BETA-BLOCKER TREATMENT ALGORITHM

Signs and Symptoms of Beta-blocker (BB) toxicity:
Bradycardia, hypotension, low cardiac index, sedation

+/- membrane stabilizing effects (QRS widening on a 12-lead ECG, seizure activity) can occur with some BB agents (propranolol, carvedilol)
+/- QTc prolongation can occur with some BB agents (sotolol)

YES

Fluids:
Titrate based on response, suggested start:
Adult: 1-2 L NS bolus
Pediatrics: 10-20 mL/kg NS bolus

Atropine:
Atropine should still be considered as initial treatment for symptomatic bradycardia or conduction disturbances, but failure with this drug may be expected.
Adult Dose Atropine: 0.5 – 1mg IV Repeat q 3 – 5 min to total dose 3 mg
Pediatric Dose Atropine: 0.02 mg/kg IV (minimum 0.1 mg IV; maximum single dose 0.5 mg)

High Dose Insulin Euglycemia Therapy:
For bradycardia and hypotension not responding to fluids and atropine. See Poison Centre faxable sheet for initiation, titration, and monitoring guidelines.

Vasopressors:* May be used concurrently with High Dose Insulin Euglycemia Therapy. No single agent has been consistently shown to be more effective. Norepinephrine or epinephrine are preferred due to their vasoconstricting effects.
*Note: High doses may be required.

Refractory to first line treatments:
Bedside ultrasound may help to guide management. **Contact Poison Centre** for consideration of other treatments such as incremental doses of High Dose Insulin Euglycemia Therapy, Lipid Resuscitation Therapy (see Poison Centre faxable sheet for details), pacemaker, ECMO, hemodialysis (select BBs).
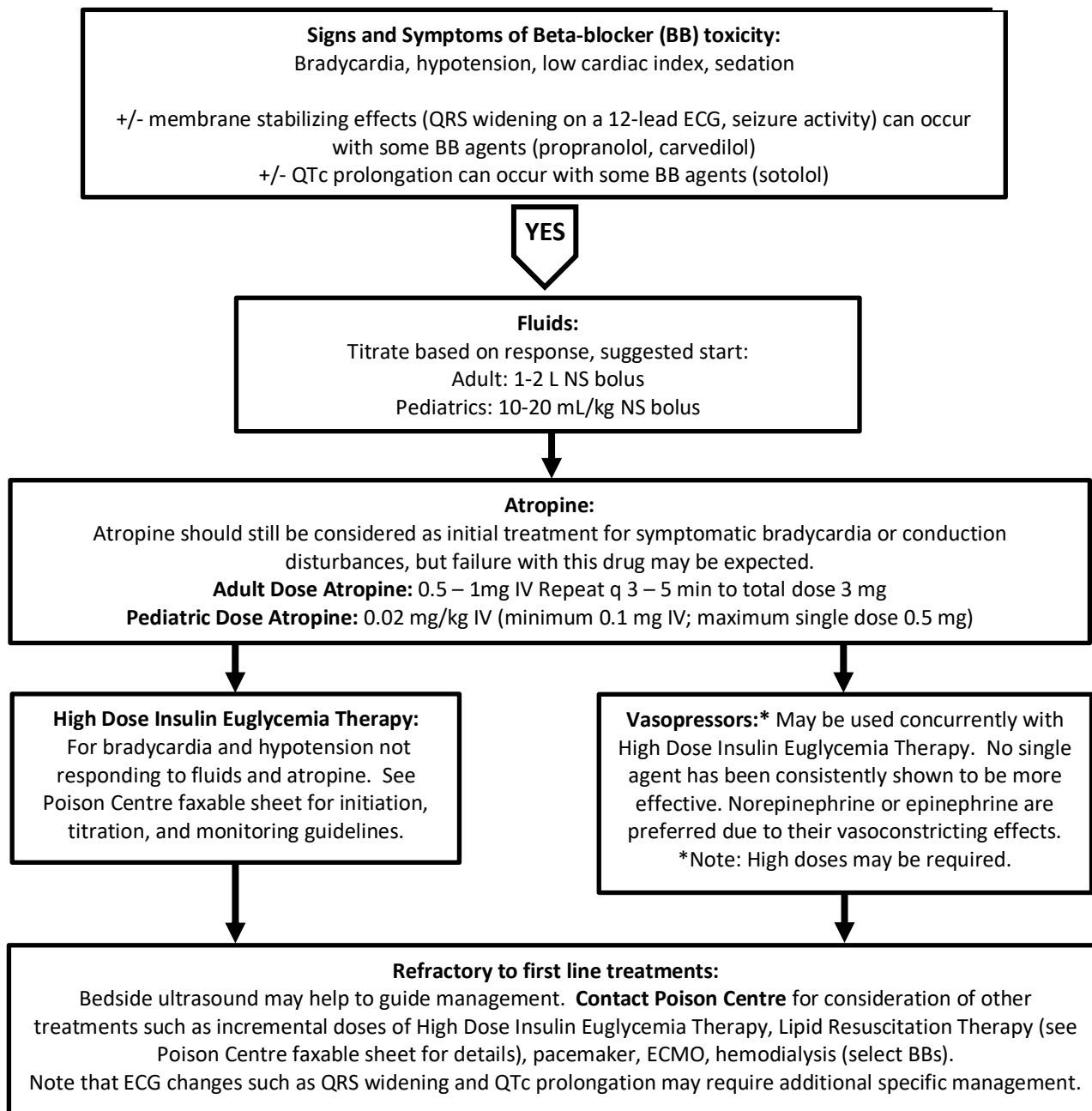Note that ECG changes such as QRS widening and QTc prolongation may require additional specific management.

Adjunctive agents:
Glucagon: May transiently improve heart rate > blood pressure. Limitations include nausea/vomiting, hyperglycemia, and tachyphylaxis. Not routinely recommended for severe BB toxicity.
Calcium: May transiently improve blood pressure and may be considered as adjunctive treatment particularly for propranolol overdose, or beta-blocker with concurrent calcium channel blocker overdose.
> **Adult Dose of Calcium: Calcium Chloride** (10%) Bolus: 10-20 mL (10%) (or 1-2 g) q10-20 min as required; **Calcium Gluconate** (10%) Bolus: 30-60 mL (or 3-6g) q10-20 min as required.
> **Pediatric Dose of Calcium: Calcium Chloride** (10%) Bolus: 0.1-0.2 mL/kg q10-20 min as clinically required; **Calcium Gluconate** (10%) Bolus: 0.3-0.6 mL/kg q10-20 min as clinically required.

Phosphodiesterase inhibitors (e.g. milrinone): May improve cardiac output, but use limited by vasodilation and hypotension. Not routinely recommended.