

Calcium Channel / Beta Blocker Overdose Cheat Sheet

High Dose Euglycemic Insulin Therapy (HEIT)

Who gets this? Calcium Channel Blocker Overdose Patients.

In calcium channel blocker overdose, calcium channels in the heart, vasculature, and pancreas are blocked. This leads to bradycardia, vasodilation, and hyperglycemia. Specifically, the pancreas experiences inhibition of glucose-induced insulin release. This inhibition of insulin causes hyperglycemia and shifts the metabolic energy source of the heart from carbohydrates to fatty acids, which are more difficult to utilize for energy.

By supplying the patient with exogenous insulin, we can help shift the heart's metabolic energy source back to carbohydrates, which will allow the heart to beat faster and stronger. Additionally, insulin increases intracellular calcium thus improving contractility.

The clinical effect of this insulin therapy is dose dependent and can lead to doses of insulin far more than our usual rates. To counteract the hypoglycemia this would inevitably cause, we will supply a high concentration dextrose source, such as D20W. It is important to note that not all overdose patients will be hyperglycemic on presentation, however HIET can still be effective in these patients.

The insulin rate will be titrated by the provider team to a goal HR or BP and to maintain a BG 150-200mg/dL.

Glucagon Therapy

Who gets this? Beta Blocker Overdose Patients.

In beta blocker overdose, beta adrenergic receptors are inhibited which will lead to bradycardia. While exogenous beta agonists (i.e., epinephrine) may potentially be effective, typically they are ineffective. Glucagon can be used to bypass the membrane bound beta-adrenergic receptors and activate the same intracellular pathways that would otherwise be controlled by the adrenergic receptor.

Glucagon can be administered as a bolus and/or an infusion. Glucagon is supplied as boxes of 1mg powder vials and their diluent.

The infusion rate will be titrated by the provider team to a goal HR or BP. Hyperglycemia and nausea/emesis is common with glucagon.

Situation

This year we had a VUAH ICU patient with BB/CCB overdose orders who ended up on a >350 unit/hr. insulin infusion rate. As a result of an interdisciplinary case review, an action plan was developed with help from toxicology, nursing and ICU/ED pharmacist groups. Patient scenarios that require utilization of the BB/CCH overdose order panel are rare.

Background

VUAH currently carries two varieties of insulin, 100mg/100mL (standard) and 250mg/250mL (larger volume). The maximum orderable dextrose infusion is currently D20W.

Assessment

These concentrations of insulin and dextrose can lead to unsustainable volume overload in overdose cases like the patient case described above.

Recommendation

- For Beta Blocker/Calcium Channel Blocker overdose, the standard insulin bag will be 500 unit/500 mL
- With Toxicology approval, a concentrated insulin bag can be ordered: 2400 unit/ 150mL (16 unit/mL)
- With Toxicology approval, a concentrated infusion of Dextrose 70% in water can be ordered.
- EPIC changes will go live on **10/25/2022**

How to program this in the Alaris Pump:

- Guardrails Drugs→ Insulin→ therapy type 'BB/CCB overdose'→ concentration options will be 500 units/500 mL or 2400 units/150 mL
(therapy type of '.Standard' listed first has usual insulin concentration of 100 units/100 mL)
- Guardrails Fluids→ Dextrose 70%