Knowledge Update

BC Centre for Disease Control
Provincial Health Services Authority

Topic	Pathways of Reporting Overdose Events in British Columbia, 2015-2021
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Data source	Provincial Overdose Cohort
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Key messages

- Between 2015 and 2021, 65.0% of total fatal toxic drug related poisonings (overdoses) occurred without any healthcare contact (defined as contact with BC Emergency Health Services (EHS), emergency departments (EDs), or hospitalization) at the time of drug poisoning. This is a notably lower percentage than the 79.6% reported by Graham et al. (2022) for the years 2015 - 2017.
- From 2015 to 2021, 96% of overdose events that occurred with a record of healthcare contact survived.
- Of overdose events with EHS, ED or hospital contact between 2015 and 2021, 74.2% were attended by EHS, 47.3% visited the emergency department, and 9.5% were hospitalized.
- The proportion of EHS-attended overdose events survived but not transported to hospital has grown from 41.4% of total overdose events with healthcare contact in 2017 to 53.1% in 2021.

Introduction

- Toxic drug related poisonings (overdoses) are a public health crisis in Canada, particularly in British Columbia (BC), where a public health emergency was declared in 2016. Between January 2015 and December 2021, 52,227 people in BC experienced a drug poisoning with healthcare contact, and approximately 21% of them (n = 10,826) died as a result [1].

- To understand the factors associated with drug-related overdoses, the BC Centre for Disease Control (BCCDC) established the BC Provincial Overdose Cohort (BC-ODC) [1], a collection of linked administrative health datasets, including death records, ambulance service, emergency department visits, hospitalizations, and physician records.

- This analysis aims to answer questions about healthcare pathways and utilization by people who experience drug toxicity poisoning events, building on the work of Graham et. al (2022) [2]. The analysis by Graham et al. sought to understand how often people were experiencing a toxic drug poisoning event and where they were connecting with healthcare services. Their research used the BC-ODC for the calendar years 2015 to 2017 (the 2017 cohort). The current analysis extends this analysis by using the BC-ODC data from 2015 to 2021 (the 2021 cohort) and further investigates the patterns in reporting overdose events in BC over time. This examination of overdose-related healthcare utilization over time contributes to the body of knowledge being used to monitor and adjust the response to the toxic drug crisis in BC.

Study Design and Methods

- The BC-ODC consists of multiple datasets. The following sources of administrative data were linked to identify overdose cases: BC Emergency Health Services (EHS), Emergency Departments (ED) which provide paper-based reporting for each case of illicit drug overdose in three British Columbia Health Authorities, National Ambulatory Care Reporting System (NACRS), Medical Services Plan (MSP), Drug and Poison Information Centre (DPIC), Discharge Abstract Database (DAD), Vital Statistics and BC Coroners Service (BCCS) [3]. The BC-ODC also contains a 20% random sample of people from the BC Ministry of Health Provincial Client Roster [4] as a comparison group to the overdose population.

- An overdose episode (overdose event) was previously defined in MacDougall et al. (2019) [3] and used in the work of Graham et al. (2022) [2]. This report adopts the same definition. If a patient had multiple healthcare encounters within a 24-hour period for a single drug poisoning, these encounters were grouped into one overdose episode. A single encounter within 24 hours is also considered as one overdose episode. The definitions and data sources for overdose events can be found in Table 4.

- Graham et al. (2022) created an overdose reporting pyramid that conceptually illustrates the pathways of drug toxicity poisoning events and recorded healthcare use (Figure 1) [2]. This pyramid is further divided into two branches: healthcare-attended overdose events and overdose events where there was no reported contact with healthcare services (Figure 2). This report captures the number of overdose events in each box in Figure 2 using the 2021 cohort and further breaks them down by year in Tables 1 and 2 to study trends over time.

- People experiencing overdose can interact with the healthcare system in various ways. Depending on the pathway, these events will appear in different data sets. For example, a person experiencing an overdose may be transported by ambulance (captured in EHS data) to an emergency department (captured in paper-based ED reporting and/or NACRS data), hospitalized (captured in DAD data), and then discharged. They may also arrive as walk-in patients (e.g., using private vehicles or alternative transportation to arrive in hospital), or leave hospital before medically advised discharge (BMA) [5]. Similarly, fatal overdose events can follow many different pathways, as overdose death can occur at any stage of care or without any reported contact at all with healthcare services (captured in BCCS and Vital Statistics).

- Graham et al. (2022) [2] made some assumptions to address discrepancies in healthcare data. If an overdose event was recorded in the hospitalization data (DAD) but not found in the emergency department data (ED), it is assumed that the overdose patient was admitted through the emergency department to receive inpatient care in hospital. Additionally, if an overdose record was found only in MSP or DPIC, with a physician's note indicating that the care was provided in ED, a similar assumption was made. The same assumptions are applied in this report.

Findings

A total of 95,178 unique overdose episodes were identified between 2015 and 2021.

Fatal Overdose Episodes

- 65.0% (n = 6,981, Figure 2 Box D) of total fatal overdose events (n = 10,795) reported in the 2021 cohort between 2015 and 2021 occurred without any healthcare contact at the time of overdose (Figure 3). This is a notable decrease in proportion compared to the 2017 cohort. Between 2015 and 2017, 79.6% (n = 2,432) of total fatal overdoses (n = 3,056) had no healthcare contact at the time of drug poisoning [2].

- Among overdose episodes with a record of healthcare contact (n = 95,178, Figure 2 Box B), a total of 4.0% ended in a death between 2015 and 2021 (n = 3,814, Figure 2 Boxes E, J, O).

- Of fatal overdoses with a record of healthcare contact, the highest number occurred during contact with EHS (27.6% of total fatal overdoses) (Figure 2 Box E, Figure 3), while a smaller proportion occurred during hospitalization (6.3% of total fatal overdoses) (Figure 2 Box O, Figure 3). Fatalities in the ED represented the lowest proportion of all fatal overdoses (1.4%) (Figure 2 Box J, Figure 3).

Non-fatal Overdose Episodes

- The number of overdose-related healthcare contacts significantly increased throughout the years, from 6,511 in 2015 to 21,687 in 2021 (Table 1 Row F). This represents a 233.0% increase, which is on a similar scale to the 249.0% increase in deaths from 705 in 2015 to 2,458 in 2021 (Table 2 Row E) [6].

Overdose Episodes Attended by Emergency Health Services

- 52.7% (n = 50,179, Figure 2 Box E, F) of the total overdose episodes with healthcare contact were attended solely by EHS. The majority (94.1%, n = 47,196) of these episodes involved people receiving care from paramedics (EHS) who were not transported to the ED or hospital after (Figure 2 Box F). The rest were fatal overdose cases (5.9%, n = 2,983, Figure 2 Box E).

Overdose Episodes Attended in Emergency Department

- Among the healthcare-attended overdose episodes between 2015 and 2021, 47.3% were attended in the ED or assumed to have been (n = 44,999) (Figure 2 Box G, H, I, Table 1 Row C, D1, D2, E). This was referred to as *ED attachment* by Graham et al. (2022) [2]. Of the 44,999 episodes:
    - 45.4% (n = 20,447) were transported to the ED via EHS services (Table 1 Row D1). In the 2017 cohort, arrival to the ED via EHS services accounted for 42% of overdose episodes with ED attachment (7,029 out of 16,718 overdose episodes with a record of contact or assumed contact with the ED) [2].
    - 31.1% arrived at the ED via alternative transportation or as walk-ins (n = 13,994) (Table 1 Row D2). In the 2017 cohort, arrival records to the ED through alternative transportation or walk-ins accounted for 38.5% (n = 6,442) of overdose episodes with ED attachment.
- Overdose episodes that were captured in MSP data accounted for a small portion of total overdoses (3.8% of healthcare-attended overdoses) (Figure 2 Box G). These episodes were assumed to have been seen in the ED, although there was no associated emergency department visit record. They were identified based on service location codes in MSP, which indicate that the visits were hospital related.

- 43.4% of total overdose episodes (n = 41,352, Figure 2, Box H, I) had an ED discharge or hospitalization record (referred to as *ED discharge* by Graham et al. (2022)) [2].

- While attended in the ED, the overdose survival rates were extremely high. Over six years, a total of 152 people died while receiving care in the ED (0.4% of ED discharge, Figure 2 Box J). This excludes fatal cases where people were subsequently hospitalized after being treated in the ED.

- The majority of ED discharges were for overdose events in which patients survived and were discharged without further hospitalization (n = 29,807, 72.1% with ED discharge, Figure 2 Box K). When broken down by year, the trends remained consistent at around 70.0% between 2016 and 2021. However, 2015 was an exception, with a lower percentage of ED discharges that year (55.6% with ED discharge, Table 1 Row H).

- 0.5% with ED discharge indicated that patients left the ED against medical advice or left BMA (n = 200) (Figure 2 Box L, Table 1 Row I).

Overdose-Related Hospitalization

- 7.3% of healthcare-attended overdose episodes were overdose-related hospitalizations without corresponding ED records (n = 6,911, Figure 2 Box I). These were assumed to have been admitted through the ED.

- Of those with ED discharge, 9,013 overdose episodes resulted in hospitalization for overdose (21.8%, Figure 2 Box N), while 2,180 were hospitalized for other reasons (5.3%, Figure 2 Box M). In 2015, overdose hospitalization rates were notably higher, with 39.6% of ED discharges resulting in hospitalization for overdose. In contrast, the remaining years saw around 20% of overdoses with ED discharge leading to hospitalization for overdose inpatient care (Table 1 Row K).

- Among those with hospitalization records for overdose (n = 9,013) (Figure 2 Box M), 92.5% survived (n = 8,334, Figure 2 Box P), while the remainder resulted in fatalities (n = 679) (Figure 2 Box O).

<u>Healthcare Utilization</u>

For this analysis, all overdose events attended by EHS (Table 1 Row A, B, D1) were combined into a category called ‘paramedic-attended events.’ Any overdose events where patients were assumed to have received (captured in MSP or DPIC, but not ED data) or actually received care in the ED were grouped into emergency department visits (Table 1 Row C, D1, D2, E). Lastly, overdose-related hospitalizations were categorized as hospital visits (inpatient care) (Table 1 Row K). Table 3, Figure 4a, and 4b show how each category changed over time.

- The total number of drug poisoning events (n = 95,178) fluctuated during the study period. It sharply rose from 6,511 to 15,204 between 2015 and 2017, then began to slow down in 2018. However, due in part to the COVID-19 pandemic and the variability of the unregulated and toxic drug supply, there was an exponential increase in the total number of drug poisoning events since 2020 (n = 21,687 in 2021).

- Between 2015 and 2021, 74.2% (n = 70,626) of all identified overdose events were attended by paramedics, highlighting the key role of paramedic services in responding to the toxic drug crisis. As the total number of overdose events increased over time, the utilization of paramedic services also grew substantially, rising from 4,664 in 2015 to 17,031 in 2021.

- 47.3% of total overdose events with healthcare records (n = 44,999) were emergency department visits between 2015 and 2021. Emergency departments were the second most utilized service for responding to overdose events, following EHS. The number of ED visits also saw a sharp rise, from 2,552 in 2015 to 9,446 in 2021, reflecting a 270.0% increase. Since 2017, the percentage of total overdoses involving emergency department care had been decreasing over time, while the percentage involving paramedic care had been increasing over time.

- Only 9.5% of total overdose events with healthcare records received inpatient treatment in hospital (n = 9,013), as most patients were discharged from the ED after non-fatal overdose events. The growth in hospital service utilization (i.e. hospitalizations) was less pronounced than paramedic-attended events and emergency department visits, with an 89.0% increase from 956 in 2015 to 1,810 in 2021.

Interpretation

- A notable increase (233.0%) in the number of overdose events with healthcare contacts was observed between 2015 and 2021, in line with a similar percentage increase in total fatal overdose events (249.0%). The similar scale of these increases suggests that the change may be attributable to an increasing scale of the toxic drug crisis, likely due to increased variability and potency of the unregulated drug supply [6].

- The pattern of events across each type of healthcare contact generally followed the overall trend in total overdose events (Table 1 Row A to F). However, one notable deviation was the number of paramedic-attended overdose events in which people survived but were not transported to the ED– this number consistently increased each year, except for a marginal decrease in 2019 (Table 1 Row B). Understanding this pattern is critical, as transport to hospital following a non-fatal drug poisoning events can provide an important opportunity for people to receive care for underlying or chronic conditions and connect them to the system of substance use care – prevention, harm reduction, treatment, and recovery [7].

- One potential factor influencing this trend is a policy change that expanded paramedic transport options. On March 29, 2017, the Emergency Health Services Act [8] was amended to allow paramedics to treat patients at the scene without requirement to transport them to hospital afterward. It also permitted the transport of patients to non-hospital services, such as a doctor's office or specialized community resources. Prior to this change, paramedics were required to transport all patients to hospital, regardless of event severity. This shift in policy, combined with the effectiveness of naloxone to temporarily reverse the effects of an overdose [9, 10, 11], may have contributed to the increase in overdose patients who were not transported to hospital following paramedic intervention.

- Another contributing factor to the trend is the potential increase in refusal of hospital transport following paramedic care, which could not be elucidated from the data sources in this study. If refusal rates have risen, this may reflect several factors: a) patients feeling less ill after naloxone administration and declining further medical treatment, b) increased concerns about stigmatization or criminal justice consequences if transported to hospital, or c) fear of long wait times in the emergency department (without access to substances and/or observed consumption services). These barriers may further discourage people from seeking hospital-based care after an overdose. An increase in refusal of transport may also help explain the rising proportion of the total overdoses involving paramedic care, relative to those involving emergency department or hospital services. Reduced hospital transport may result in missed opportunities for intervention in the non-fatal consequences of overdose, such as anoxic or hypoxic brain injury [12].

- The potential increase in the refusal rate may also help explain why the proportion of the total overdoses involving paramedic care has risen relative to those involving emergency department or hospital services. The effectiveness of naloxone in reversing overdose symptoms may reduce patients' perceived need for further medical care in emergency department or hospital following paramedic attendance. In addition, stigma, previous negative experiences in emergency departments, and fear of legal consequences may further discourage people from seeking hospital-based care after an overdose.

- The distribution of drug poisoning deaths across different healthcare settings—including those with no healthcare contact at the time of the event—is shown in Figure 3. The highest proportion of fatalities occurred during paramedic-attended drug poisoning events (27.6% of all fatal overdose events). In comparison, deaths occurred in the ED and during hospitalization represented 1.4% and 6.3% of all fatal overdose events, respectively. One possible explanation for this distribution is the nature and timing of medical intervention. Paramedics are often the first medical responders to overdose cases [13, 14]. Our analysis showed that 74.2% of all overdoses with healthcare records were attended to by paramedics, a proportion notably higher than those involving emergency department (47.3%) and hospital (9.5%) contact (Table 3). This suggests that paramedics encounter overdose events across a

wide range of severity, including the most acute cases and situations where the patient was already deceased upon their arrival, given their frontline role [15] and the high proportion of fatal overdoses observed in paramedic-attended events in our data.

- Moreover, the increasing toxicity of the unregulated drug supply—particularly the presence of fentanyl and its analogues mixed with non-opioid depressants such as benzodiazepines, xylazine, or alcohol, as well as stimulants—can complicate treatment, as sedative effects from non-opioid substances are not reversed by naloxone, thereby increasing the risk of fatal drug poisonings [14, 16, 17, 18]. Paramedics may reach the patient earlier by responding at the scene; however, survival often depends on the time between when the overdose occurs and when it is discovered, the severity of the overdose, and any interventions that take place before paramedic arrival. These factors can increase the risk of death before transfer to the ED [14, 19]. Conversely, patients who survive long enough to reach the ED may be more likely to receive escalated care or be admitted to hospital, with death occurring later during hospitalization [19]. However, these interpretations are based on the patterns observed in our data and should be explored further in future studies using detailed clinical or qualitative data on treatment timelines and care decisions.

- Overall, the data presented suggest that while overdose events attended in all healthcare contact environments studied have significantly increased in volume since the declaration of the public health emergency in 2016, attendance of medical intervention, whether via paramedic services (EHS), ED, or hospitalization, largely results in patient survival (96.0%, based on our calculation of total fatal overdoses occurred during EHS, ED and hospitalization over all overdose events with healthcare contact). Survival rates of non-fatal overdose events not attended to by medical staff is not available, but the high recorded rate of patient survival is consistent with 65.0% of fatalities occurring in patients who did not have healthcare contact at the time of death, and 52.0% of fatalities occurring in people who were using drugs alone [6, 20]. Further harm reduction efforts that promote timely medical intervention during overdose events could help reduce toxic drug deaths in BC. Strategies may include expanded public awareness and training for take-home naloxone use, increased access to naloxone kits, and promotion of digital tools such as the Lifeguard app, which connects people using drugs alone to emergency responders in the event of an overdose.

Limitations

Limitations

- While this study examines the healthcare pathways of people who experience drug toxicity poisoning, it only includes primary care, ambulance, emergency department, and hospital services. Broader pathways, such as acute and tertiary mental health services, community and bed-based substance use

services, correctional settings, and medical withdrawal management (detox), are not captured in the data.

- Graham et al. (2022) discuss that using ED data alone to identify overdose events that occurred in the emergency department may lead to an underestimation of overdose events in the emergency department [2]. This issue persisted for the 2021 cohort, as 10,558 overdose events with healthcare records were assumed to have been seen in the ED but did not have a corresponding ED record (Figure 2 Box G, I). Overall, 3,647 of these were captured in MSP or DPIC data, and the remaining 6,911 had records of hospitalization. Their research also emphasized that not all drug toxicity poisoning deaths were found in BCCS data; 4.5% of all overdose deaths in the 2021 cohort were identified in Vital Statistics Death data.

- The study data on non-fatal drug poisoning events are limited to people who accessed healthcare services during the study period. Overdose events managed in community—such as those reversed with naloxone without medical assistance, or where people left before the ambulance arrived—are not captured. Additionally, stigma and discrimination associated with drug use can discourage people from seeking the care they need, further contributing to an underestimation of the true number of toxic drug poisoning events. Flynn et al. (2025) highlight the limitations of relying solely on health administrative data to identify the total number of overdose events. Their findings suggest that more than 70% of total events in the 2017 cohort may have gone unreported and were not captured in administrative records [21].

Next steps

- Although the BC-ODC data offers a valuable look at how the utilization of certain healthcare services in overdose events has changed over time, it does not include data beyond physician care, EHS, ED, and hospital records. To gain a deeper understanding of how people in BC are accessing the entire system of care for drug toxicity poisoning, it is important to also link these data to health services offered to people who use substances – such as overdose prevention services, medical treatment, and bed-based recovery services.

- Research shows that people who use substances, particularly those with substance use disorder, face a higher risk for other medical conditions, such as mental disorders, brain injury, and cardiovascular diseases [12, 22-25]. This analysis highlights that 5.3% of overdoses in the emergency department resulted in hospitalization for reasons other than the overdose itself. Further investigation is needed to understand the underlying causes of these hospitalizations and to improve care for people who have experienced an overdose and present with co-morbidities that require treatment.

Conclusion

- Only one-third of all fatal overdose events had any overdose-related healthcare contact at the time of drug poisoning in British Columbia. This trend was observed almost every year in the Provincial Overdose Cohort Data from 2015 to 2021. These findings highlight the importance of ongoing efforts to address systemic barriers across the full continuum of substance care—prevention, harm reduction, and treatment—that leave many people without medical support during critical moments.

- Between 2020 and 2021, the number of both fatal and non-fatal overdose events involving healthcare contact increased substantially, thus increasing patient volumes in the healthcare system that was already grappling with the effects of the COVID-19 pandemic and staffing shortages. Much of this increase in overdose events and healthcare contacts is likely driven by the increased toxicity and general variability in the unregulated drug market in BC [6]. However, efforts across the healthcare and legal systems to reduce stigma, minimize harms associated with substance use, and alleviate fear of seeking help may also have mitigated some of the negative impacts of these challenges [26-29].

Supporting Information

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Data steward(s) disclaimer

Access to data provided by the Data Stewards is subject to approval but can be requested for research projects through the Data Stewards or their designated service providers. The following data sets were used in this study: BC Emergency Health Services (EHS), Emergency Departments (ED) which provide paper-based reporting for each case of illicit drug overdose in three British Columbia Health Authorities, National Ambulatory Care Reporting System (NACRS), Medical Services Plan (MSP), Drug and Poison Information Centre (DPIC), Discharge Abstract Database (DAD), Vital Statistics, BC Coroners Service (BCCS), and the BC Ministry of Health Provincial Client Roster. All inferences, opinions, and conclusions drawn in this publication are those of the author(s), and do not reflect the opinions or policies of the Data Steward(s). This Data was provisioned under Information Sharing Agreement (ISA) J16-145.

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We thank the Harm Reduction and Substance Use Services Analytics team at the BC Centre for Disease Control (BCCDC) for their guidance and review of this work. We also thank the team for providing the code used for Graham et al. (2022) for this update.

Tables and Figures

Figure 1. Overdose reporting pyramid

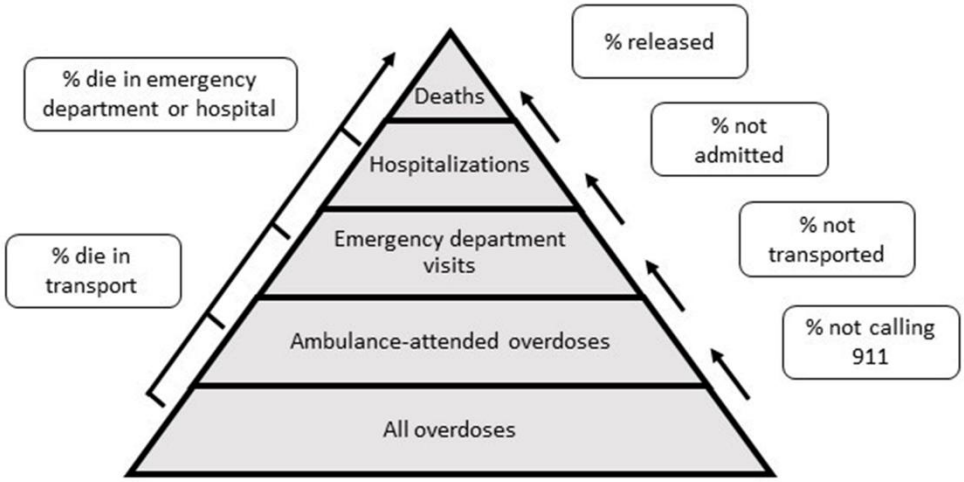
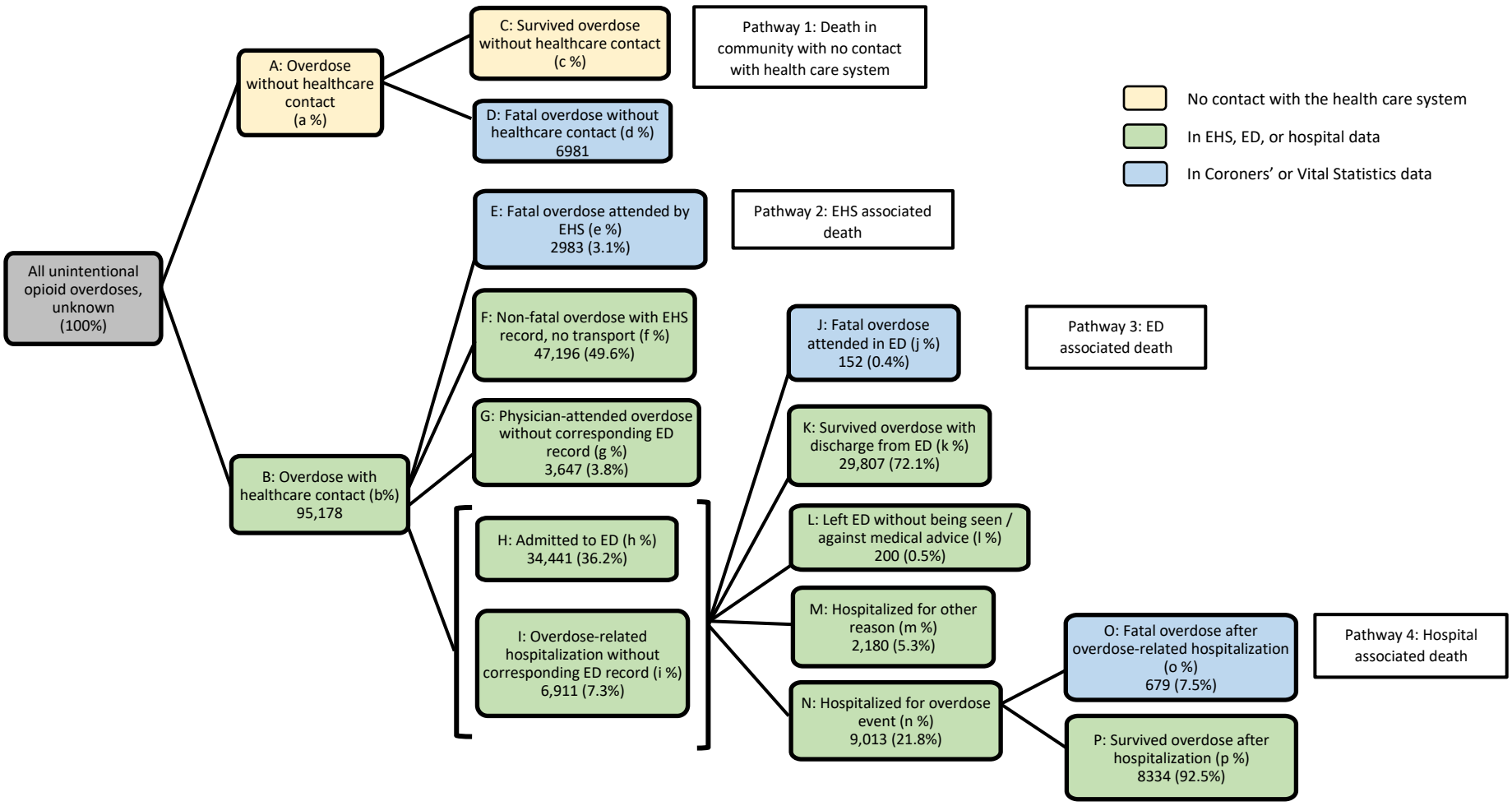


Figure 2. Pathways of care for drug poisoning events, BC Provincial Overdose Cohort, 2015-2021.



Note: Definitions and data sources for each box can be found in Table 2.

Figure 3. Percentage of Fatal Overdose Events with or without Healthcare Contact, 2015 - 2021

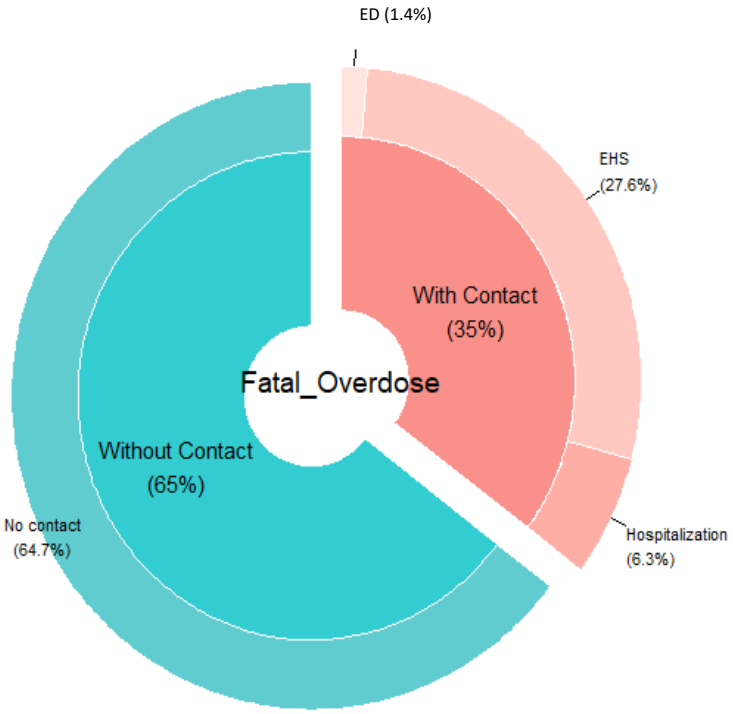
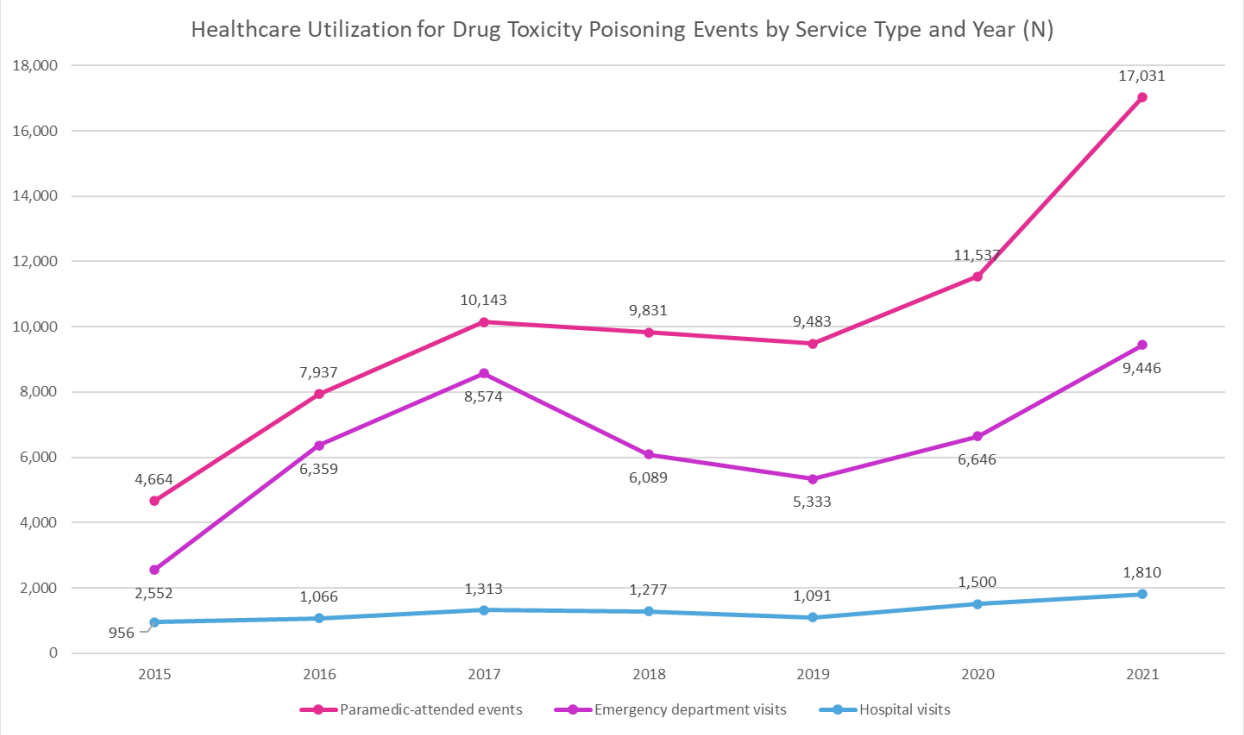
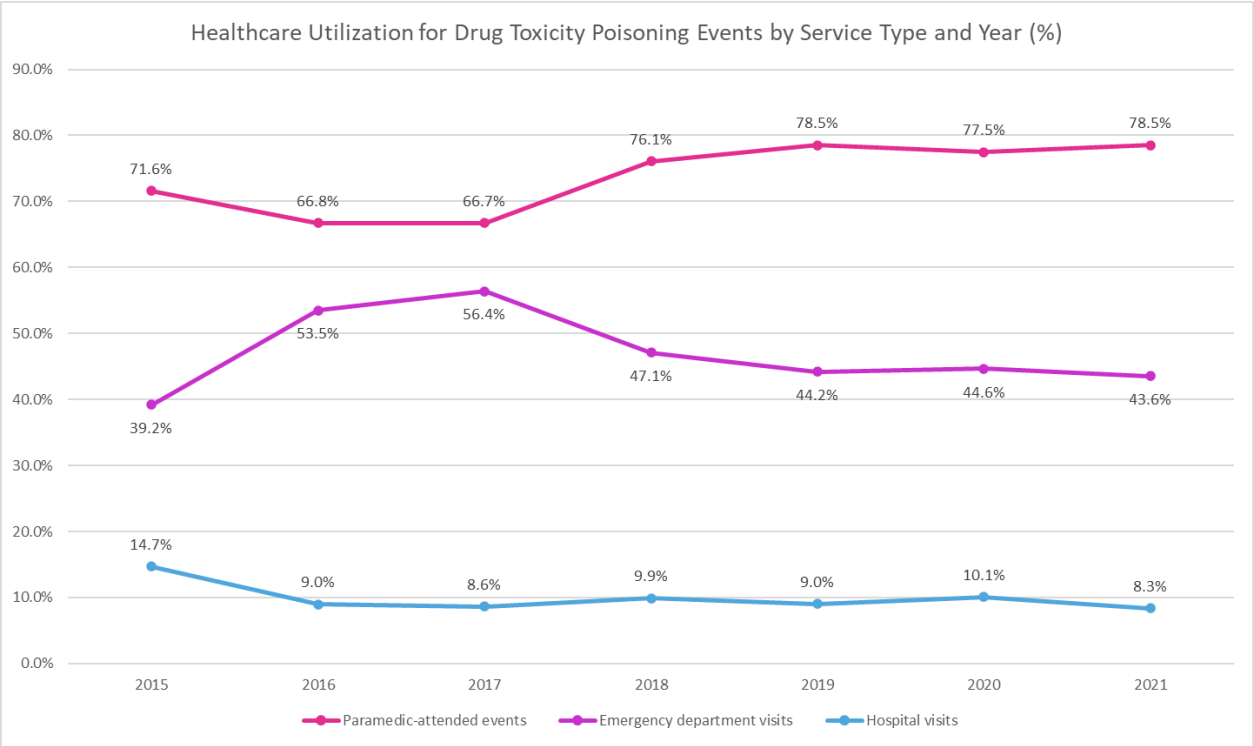


Figure 4a. Healthcare Utilization for Drug Toxicity Poisoning Episodes by Service Type and Year (N - Table 3)



Note: all overdose events attended by EHS (Table 1 Row A, B, D1) were combined into a category called 'paramedic-attended events.' Any overdose events where patients were assumed to have received (captured in MSP or DPIC, but not ED data) or actually received care in the ED were grouped into emergency department visits (Table 1 Row C, D1, D2, E). Lastly, overdose-related hospitalizations were categorized as hospital visits (Table 1 Row M).

Figure 4b. Healthcare Utilization for Drug Toxicity Poisoning Episodes by Service Type and Year (% - Table 3)



Note: all overdose events attended by EHS (Table 1 Row A, B, D1) were combined into a category called 'paramedic-attended events.' Any overdose events where patients were assumed to have received (captured in MSP or DPIC, but not ED data) or actually received care in the ED were grouped into emergency department visits (Table 1 Row C, D1, D2, E). Lastly, overdose-related hospitalizations were categorized as hospital visits (Table 1 Row M).

Table 1. Pathways of Reporting OD Events: total overdose events with healthcare contact between 2015 and 2021

	2015		2016		2017		2018		2019		2020		2021		Total	
Overdose with Healthcare Record	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**
F Total overdose events with healthcare contact	6,511	100.0%	11,889	100.0%	15,204	100.0%	12,925	100.0%	12,073	100.0%	14,889	100.0%	21,687	100.0%	95,178	100.0%
A Fatal overdose attended by EHS	219	3.4%	286	2.4%	334	2.2%	457	3.5%	398	3.3%	571	3.8%	718	3.3%	2,983	3.1%
B Survived overdose with EHS contact but no transport to ED	3,740	57.4%	5,244	44.1%	6,296	41.4%	6,379	49.4%	6,342	52.5%	7,672	51.5%	11,523	53.1%	47,196	49.6%
C Physician-attended OD without corresponding ED record	140	2.2%	702	5.9%	1,067	7.0%	362	2.8%	334	2.8%	244	1.6%	798	3.7%	3,647	3.8%
D1 Admitted to ED with EHS record	705	10.8%	2,407	20.2%	3,513	23.1%	2,995	23.2%	2,743	22.7%	3,294	22.1%	4,790	22.1%	20,447	21.5%
D2 Admitted to ED without EHS record	819	12.6%	2,381	20.0%	3,060	20.1%	1,739	13.5%	1,416	11.7%	1,978	13.3%	2,601	12.0%	13,994	14.7%
E Overdose-related hospitalization without corresponding ED record†	888	13.6%	869	7.3%	934	6.1%	993	7.7%	840	7.0%	1,130	7.6%	1,257	5.8%	6,911	7.3%
Among overdose events in ED																
L Total overdose events that were discharged or hospitalized from ED (D1 + D2 + E)	2,412	100.0%	5,657	100.0%	7,507	100.0%	5,727	100.0%	4,999	100.0%	6,402	100.0%	8,648	100.0%	41,352	100.0%
G Fatal overdose attended in ED	–	–	–	–	38	0.5%	24	0.4%	24	0.5%	15	0.2%	31	0.4%	152	0.4%
H Survived od events with discharge from ED	1,341	55.6%	4,265	75.4%	5,667	75.5%	4,111	71.8%	3,599	72.0%	4,490	70.1%	6,334	73.2%	29,807	72.1%
I Left ED without being seen	–	–	–	–	33	0.4%	58	1.0%	22	0.4%	22	0.3%	44	0.5%	200	0.5%
J Hospitalized for other reason	110	4.6%	290	5.1%	456	6.1%	257	4.5%	263	5.3%	375	5.9%	429	5.0%	2,180	5.3%
K Hospitalized for overdose	956	39.6%	1,066	18.8%	1,313	17.5%	1,277	22.3%	1,091	21.8%	1,500	23.4%	1,810	20.9%	9,013	21.8%
Among overdose related hospitalization																
O Total overdose related hospitalization (=K)	956	100.0%	1066	100.0%	1313	100.0%	1277	100.0%	1091	100.0%	1500	100.0%	1810	100.0%	9,013	100.0%
M Fatal overdose events after OD-related hospitalization	34	3.6%	74	6.9%	111	8.5%	112	8.8%	83	7.6%	125	8.3%	140	7.7%	679	7.5%
N Survived after hospitalization	922	96.4%	992	93.1%	1,202	91.5%	1,165	91.2%	1,008	92.4%	1,375	91.7%	1,670	92.3%	8,334	92.5%

Notes:
†Most people who were hospitalized for overdose were assumed to be admitted through the emergency department.
Cells indicated with "–" have been suppressed in line with BC Ministry of Health data disclosure policies to protect against re-identification risk from small cell sizes.

Table 2. Pathways of Reporting OD Events: total fatal overdoses between 2015 and 2021

	Year															
	2015		2016		2017		2018		2019		2020		2021		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
E Total fatal overdose	705	100%	1,132	100%	1,628	100%	1,707	100%	1,216	100%	1,949	100%	2,458	100%	10,795	100%
A Fatal overdose where there was no healthcare contact	450	66.6%	754	66.6%	1145	70.3%	1114	65.3%	711	58.5%	1,238	63.5%	1,569	63.8%	6,981	64.7%
B Fatal overdose attended by EHS	219	25.3%	286	25.3%	334	20.5%	457	26.8%	398	32.7%	571	29.3%	718	29.2%	2,983	27.6%
C Fatal overdose attended in ED	–	–	–	–	38	2.3%	24	1.4%	24	2.0%	15	0.8%	31	1.3%	152	1.4%
D Fatal overdose events after OD-related hospitalization	–	–	–	–	111	8.5%	112	8.8%	83	7.6%	125	8.3%	140	7.7%	679	6.3%
Note: Cells indicated with "–" have been suppressed in line with BC Ministry of Health data disclosure policies to protect against re-identification risk from small cell sizes.																

Table 3. Healthcare utilization by service type and year

	2015		2016		2017		2018		2019		2020		2021		Total	
Service Type	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**
D Total overdose with healthcare contact	6,511	100.0%	11,889	100.0%	15,204	100.0%	12,925	100.0%	12,073	100.0%	14,889	100.0%	21,687	100.0%	95,178	100.0%
A Paramedic-attended service	4,664	71.6%	7,937	66.8%	10,143	66.7%	9,831	76.1%	9,483	78.5%	11,537	77.5%	17,031	78.5%	70,626	74.2%
B Emergency department visits	2,552	39.2%	6,359	53.5%	8,574	56.4%	6,089	47.1%	5,333	44.2%	6,646	44.6%	9,446	43.6%	44,999	47.3%
C Hospital visits	956	14.7%	1,066	9.0%	1,313	8.6%	1,277	9.9%	1,091	9.0%	1,500	10.1%	1,810	8.3%	9,013	9.5%

Note:
All overdose events attended by EHS (Table 1 Row A, B, D1) were combined into a category called 'paramedic-attended events.' Any overdose events where patients were assumed to have received (captured in MSP or DPIC, but not ED data) or actually received care in the ED were grouped into emergency department visits (Table 1 Row C, D1, D2, E). Lastly, overdose-related hospitalizations were categorized as hospital visits (Table 1 Row M).
The total number of overdoses with healthcare contact (Table 1 Row F) is less than the sum of services provided by each healthcare sector because some patients were attended by more than one type for a single overdose episode. For example, if a patient was attended to by a paramedic and then transported to the emergency department, the episode was counted in both the paramedic-attended service and emergency department visits. The percentage is interpreted as the proportion of total overdose episodes associated with each service type.

Table 4. Definitions and data sources for overdose events, BC provincial overdose cohort, 2015-2021

Box	Description	Definition	Data sources
A	Overdose with no healthcare record	Overdose events with no contact with the healthcare system (EHS, ED, or hospitalization data).	Not directly estimable
B	Overdose with healthcare record	Overdose events recorded in EHS, ED, or hospitalization data.	EHS, ED, MSP, DPIC, NACRS, DAD
C	Non-fatal overdose with no healthcare record	Non-fatal overdose events with no record of contact with the healthcare system (EHS, ED, or hospitalization data).	Not directly estimable
D	Fatal overdose with no healthcare record	Overdose deaths with no record of contact with the healthcare system (EHS, ED, or hospitalization data).	BCCS, VS
E	Fatal overdose with EHS record	Overdose events with an EHS record and death record, where EHS services arrived but the person had died on the scene or in transport to the ED.	EHS, BCCS, VS
F	Non-fatal overdose with EHS record, no transport	Overdose events with an EHS record, where EHS services arrived but the person was not transported to the ED (assumed non-fatal).	EHS
G	Non-fatal physician-attended overdose with no ED record	Overdose events presumed to be in ED due to MSP or DPIC record, but with no ED record (assumed non-fatal). Events may have been miscoded due to data linkage or other issues.	MSP, DPIC
H	Admitted to ED (with or without EHS record)	Overdose events with an ED record (if no EHS record, it is assumed admitted through sources other than EHS (e.g. walk-in) or miscoded due to data linkage or other issues).	EHS, ED, NACRS
I	Record or overdose-related hospitalization with no ED record	Overdose events with a hospitalization record but no ED record. Events are assumed to have been seen in the ED.	DAD
J	Fatal overdose with ED record	Overdose deaths with an ED record and a death record.	ED, NACRS, BCCS, VS
K	Non-fatal overdose with record of discharge from ED	Overdose events with an ED record discharged from the ED (assumed non-fatal).	ED, NACRS
L	Left ED without being seen / against medical advice	Overdose events with an ED record that indicated left the ED without being seen or against medical advice (LWBS/LAMA).	NACRS
M	Hospital record for reason other than overdose	Overdose events with an ED record and a hospitalization record, hospitalization record does not include overdose (assumed non-fatal).	ED, NACRS, DAD
N	Hospital record for overdose	Overdose events with a hospitalization record related to overdose.	DAD
O	Fatal overdose with hospital record	Overdose deaths with a hospitalization record related to overdose and a death record indicating overdose.	DAD, BCCS, VS
P	Non-fatal overdose with hospital record	Overdose events with a hospitalization record related to overdose who were discharged from hospital (assumed non-fatal).	DAD

BCCS = BC Coroners Service, DAD = Discharge Abstract Database, DPIC = Drug Poison and Control Centre, ED = Emergency Department, EHS = BC Emergency Health Services, LAMA = Left Against Medical Advice, LWBS = Left Without Being Seen, MSP = Medical Services Plan, NACRS = National Ambulatory Care Reporting System, VS = BC Vital Statistics

Table 5. Definitions and data sources for all pathways of overdose events, 2015-2021

Data source	Definition of record of overdose
BC Coroner's Service (BCCS)	Open and closed cases of accidental and undetermined illicit drug-related overdose deaths in British Columbia, Canada. Includes: overdose deaths involving unregulated drugs and/or drugs sold illicitly (e.g., heroin, cocaine, MDMA, methamphetamine, illicit fentanyl, fentanyl analogues, etc.); medications not prescribed to the deceased but obtained or purchased through unknown means, or where origin of drug not known; combinations of the above with prescribed medications. Excludes: intentional drug toxicity deaths and unintentional deaths due solely to one's own prescribed medications. [6]
Canadian Vital Statistics Deaths Database	ICD-10 codes Underlying cause of death (UCOD) starts with T40.0 (poisoning from opium), T40.1 (poisoning from heroin), T40.2, T40.3, T40.4, T40.6 (T40.2-T40.6 poisoning from other opioids), or Contributing cause of death (CCOD) starts with T40.1 (poisoning from heroin), T40.2, T40.3, T40.4, T40.6 (T40.2-T40.6 poisoning from other opioids). Excluded cases where ICD codes began with J (indicating medical assistance in dying).
BC Emergency Health Services (EHS)	Reporting from Patient Care Information System – Paramedic-attended opioid overdose, defined as: Naloxone administered by paramedics or Recreational drug OD impression code or CARD 9 (Cardiac or respiratory arrest/death), 23 (overdose/poisoning (ingestions)), 26 (sick), 31 (unconscious), Cardiac arrest impression code and CARD 23 (overdose/poisoning (ingestion)) Reporting from Siren - Naloxone administered, 'Opioid Related' or 'Opioid Related /OD' impression code, Cardiac Arrest and CARD 23 (overdose/poisoning (ingestion))
National Ambulatory Care Reporting System (NACRS)	ICD-10 code T40.0 (poisoning from opium), T40.1 (poisoning from heroin), T40.2, T40.3, T40.4, T40.6 (T40.2-T40.6 poisoning from other opioids) in diagnostic code fields
Case-based reporting by Emergency Department (ED)	Case-based reporting based on physician's assessment of clinical symptoms indicated opioid overdose, regardless of patient's self-reported drug use. Used for Interior Health Authority, Vancouver Island Health Authority, and Northern Health Authority.
Medical Services Plan (MSP)	If any diagnostic code was ICD-9: 965.0 (poisoning by opiates and related narcotics) or ICD-10: E850.0 (accidental poisoning by opiates and related narcotics)
Drug Poison and Control Centre (DPIC)	Any call with an AAPCCGenCode indicative of an opioid, with or without the involvement of other drugs/alcohol: 37701–05, 37707–8, 37784, 200625, 200628, 200630, 200638, 201063, 201131
Discharge Abstract Database (DAD)	ICD-10 code T40.0 (poisoning from opium), T40.1 (poisoning from heroin), T40.2, T40.3, T40.4, T40.6 (T40.2-T40.6 poisoning from other opioids) and corresponding diagnosis type as M (most responsible diagnosis), 2 (post-admit comorbidity), W(service transfer), X (service transfer), Y (service transfer), 6 (proxy for most responsible diagnosis) in the diagnostic code fields