

# FENTANYL CONCENTRATION IN DRUG CHECKING SAMPLES AND RISK OF DRUG-RELATED MORTALITY DURING AN ILLICIT DRUG TOXICITY CRISIS IN VANCOUVER, CANADA: A TIME SERIES ANALYSIS

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**Background:** The proliferation of fentanyl and its analogues in the unregulated drug market remains a major driver of the illicit drug toxicity crisis in North America. Although drug checking services have been implemented as a harm reduction strategy to address the crisis, little is known about the potential utility of these services as a mechanism for monitoring population-level risk of overdose stemming from time-varying fentanyl adulteration of unregulated drug supplies. We therefore sought to assess the relationship between temporal fluctuations in fentanyl concentration in drug checking samples and the illicit drug-related mortality rate in Vancouver, Canada.

**Methods:** Monthly population-based illicit drug mortality rates were drawn from provincial coroner records. Monthly median fentanyl concentration in drug checking samples was calculated using a validated quantification model from point-of-care Fourier-Transform Infrared (FTIR) spectra among samples that tested positive for fentanyl at community drug checking services. We conducted a time series analysis using generalized additive modelling to examine the association between monthly median fentanyl concentration in drug checking samples and monthly drug mortality rates in Vancouver, controlling for calendar month.

**Results:** Between January 2019 and October 2020, there were a total of 577 overdose deaths in Vancouver, and the observed monthly drug mortality rate ranged from 1.75 to 7.65 per 100,000 population. Of 1074 fentanyl-positive samples, the monthly median fentanyl concentration ranged from 4.5% to 9.8%. We observed a significant, positive association between monthly median fentanyl concentration and monthly illicit drug mortality rate, adjusting for calendar month ( $p < 0.001$ ).

**Conclusions:** We found that the drug mortality rate increased during periods when higher concentrations of fentanyl were detected in drug checking samples. These findings suggest a role for point-of-care drug checking services as a tool for monitoring evolving fentanyl adulteration of the unregulated drug market to inform public health responses to the illicit drug toxicity crisis.

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*No conflicts to declare.*

**Figure 1.** Predicted monthly overdose mortality rate based on fentanyl concentration in drug checking samples as estimated by the generalized additive model superimposed on the observed monthly overdose rate in Vancouver, Canada (January 2019 – October 2020).

