BETA BLOCKER OVERDOSE

(Last updated October 2020; Reviewer: Tabinda Jawaid, MBBS Aysun Tekin, MD; Ognjen Gajic, MD)

PRESENTING COMPLAINT: Shortness of breath, irregular heartbeat, lightheadedness.

FINDINGS

- **A** Check airway, wheezing might be present
- **B** ↑ RR
- **C** ↓ BP, ↓ HR
- **D** Altered variable (V, P, U, D)*  Presyncope/syncope, acute delirium, depressed level of consciousness or seizures might occur.
- **E** Pallor, diaphoresis
- **U_{PC}** Myocardial depression/ventricular dysfunction/arrhythmia
- **L_{PC}** ↑↑ glucose, ABG: ↓ pH, ↓ HCO_3^-, ↓ CO_2, electrolytes

*V (verbal), P (Pain), U (unconsciousness), D (delirious)

L_{PC} (point-of-care labs), U_{PC} (point-of-care ultrasound)

OTHER HISTORY

- Time of ingestion and amount.
- Etiology of drug overdose:
  - Intentional vs. unintentional
  - Suicidal ideation
Confusion (dementia, polypharmacy, etc.)

- Type of beta blocker:
  - Beta-1 selective or non-selective
  - Membrane stabilizing activity – propranolol, acebutolol
  - Lipid soluble – propranolol, more likely to cause CNS effects
  - Sotalol: has class III anti-arrhythmic effects

- Co-ingestion of other medications – calcium channel blockers, tricyclic antidepressants

**DIFFERENTIAL DIAGNOSIS**

- Drug toxicities
  - calcium channel blockers
  - clonidine
  - tricyclic antidepressants
  - digoxin
  - cholinergic toxicity

- Other causes of shock
  - Cardiogenic
  - Distributive
  - Hypovolemic
OTHER INVESTIGATIONS

**EKG:**
- Sinus bradycardia is the most common finding
- 1<sup>st</sup> degree AV block
- Junctional rhythm
- QT prolongation / Torsades de Pointes can occur with sotalol
- Asystole (severe cases)

**Monitoring:**
- Continuous cardiac, saturation, and arterial blood pressure monitoring

**Additional tests:** screen for other drugs or toxins, CG, glucose, electrolytes, cardiac enzymes, metabolic panel, acetaminophen and salicylate levels (if suspected).

**Imaging:**
- Chest X-ray (pulmonary edema)
- Echocardiography: myocardial depression, ventricular dysfunction, arrhythmia

THERAPEUTIC INTERVENTIONS

**Initial interventions:**
- Advanced cardiac life support, intubation with mechanical ventilation, fluid bolus (If necessary, in severe cases)
Medications:

• GI decontamination: Activated charcoal 1mg/kg
  o Hemodynamically stable patient, with ingestion within last 2 hours.
  o Consider extended time frame with ingestion of extended release forms.

• Atropine 0.5 mg – 1 mg IV every 3-5 minutes (not to exceed a total of 3mg or 0.04 mg/kg)
  o Usually effective only in mild toxicity cases

• Glucagon 50 – 150 mcg/kg IV bolus
  o Can be repeated in 3-5 minutes
  o If repeated glucagon boluses fail glucagon infusion: starting dose based on initial response from boluses (i.e.: 10 mg/hour, if improvement seen with two successive 5mg doses).

• Euglycemic insulin therapy
  o Initial Bolus 1 IU/kg
  o Drip - 0.5 IU/kg/hour can titrate up to 1 IU/kg/hr
  o Concomitant glucose administration to maintain euglycemia
    ■ Eu/hypoglycemia - d50 bolus, followed by continuous dextrose infusion
    ■ Hyperglycemia – can hold d50 bolus
    ■ Potassium replacement as needed

• Calcium (improves negative inotropy, but not bradycardia)
  o Calcium gluconate 10% - 30 ml bolus over 5-10 minutes
Calcium Chloride 10% - 10 ml (1 gram) IV bolus over 5 minutes
   - Monitor for rare but serious cardiac side effects.

- Sodium bicarbonate 150 mEq bolus.
   - Indicated for QRS duration longer than 120 ms or severe acidosis.
- Vasopressors (if necessary to maintain MAP > 60 mmHg)

**Procedures:**

- Cardiac pacing
- Hemodialysis
- Extraordinary measures
  - Aortic balloon pump
  - Extracorporeal circulatory support (bypass)

**Contact/Consult:** Poison Control and Cardiology/Intensive Care Team if necessary and available.

**ONGOING MANAGEMENT**

- **Therapeutic goals:**
  - HR > 60 mmHg, MAP > 60 mmHg, EF > 50% (or at previously baseline), improved mental condition, resolution of acidosis.
- **Further monitoring vs. disposition:**
  - Any patients with signs of hemodynamic instability should be monitored in ICU, and further therapy as indicated.
Asymptomatic patients whom have ingested beta blocking agents with MSA, extended release forms, or sotalol should be monitored for at least 6 hours.

**CAUTION**

- **Complications:**
  - Shock, ventricular arrhythmias, asystole, respiratory failure, seizures.

**REFERENCES & ACKNOWLEDGMENTS**

- This card was reviewed by Reviewers: Prashant Jagtap, MD; Courtney Bennett, DO in 2016.


- Ref3 Lemkin, Ellen and Barrueto, Fermin. Beta Blocker Poisoning. In :UpToDate, Post TW (Ed) UpToDate, Waltham, Ma. (Accessed on February 9, 2015)