Non-Dihydropyridine Calcium Channel Blockers (CCBs) – Verapamil and Diltiazem

Overdose of verapamil or diltiazem is associated with cardiovascular collapse. Onset of toxicity is often delayed with modified-release preparations.

Toxicity / Risk Assessment

- Predominantly cause negative inotropy and chronotropy, as well as vasodilation
- Ingestion of 2-3x of usual dose -> serious toxicity
- Ingestion > 10 tablets can be life threatening

***↑ risk**: elderly and children/underlying cardiac disease/co-ingestion of other cardiac medications (beta-blockers, ACEI & ARB, digoxin)*

***Standard release:** symptoms occur within 1-2 hours*

***Modified release:** symptoms may be delayed up to 12 hours*

Clinical features:

- CVS: ↓HR, 1˚AVB, ↓BP, pulmonary oedema; may progress to refractory shock and death
- Metabolic: ↑glucose, lactic acidosis
- GI: nausea, vomiting, ileus
- CNS: agitation and confusion secondary to inadequate perfusion

Note: cerebral function may be preserved until late in the course of deteriorating systemic perfusion

Management: potentially life-threatening – manage in resus + **consult a Clinical Toxicologist early**

Decontamination: Activated Charcoal 50g: Alert patients <2 hours post exposure to a potentially toxic dose of a standard release CCB preparation and < 12 hours post ingestion of modified release CCB preparation

- Intubated patients (regardless of time post ingestion) via NG/orogastric tube after confirmation of correct placement
- Whole bowel irrigation (WBI) may be appropriate in selected cases *(Discuss with Clinical Toxicologist)*

Bradycardia: Atropine: in case of ↓HR, 0.6 mg (child 0.02 mg/kg) IV boluses q5 minutely up to 3 doses

Cardiac pacing: can be used to bypass AV block, set rates > 60/minute. Capture may be difficult.

Hypotension *(Graduated, targeted approach)*

Hypotension can be due to combination of myocardial depression, vasodilatation and heart block. Early echocardiogram may guide treatment.

Fluid: initially load with 10-20 mL/kg IV crystalloid, further IV fluids may lead to pulmonary oedema

Calcium: 30 mL Ca^{2+} gluconate (3 grams, 6.6 mmol) bolus IV over 5 minutes. Repeat boluses x 3 in 1st 60 minutes. Infusion to maintain ionized Ca^{2+} concentration 1.5-2.0 mmol/L. Monitor Ca conc. 2 hourly.

Catecholamine: - Adrenaline reasonable first line agent if bradycardia. Noradrenaline +/- vasopressin for vasoplegia.

High-Dose Insulin Euglycaemia Therapy (HIET): HIET is most effective if commenced early

-See separate *High-dose Insulin Euglycaemia Therapy* guideline

Refractory Shock +/- cardiac arrest

Consider **ECMO** early in massive ingestions or those not responding to medical therapy

Methylene blue/Lipid Emulsion: may be indicated in refractory shock. *(Discuss with Clinical Toxicologist)*

Disposition: discharge if no signs of toxicity > 6 hours post OD standard release or > 24 hours post OD modified release