

BRIEF REPORT

Overdose deaths and the COVID-19 pandemic in British Columbia, Canada

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Abstract

Introduction. British Columbia (BC) declared an overdose public health emergency in 2016. Since then, BC has consistently reported the highest overdose death rates of any province in Canada. In the context of the COVID-19 pandemic, overdose deaths in BC reached a record high in 2020. This analysis reports on changes in the profile of people who have died of overdose since BC's declaration of COVID-19 as a public health emergency on 17 March 2020. **Methods.** Using BC Coroners Service data, Chi-square tests and multivariable logistic regression were conducted to compare demographic, geographic and post-mortem toxicology data between people who died of overdose before (17 March–31 December 2019) and after (17 March–31 December 2020) BC's declaration of COVID-19 as a public health emergency. **Results.** Overdose deaths observed since 17 March 2020 ($n = 1516$) more than doubled those observed in the same period in 2019 ($n = 744$). In the adjusted logistic regression model, odds of death in the post compared to pre-COVID-19 period was significantly higher among males compared to females, among all older age groups compared to people aged 30–39, and was lower in public buildings compared to private residences. **Discussion and Conclusions.** Alongside a significant increase in overdose deaths since BC's declaration of COVID-19 as a public health emergency, the demographic profile of people who have died of overdose has changed. Ongoing overdose prevention efforts in BC must seek to reach people who remain most isolated, including older adults, who during dual public health emergencies are facing compounded risk of preventable mortality. [Palis H, Bélaïr M-A, Hu K, Tu A, Buxton J, Slaunwhite A. Overdose deaths and the COVID-19 pandemic in British Columbia, Canada. *Drug Alcohol Rev* 2021]

Key words: COVID-19, overdose, overdose death, drug toxicity, public health emergency.

Introduction

British Columbia (BC) declared a public health emergency of illicit drug toxicity (i.e. overdose) deaths in 2016 [1]. Since then, BC has consistently reported the highest overdose death rate of any Canadian province [2]. Following a modest decline in 2019, overdose deaths have increased since BC's declaration of COVID-19 as a public health emergency, and 2020 had the highest number of overdose deaths ever recorded in the province, more than all homicide, suicide and motor vehicle incident deaths in the same

period [3]. This significant increase has been attributed in part to pandemic restrictions. These restrictions have included international border closures which have had directly observable impacts on the drug supply in Canada, and physical distancing protocols which have posed challenges to providing direct care services to people who use drugs [4].

Each month, the BC Coroners Service reports on the characteristics of overdose deaths to inform overdose response across the province [3]. Building on this reporting, we present a comparison of demographic and geographic characteristics of people who died of

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overdose before and after COVID-19 was declared a public health emergency in BC on 17 March 2020. Since this declaration, physical distancing protocols have been in place and many health and social services have been operating with reduced capacity. This has resulted in limited access to safe spaces for drug use, and restricted social supports among people most vulnerable to overdose death [5]. We expect that these changes may have had a direct impact on the demographics and geography of overdose deaths in BC. This analysis will identify characteristics of people facing a disproportionate burden of overdose risk during COVID-19 and will allow for the identification of key populations for whom targeted interventions can be prioritised to reduce overdose death in BC.

Methods

BC Coroners Service surveillance data includes all confirmed illicit drug toxicity (overdose) deaths in BC, as determined by a medical examiner or presiding coroner. We report characteristics of overdose deaths before (17 March–31 December 2019) and after (17 March–31 December 2020) declaration of the COVID-19 public health emergency in BC [Note: To control for the potential influence of seasonality on study conclusions, deaths between 1 January and 16 March 2020 were not included (see Supporting Information)]. Associations between independent variables and overdose death (outcome) before and after the COVID-19 public health emergency declaration were examined using Chi-square tests. Unadjusted logistic regression models were used to determine the association between each independent variable and overdose death. A multivariable logistic regression model was used to determine the association of each variable with overdose death, holding all other variables constant. Data used in the present study come from surveillance data at the British Columbia Centre for Disease Control that were acquired under the provincial public health emergency. This work was completed as part of the British Columbia Centre for Disease Control's public health functions relating to provincial overdose response, therefore ethics approval for this project was not required.

Results

Overdose deaths observed since BC's declaration of the COVID-19 public health emergency on 17 March 2020 ($n = 1516$) more than doubled those observed in the same period in 2019 ($n = 744$). Descriptive

analyses revealed a significantly higher proportion of males among post versus pre-COVID-19 overdose deaths (81.7% vs. 74.9%). There were fewer overdose deaths among people aged 30–39 (23.4% vs. 29.4%) post-COVID-19, and more among people aged 40–49 (23.0% vs. 21.5%), 50–59 (23.6% vs. 20.8%) and 60+ (11.9% vs. 9.3%). The distribution of place of injury was significantly different between overdose deaths occurring in the pre- and post-COVID-19 periods, with a higher proportion of overdose deaths occurring outside in the post-COVID-19 period (15.4% vs. 12.8%) and a lower proportion occurring in public buildings (0.9% vs. 2.2%). There were no significant differences in location of overdose in pre- versus post-COVID-19 periods when considering health authority region or urbanicity score. The proportion of deaths with fentanyl detected did not differ between periods (83.5% vs. 84.4%) (Table 1).

In the adjusted logistic regression model, the odds of death post versus pre-COVID-19 was significantly higher among males compared to females [odds ratio (OR): 1.47] and among people aged 40–49 (OR: 1.33), 50–59 (OR: 1.43) and 60+ (OR: 1.65) compared to people aged 30–39. The odds of overdose death was significantly lower in public buildings (OR: 0.46) and in other locations (e.g. medical facilities, correctional centres) (OR: 0.40) compared to private residences in the post-COVID-19 period (Table 2).

Discussion

This analysis describes a shift in the profile of people who died of overdose since the declaration of the COVID-19 pandemic in BC. The odds of death post-COVID-19 was significantly higher among older adults compared to people aged 30–39, who prior to the pandemic, were consistently overrepresented among overdose deaths in BC [3]. Older adults have faced barriers to health service utilisation during COVID-19 [6], causing interruptions to regular medical visits and access to medication assisted treatment [7]. This, in combination with social isolation, has increased vulnerability to relapse and overdose among older adults during the pandemic [6]. Furthermore, odds of death post-COVID-19 was significantly higher among males compared to females. These findings are consistent with recent literature which has identified age and sex as critical factors for consideration in building robust treatment and prevention efforts to prevent overdose death [8].

There were significant differences between the location of overdose deaths in the post compared to pre-COVID-19 period with more deaths outside and less in

Table 1. Demographic and geographic characteristics of overdose deaths in pre- (17 March–31 December 2019) and post- (17 March–31 December 2020) COVID-19

	Deaths in pre- and post- COVID-19 periods	Pre-COVID-19 overdose deaths 17 March–31 December 2019	Post-COVID-19 overdose deaths 17 March–31 December 2020	<i>P</i> value
	<i>n</i> (%), 2260 (100)	<i>n</i> (%), 744 (32.9)	<i>n</i> (%), 1516 (67.1)	
<i>Place of overdose^a</i>				
Private residence	1265 (56.0)	422 (56.7)	843 (55.6)	
Other residence	586 (25.9)	191 (25.7)	395 (26.1)	
Public building	30 (1.3)	16 (2.2)	14 (0.9)	
Outside	325 (14.4)	95 (12.8)	230 (15.2)	
Other	29 (1.3)	16 (2.2)	13 (0.9)	
Missing	25 (1.1)	4 (0.5)	21 (1.4)	0.006
<i>Overdose location urbanicity score^b</i>				
Large	1464 (64.8)	480 (64.5)	984 (64.9)	
Medium	346 (15.3)	123 (16.5)	223 (14.7)	
Small	234 (10.3)	75 (10.1)	159 (10.5)	
Rural	216 (9.6)	66 (8.9)	150 (9.9)	0.632
<i>Overdose location regional health authority^c</i>				
Fraser health	739 (32.7)	238 (32.0)	501 (33.0)	
Interior health	352 (15.6)	104 (14.0)	248 (16.4)	
Island health	368 (16.3)	134 (18.0)	234 (15.4)	
Northern Health	171 (7.6)	56 (7.5)	115 (7.6)	
Vancouver coastal health	630 (27.9)	212 (28.5)	418 (27.6)	0.383
<i>Age category^d, years</i>				
<19	23 (1.0)	9 (1.2)	14 (0.9)	
19–29	393 (17.4)	132 (17.7)	261 (17.2)	
30–39	574 (25.4)	219 (29.4)	355 (23.4)	
40–49	508 (22.5)	160 (21.5)	348 (23.0)	
50–59	512 (22.6)	155 (20.8)	357 (23.6)	
60+	250 (11.1)	69 (9.3)	181 (11.9)	0.024
<i>Sex^e</i>				
Female	464 (20.5)	187 (25.1)	277 (18.3)	
Male	1796 (79.5)	557 (74.9)	1239 (81.7)	<0.001
<i>Fentanyl detected^f</i>				
No	360 (15.9)	123 (16.5)	237 (15.6)	
Yes	1900 (84.1)	621 (83.5)	1279 (84.4)	0.583

^a*Place of overdose*: coded according to BC Coroners Service categories. Private residence = driveways, garages, trailer homes, the decedent's or another's residence; Other residence = hotels, motels, rooming houses, single room occupancy housing, shelters, supportive housing, safe houses; Public building = community centres, businesses; Outside = includes vehicles, streets, sidewalks, parking lots, public parks, wooded areas, campgrounds.; Other = medical facility, occupational site, correctional centre, police custody, other institutions. ^b*Overdose location urbanicity score*: derived from Statistics Canada population centre (popctr) census variable. Population centres have no fewer than 400 people per square kilometre and are classified by population sizes: small (1000–29 999), medium (30 000–99 999), large (100 000 or more). Areas outside population centres are labelled as rural. ^c*Overdose location regional health authority*: BC has five regional health authorities. These are organizations responsible for delivering health services to meet the needs of populations within their respective geographic regions. ^d*Age category*: coded according to BC Coroners Service age group categories. ^e*Sex*: biological sex retrieved from the Client Roster File. ^f*Fentanyl detected*: variable retrieved from BC Coroners Service post-mortem toxicology results.

public buildings. This is consistent with recent reporting from Ontario (Canada's most populous province) [9] and could be attributed to pandemic restrictions that have limited access to social supports and safe

spaces for drug use, such as overdose prevention sites and supervised consumption services [10]. Due to COVID-19 capacity restrictions, the number of visits to BC's 38 overdose prevention sites and supervised consumption services

Table 2. Multivariable logistic regression models for the relationship of demographic and geographic characteristics with post-COVID-19 overdose death (17 March–31 December 2020)

	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
Reference: Pre-COVID-19 overdose death (17 March–31 December 2019)		
<i>Place of overdose^a</i>		
Private residence	Reference	Reference
Other residence	1.04 (0.84–1.28)	1.00 (0.81–1.25)
Public building	0.44 (0.21–0.91)	0.46 (0.22–0.97)
Outside	1.21 (0.93–1.58)	1.20 (0.91–1.56)
Other	0.40 (0.19–0.85)	0.40 (0.19–0.85)
<i>Overdose location urbanicity score^b</i>		
Large	Reference	Reference
Medium	0.88 (0.69–1.13)	0.92 (0.71–1.18)
Small	1.03 (0.77–1.39)	1.10 (0.81–1.49)
Rural	1.10 (0.81–1.51)	1.08 (0.79–1.48)
<i>Overdose location regional health authority^c</i>		
Fraser health	1.07 (0.85–1.34)	—
Interior health	1.21 (0.91–1.60)	—
Island health	0.89 (0.68–1.16)	—
Northern health	1.04 (0.73–1.49)	—
Vancouver coastal health	Reference	—
<i>Age category^d, years</i>		
<19	0.96 (0.41–2.26)	1.10 (0.46–2.61)
20–29	1.22 (0.93–1.60)	1.22 (0.93–1.61)
30–39	Reference	Reference
40–49	1.34 (1.04–1.77)	1.33 (1.03–1.72)
50–59	1.42 (1.10–1.83)	1.43 (1.10–1.85)
60+	1.62 (1.17–2.24)	1.65 (1.18–2.30)
<i>Sex^e</i>		
Female	Reference	Reference
Male	1.50 (1.22–1.85)	1.47 (1.18–1.82)
<i>Fentanyl detected^f</i>		
No	Reference	Reference
Yes	1.07 (0.84–1.36)	1.11 (0.87–1.42)

Bolding reflects statistical significance $P < 0.05$. Unadjusted estimates reflect the association of each independent variable with the outcome, with no adjustment for the effect of other variables. Adjusted estimates reflect the association of each independent variable with the outcome, after adjusting for the effect of all other variables. Place of overdose was missing for $n = 25$ (1.1%) cases and the model was run on $n = 2235$ observations. Overdose location urbanicity score and regional health authority were not independent, only urbanicity score was included in the adjusted multivariable model. CI, confidence interval; OR, odds ratio. ^a*Place of overdose*: coded according to BC Coroners Service categories. Private residence = driveways, garages, trailer homes, the decedent's or another's residence; other residence = hotels, motels, rooming houses, single room occupancy housing, shelters, supportive housing, safe houses; public building = community centres, businesses; outside = includes vehicles, streets, sidewalks, parking lots, public parks, wooded areas, campgrounds; other = medical facility, occupational site, correctional centre, police custody, other institutions. ^b*Overdose location urbanicity score*: derived from Statistics Canada population centre (popctr) census variable. Population centres have no fewer than 400 people per square kilometre and are classified by population sizes: small (1000–29 999), medium (30 000–99 999), large (100 000 or more). Areas outside population centres are labelled as rural. ^c*Overdose location regional health authority*: BC has five regional health authorities. These are organizations responsible for delivering health services to meet the needs of populations within their respective geographic regions. ^d*Age category*: coded according to BC Coroners Service age group categories. ^e*Sex*: biological sex retrieved from the Client Roster File. ^f*Fentanyl detected*: variable retrieved from BC Coroners Service post-mortem toxicology results.

has been reduced since the pandemic, by more than half from January ($n = 68\,720$) to April 2020 ($n = 32\,531$). These services remain critical in the context of dual public health emergencies, and increased capacity (i.e. space, staff) should be prioritised to support their operation as essential services throughout the pandemic.

Risk of overdose death during COVID-19 in BC has also been elevated by a coinciding increase in toxicity of the drug supply beyond that observed in recent years [3]. In

BC, 'extreme fentanyl concentrations' [Note: Extreme fentanyl concentrations are defined as $>50\ \mu\text{g/L}$. Drug concentration data can be affected by post-mortem redistribution, both with respect to increasing concentrations over time (time of death vs. collection) and movement of drug from one compartment (such as fat) into the blood near the site of collection)] have been detected in post-mortem toxicology in approximately 13% of illicit drug toxicity deaths since April 2020, compared to 8% in the year

prior to the pandemic, and carfentanil (a potent synthetic opioid) was detected in more than twice as many deaths in the first 9 months of 2021 than all of 2020 [3]. Non-prescribed benzodiazepines are also increasingly detected in illicit opioids samples in BC [3], which are of particular concern for overdose, given the combined respiratory depressant effects of these drugs when consumed together.

The findings of the present analysis, taken together with BC's increasingly toxic drug supply, highlight and elevate the urgency of expanding access to interventions such as opioid agonist treatment, and pharmaceutical alternatives to the toxic drug supply to reduce overdose death. In BC, these pharmaceutical alternatives include opioid, stimulant, and benzodiazepine medications meant to be prescribed to people who use illicit drugs with the intention of reducing their reliance on the illicit drug supply [11]. Interim surveillance shows that these prescriptions have reached only a small proportion of people who are at risk of overdose in BC [12], and that prescribing has primarily been in urban areas, and dispensed daily through community pharmacies [13]. Rates of overdose death in BC have been unprecedentedly high during the COVID-19 pandemic, and there is an urgent need to scale up and adapt interventions to engage people at risk of overdose. Overdose prevention efforts will have the most impact when based on the recommendations of people with lived and living experiences of substance use [14].

There are a number of limitations to consider. This analysis used data collected by the BC Coroners Service as part of their ongoing surveillance of illicit drug toxicity deaths. Future studies may consider linking data to investigate other factors that are known to influence overdose risk such as discontinuation from opioid agonist treatment or release from prison [15]. These data could help to identify factors associated with increased vulnerability to overdose death during COVID-19 that are not fully captured in this analysis.

The presented analyses reported on the presence of fentanyl in illicit drug toxicity deaths. While prior research using historical data has found an increase in other contaminants (e.g. etizolam) detected in post-mortem toxicology [3], full-toxicology results for each death remain under investigation and are not presently available for reporting. In future analyses, comprehensive indicators of contamination of the drug supply (e.g. concentration) will be of critical importance to understanding the rapidly changing illicit drug supply during the pandemic, and subsequent impacts on overdose mortality in BC.

Conclusion

Alongside a significant increase in overdose deaths since the declaration of the COVID-19 pandemic in BC, the

demographic profile of people who have died of overdose has changed. Ongoing overdose prevention efforts in BC must seek to reach people who remain disengaged from harm reduction and treatment services, including older adults, who during dual public health emergencies are facing compounded risk of preventable mortality.

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Conflict of Interest

The authors have no conflicts of interest.

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Supporting Information

Additional Supporting Information may be found in the online version of this article at the publisher's website:

Appendix S1: Justification for exclusion of 1 January–16 March 2020 from the pre-COVID-19 period.

Table S1: Injury location for the $n = 198$ deaths that occurred between 1 January–16 March 2020 from pre-period.

Table S2: Demographic and geographic characteristics of overdose deaths in pre (17 March 2019–16 March 2020) and post (17 March–31 December 2020) COVID-19 periods.

Table S3: Multivariable logistic regression models for the relationship of demographic and geographic characteristics with post-COVID-19 overdose death.