Presented at North American Congress of Clinical Toxicology 2021– Virtual

Published in Clin Toxicol 2021;59(11):1060

**48. Clinical effects and treatment of patients following overdoses of brorphine and butyrylfentanyl**

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**Background:** Brorphine is a novel piperidine-based opioid of similar potency to fentanyl associated with opioid-related fatalities, first appearing in the United States in June 2020. Butyrylfentanyl is a short-acting fentanyl analog associated with morbidity following an overdose. This case series from the ToxIC Fentalog database reviews the clinical course of emergency department (ED) patients presenting following either a brorphine or butyrylfentanyl overdose.

**Methods:** The ToxIC Fentalog database is an ongoing cohort study within the ToxIC network at nine sites located across the United States. Consecutive ED patients with an acute opioid overdose and available waste blood samples drawn as part of clinical care were screened, and we excluded pediatrics, prisoners, and those with non-toxicological diagnoses. Information including but not limited to demographics, substance use history, psychiatric history, clinical course including if the patient received naloxone, vital signs and laboratory information, and disposition were collected following a chart review. Left over blood samples were obtained from all included patients and sent to the Center for Forensic Science Research and Education (CFSRE) for analysis. Discarded blood samples were collected and toxicological confirmation was performed via liquid chromatography quadrupole time-of-flight mass spectrometry for the presence of over 900 novel psychoactive substances and their metabolites.

**Results:** Between 9/21/20-3/9/21, 481 patients were screened and 173 met inclusion criteria. Of these, 5 patients tested positive for either brorphine (N = 2) or butyrylfentanyl (N = 3). All 5 patients were evaluated at Barnes Jewish Hospital in St. Louis, MO, which enrolled 34 patients into the database during the time period. No patient was positive for both substances. Ages ranged from 36-75 years and 3 were male. Three patients had a history of non-substance related psychiatric illness. All 5 patients received naloxone, with 2 receiving it in the hospital and 3 by EMS. One patient that used butyrylfentanyl received 3 doses of naloxone and was intubated in the ED and admitted to the intensive care unit. He had infiltrates on his CXR and remained intubated for 40 hours and required vasopressors. His initial lactate was 10.7 mmol/L with a pH of 6.95 and CO2 of 101. All the other patients were discharged from the ED with a length of stay

ranging from 8-13 hours. One patient who was positive for brorphine had suicidal intent and was admitted to psychiatry. Another patient following an accidental overdose tested positive for butyrylfentanyl and was admitted to psychiatry and started on naltrexone for an alcohol use disorder. Clonazolam, cocaine, levamisole, lidocaine, quinine, methamphetamine, heroin, and acetylfentanyl were confirmed in the 2 patients that tested positive for brorphine. Xylazine, lidocaine, quinine, cocaine, methadone, tramadol, and levamisole were confirmed in the 3 patients that tested positive for butyrylfentanyl.

**Conclusions:** Brorphine and butyrylfentanyl were detected in 5 patients presenting to a single hospital in St. Louis following an acute opioid overdose. Interestingly, no patients tested from the other project sites during the time period had the presence of either substance. All 5 recovered uneventfully, although one patient with butyrylfentanyl had a prolonged ICU course with multisystem organ failure.