

## Treatment of Beta Blocker and Calcium Channel Antagonist Poisoning by Medical Toxicologists

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**Background:** Beta blockers (BB) and calcium channel antagonists (CCA) are potentially lethal in overdose. Multiple therapies are used to treat BB and CCA poisoning.

**Research Question:** What therapies do medical toxicologists use to treat BB and CCA poisoning?

**Methods:** This is a retrospective review of case data from the Toxicology Investigators Consortium (ToxIC) database. ToxIC was queried for cases involving any BB or CCA reported from January 2017 to August 2019. Cases were excluded if they involved chronic poisonings or if signs and symptoms were considered unlikely to be related to the toxic exposure. Fisher's exact test was used to assess statistical significance. Additional descriptive statistics were also used.

**Results:** Five hundred and fourteen cases were included. Eighty-six were isolated CCA exposures, 84 were isolated BB exposures, 197 were mixed exposures including a BB, 99 were mixed exposures including a CCA, and 48 were mixed exposures involving both. Toxicological treatment was administered in 357 cases (69.5%). The most common treatment was IV fluid resuscitation (257 cases, 50%), followed by vasopressors (160 cases, 31.1%) and glucagon (124 cases, 24.1%). Hyperinsulinemic euglycemic therapy (HIE) was administered in 60 cases (11.7%) and intravenous lipid emulsion (ILE) was used in 25 cases (4.9%). Extracorporeal membrane oxygenation was initiated in 11 cases (2.1%). When cases of combined BB and CCA poisoning were excluded, cases involving BB were more frequently treated with glucagon than cases involving CCA (28.1 vs. 15.1%,  $p = 0.0011$ ), while cases involving CCA were more frequently treated with HIE (20.5 vs. 4.6%,  $p < 0.00001$ ), ILE (9.2 vs. 1.8%,  $p = 0.0005$ ), and/or vasopressors (35.1 vs. 24.2%,  $p = 0.0119$ ).

**Conclusion:** BB and CCA poisonings are commonly treated with fluid resuscitation and vasopressors. HIE and ILE are used infrequently. BB poisoning is more frequently treated with glucagon, and CCA poisoning is more frequently treated with HIE, ILE, and/or vasopressors.