Title: Wastewater-based epidemiology for Preventing Overdoses through Timely, Evidence-based Community Action and Treatment (WePrOTECT): A Pilot & Feasibility Project

Authors: Haylea Hannah, Lee Ann Prebil, Priyanka Thatipamala, Alex Buben, Ou Suk Kwon, Anita Renzetti, Matthew Willis

Background: Drug overdose is the leading cause of accidental death in Marin County. Early detection of lethal compounds circulating in our community, including fentanyl, is a key strategy to prevent overdoses. Overdose surveillance relies on healthcare utilization and death records, "downstream" outcomes that do not capture the experience of people who are not accessing services and have not yet experienced severe outcomes. This one year pilot tested the validity and utility of high-risk substance monitoring from wastewater surveillance (WWS) in Marin County.

Methods: A wastewater treatment plant serving nearly half of Marin County's population collected main plant influent samples twice weekly. Biobot Analytics tested samples to generate concentrations of high risk substances (HRS) (norfentanyl, xylazine, methamphetamine) in wastewater as milligrams per 1,000 people served. The 48 weeks between 2/6/2023 and 12/11/2023 were categorized into high (≥0.5 standard deviations [SDs] above prior six month average) and low (≤ 0.5 SDs below prior six month average) norfentanyl levels. We compared the weekly average number of 911 calls due to suspect opioid overdoses and overdose deaths one week after high vs low norfentanyl levels. We logged public health actions taken based on information learned from WWS during the pilot.

Results: In the 48 weeks between 2/6 to 12/11/2023, norfentanyl levels were high 18 weeks (38%) and low 15 weeks (31%). One week after high WWS levels, the average number of 911 calls mentioning fentanyl were 11% greater compared to low weeks (n=11.1 vs 10), and the average number of drug overdose deaths (1.8 vs. 1.6) and unintentional overdose deaths (1.6 vs. 1.3) were also 11% and 23% greater. During the pilot, two public health advisories were issued when: 1) xylazine, a new drug contaminating the illegal drug supply, was detected in wastewater; 2) high norfentanyl wastewater levels were followed by high suspect opioid overdose 911 calls. Levels of per capita methamphetamine use acted as a catalyst to improve existing outreach campaigns for methamphetamine use disorder.

Conclusion: Opioid-related 911 calls and deaths were slightly higher one week after periods of high norfentanyl WWS levels. While further testing is required to establish the utility of this methodology, HRS WWS has the potential to provide information to inform public health action. If proven, WWS of HRS may empower communities with necessary information to prevent overdoses.

Keywords: wastewater; overdose prevention; surveillance