
- SVT use BB e.g. **propranolol** 0.5-1mg slow IV, **metoprolol** 5mg slow IV or titrated **esmolol** 1% solution in 5%D, start infusion @ 0.3ml/kg/hr.
- Correct K^+

Decontamination: Activated charcoal even if delayed presentation. May need antiemetic.

Enhanced elimination: Early haemodialysis or charcoal haemoperfusion is preferred to MDAC if severe or life-threatening level.

Disposition

If asymptomatic after 6hr (12hr SR) of acute OD → D/C. Otherwise admit for monitoring. ICU if potential or displaying severe toxicity.