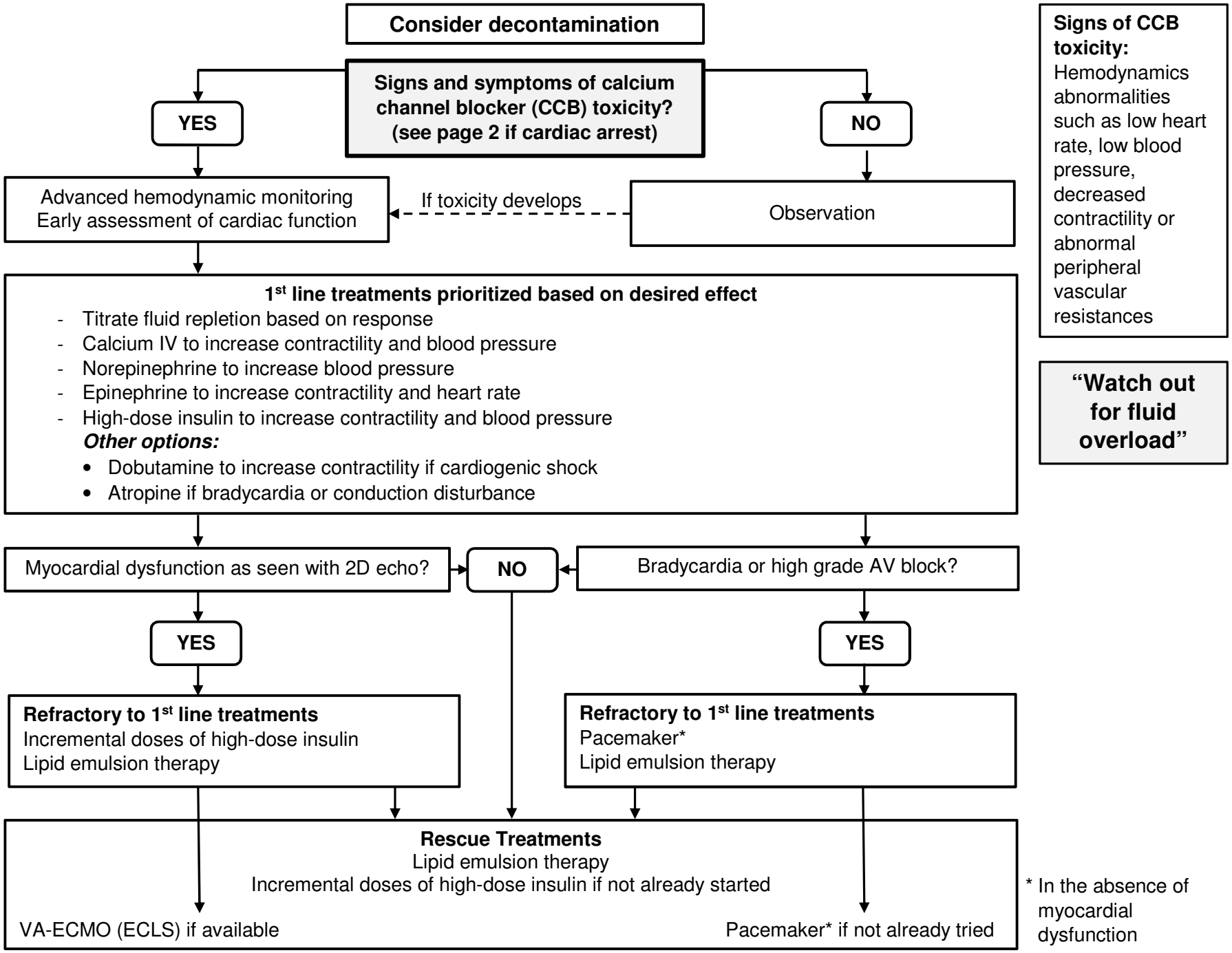
Consider decontamination
Signs and symptoms of calcium channel blocker (CCB) toxicity? (see page 2 if cardiac arrest)
YES
NO
Advanced hemodynamic monitoring
Early assessment of cardiac function
If toxicity develops
Observation
1st line treatments prioritized based on desired effect
- Titrate fluid repletion based on response
- Calcium IV to increase contractility and blood pressure
- Norepinephrine to increase blood pressure
- Epinephrine to increase contractility and heart rate
- High-dose insulin to increase contractility and blood pressure
Other options:
• Dobutamine to increase contractility if cardiogenic shock
• Atropine if bradycardia or conduction disturbance
Myocardial dysfunction as seen with 2D echo?
NO
Bradycardia or high grade AV block?
YES
YES
Refractory to 1st line treatments
Incremental doses of high-dose insulin
Lipid emulsion therapy
Refractory to 1st line treatments
Pacemaker*
Lipid emulsion therapy
Rescue Treatments
Lipid emulsion therapy
Incremental doses of high-dose insulin if not already started
VA-ECMO (ECLS) if available
Pacemaker* if not already tried
Signs of CCB toxicity:
Hemodynamics abnormalities such as low heart rate, low blood pressure, decreased contractility or abnormal peripheral vascular resistances
"Watch out for fluid overload"
* In the absence of myocardial dysfunction

Cardiac arrest secondary to CCB toxicity
Standard ACLS
Calcium IV
Lipid emulsion therapy
VA-ECMO (ECLS) if available

ANTIDOTES:

Please consult: https://www.ciusss-capitalenationale.gouv.qc.ca/antidotes

Doses for first line treatments

Calcium IV:

Peripheral IV or central line

- Adults: 3 to 6 g (30 – 60 mL) of calcium gluconate 10% IV direct, to be repeated as needed every 10 min for a maximum of 4 doses and then check calcemia (target mild hypercalcemia)
- Children: 30 – 60 mg/kg (0.3 – 0.6 mL/kg) of calcium gluconate 10% IV direct, to be repeated as needed every 10 min for a maximum of 4 doses and then check calcemia (target mild hypercalcemia)

Central line

- Adults: 1 to 2 g (10 – 20 mL) of calcium chloride 10% IV direct, to be repeated as needed every 10 min for a maximum of 4 doses and then check calcemia (target mild hypercalcemia)
- Children: 10 to 20 mg/kg (0.1 to 0.2 mL/kg) of calcium chloride 10% IV direct, to be repeated as needed every 10 min for a maximum of 4 doses and then check calcemia (target mild hypercalcemia)

High-dose insulin (expect 30 – 60 min before observing an effect):

- High dose insulin IV (regular): 1 unit/kg bolus followed by an infusion at 1 unit/kg/h (maintain euglycemia with dextrose)
- For the incremental doses of high-dose insulin IV (regular): Progressive increase of the infusion rate up to 10 units/kg/h (maintain euglycemia with dextrose)
- Plan to administer D50% in adults or D25% in children by a central line to limit IV fluids. As an example, a 70 kg patient could need an initial bolus of 50 mL of D50% followed by an IV infusion of 0.5 – 1 g/kg/h, which could be equivalent to 70 – 140 mL/h of D50%

Information concerning vasopressors and inotropes for centers where protocols are not available: High doses are expected at high concentrations to limit IV fluids.

Vasopressors	Indications	Dose	Receptors			
			α1	ß1	ß2	Dopamine
Norepinephrine	Increases mostly peripheral vascular resistances, but may increase heart rate and contractility. Often used in undifferentiated shock and vasoplegic shock.	0.01 à 3 mcg/kg/min (no max dose)	+++++	+++	++	N/A
Epinephrine	Increases heart rate, contractility, peripheral vascular resistances, decreases bronchospasms. Often used in bradycardia cardiogenic shock or anaphylactic shock.	0.01 à 0.50 mcg/kg/min (no max dose)	+++++	++++	+++	N/A
Dopamine	Increases heart rate and contractility from 3 to 10 mcg/kg/min, but increases more peripheral vascular resistances from 10 to 20 mcg/kg/min. Often used at low dose for bradycardia and at higher dose for vasoplegic shock.	2 à 20 mcg/kg/min (less benefit if more than 20 mcg/kg/min)	+++ (10 to 20 mcg/kg/min)	++++ (3 to 10 mcg/kg/min)	++ (3 to 10 mcg/kg/min)	+++++ (0.3 to 3 mcg/kg/min)