Clinical Predictors of Adverse Cardiovascular Events for Acute Pediatric Drug Exposures

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Background: Adverse cardiovascular events (ACVEs) following drug exposures have been well-characterized in adults but not adequately studied in children.

Research Question: What is the incidence and characteristics associated with ACVEs among children after drug exposure?

Methods: A prospective cohort of pediatric patients (age < 18) was extracted from the Toxicology Investigators Consortium Registry for the period of 2010 and 2016. The primary outcome was ACVE (myocardial injury, hypotension, ventricular dysrhythmia, or cardiac arrest). The secondary outcome was death. Logistic regression models were fitted using stepwise variable selection, with calculation of odds ratios (ORs) and 95% confidence intervals (CIs). A logistic regression model was fitted to replicate a previously validated adult ACVE model.

Results: Of 13,097 patients (58.5% female), there were 278 ACVEs (2.1%) and 39 deaths (0.3%). Drug classes significantly associated with ACVE (p < 0.05) were cardiovascular agents, antidepressants, non-opioid analgesics, and opioids. Opioids were significantly associated with death (p < 0.05). On multiple logistic regression, age, and type of exposure remained independently associated with ACVE. Compared to teens, children under 2 (OR 0.41, CI 0.21–0.80), ages 2–6 (OR 0.356, CI 0.20– 0.68), and ages 7–12 (OR 0.48, CI 0.26–0.91) were less likely to experience ACVE. Odds ratios for ACVE with exposure to opioids and cardiovascular agents were 3.65 (CI 2.40–5.55) and 4.84 (CI 3.41–6.81) respectively. Presence of a bicarbonate < 20 mEq/L (OR 2.31, CI 1.48–3.60) or a QTc > 500 ms (OR 2.83, CI 1.67–4.79) were independently associated with ACVE.

Discussion: We successfully extrapolated previously derived predictors of ACVE from adults to a pediatric population of drug exposures.

Conclusion: Clinical predictors of ACVE for acute pediatric drug exposures are QTc > 500 ms, bicarbonate < 20 mEq/L, opioids, and cardiovascular drug exposures. ACVEs after pediatric drug exposures are associated with age and high risk drug classes.