

Sodium Bicarbonate Therapy: Treatment Recommendations and Clinical Outcomes as Reported Through the ToxIC Registry

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Background: Sodium bicarbonate is an antidote for sodium channel blockade in poisoned patients with QRS widening on electrocardiogram. Significant practice variation exists regarding specific regimens. Characterizing current use of this antidote is important given the national shortage.

Hypothesis: We aimed to evaluate criteria for initiation and discontinuation, as well as dosing regimens, and complications among sodium channel blocker-poisoned patients treated with sodium bicarbonate.

Methods: Using the ToxIC Registry, a prospective observational case series of sodium bicarbonate use was performed using a 21-question data collection tool. Completed cases were collected from April 2015 through March 2017 encompassing 12 sites.

Results: Out of 28 patients, 16 were male and 12 were female; mean age was 32 years. Primary agents listed were amitriptyline, nortriptyline, carbamazepine, bupropion, duloxetine, chlorpheniramine, doxepin, diphenhydramine, flecainide, diethylene glycol, tramadol, rodenticide, cocaine, and an unknown agent. Medical Toxicology services recommended initiating sodium bicarbonate therapy for a QRS duration greater than 100–120 ms. 60.7% (17) received sodium bicarbonate boluses and infusions, 32.1% (9) received boluses only, and 7.1% (2) received infusion only. All services used 150 mEq/L as the concentration of sodium bicarbonate infusion. Duration of infusion ranged from 3 to 95 h. Mean improvement after sodium bicarbonate therapy was 26.4 ms ± 22.7 ms (95% CI – 34.8 to – 18.0). Four patients had ventricular tachycardia and other therapies given included lipid emulsion, hypertonic saline, amiodarone, and cardioversion. One patient was defibrillated prior to the administration of sodium bicarbonate. Six cases had rewidening of the QRS after the cessation of sodium bicarbonate (range 106–174 ms occurring at 0.5 to 24 h after stopping therapy). Sodium bicarbonate was re-initiated in two cases. Complications occurred in four cases and included hypokalemia, hypernatremia, significant alkalemia, hypocalcemia, and QTc prolongation.

Discussion: In this case series, sodium bicarbonate was used for multiple agents with an average reduction in QRS of 26.4 ms. Other therapies were minimally used.

Conclusions: Sodium bicarbonate resulted in a clinically significant re-duction in QRS widening in patients with sodium channel blockade; further study is warranted to determine which xenobiotics are most responsive to therapy along with appropriate dosing and duration