

Ivabradine is a pure negative chronotrope. Ivabradine can cause severe bradycardia and life-threatening cardiovascular compromise in overdose.

Toxicity / Risk Assessment

Ivabradine inhibits the I_f (funny) channel pacemaker current in the SA node.

Onset of effects usually occurs within 1 – 2 hours

Ivabradine can affect cardiac potassium efflux, leading to QT interval prolongation

Likelihood of toxicity increases with co-ingestion of other negative chronotropes and other agents that prolong the QT interval.

Clinical features:

Mild: Visual disturbance, GI disturbance, headache

Moderate: Palpitations, dizziness, bradycardia, hypotension, ventricular ectopy, atrial fibrillation

Severe: Severe bradycardia and hypotension leading to cardiovascular collapse, QT interval prolongation, Torsades des Pointes (TdP)

ECG changes include: Sinus bradycardia, QT interval prolongation, ventricular ectopy, and TdP

Ivabradine does NOT cause QRS prolongation

Management

Manage in a monitored environment

Immediate intervention includes management of bradycardia, hypotension and ↑QT interval

Decontamination:

- 50 g activated charcoal (paediatric: 1 g/kg) within 2 hours of overdose

Bradycardia:

- **Atropine:** 0.6 mg (0.02 mg/kg children, up to 0.6 mg) IV bolus and repeat 15 minutely up to 1.8 mg

- **Epinephrine:** 10-20 mcg bolus (child 0.1 mcg/kg) q2-3 min until adequate perfusion, followed by an epinephrine infusion

(Isoprenaline: is an alternative chronotrope but can exacerbate hypotension)

- Electrical pacing is the definitive treatment if pharmacological Rx of negative chronotropy fails

Hypotension:

- **Fluid:** Initially load with 10-20 mL/kg IV crystalloid. Excessive IV fluid may lead to pulmonary oedema
If CVS compromise despite epinephrine and IV fluid seek expert advice from a clinical toxicologist

↑QT Interval and TdP:

- See separate *QT prolongation* guideline

Disposition:

Ingestion > 15 mg (> 0.05 mg/kg children) or symptomatic cases: monitor for at least 6 hours

Discharge pending mental health assessment if asymptomatic + normal ECG at end of monitoring period

Patients with ECG changes should be monitored until resolution