

Opioid Use in Canada: Preventing Overdose with Education Programs & Naloxone Distribution

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Opioid use in Canada

This document introduces the challenges related to opioids and their prescribed and non-prescribed use in Canada. It presents some recent overdose data and common risk and protective factors. It also briefly outlines naloxone prevention and education programs and presents the evidence for their efficacy in lowering opioid overdose rates.

OVERVIEW

Opioids are a class of drugs that include heroin, opium, and pharmaceutical pain killers such as codeine, fentanyl, hydrocodone, hydromorphone, methadone, buprenorphine, and oxycodone. Pharmaceutical opioids (POs) are increasingly used in both prescribed and non-prescribed ways, both of which can lead to overdoses that cause long term effects or death. Canada is the second-largest per capita consumer of prescribed POs (International Narcotics Control Board, 2013). Almost 15% of Canadians aged 15 and up used POs in 2013 (Health Canada, 2015).

From 2000 to 2004, the recorded use of prescribed opioids in Canada increased by 50% (Fischer, Rehm, Goldman, & Popova, 2008).

Data on non-prescribed opioid use¹ are difficult to collect. The illegal nature of drug use drives it underground and marginalizes those who use drugs. This impacts the ability to collect valid, consistent data (Gustafson, Goodyear, & Keough, 2008). Nevertheless, estimates are available. There are approximately 15.5 million opioid-dependent people worldwide (Degenhardt et al., 2014). In Canada, there are an estimated 321,000 to 914,000 non-prescribed PO users in

the general population and 72,000 consumers of non-prescribed POs and/or heroin among the street-drug using population (Popova, Patra, Mohapatra, Fischer, & Rehm, 2009). Non-prescribed POs are increasingly the most commonly injected drug in most parts of the country (Fischer & Rehm, 2007; Fischer, Patra, Firestone-Cruz, Gittins, & Rehm, 2008).

While there are no national data on opioid overdose deaths, some provinces have surveillance statistics. In British Columbia, PO overdoses accounted for 438 deaths between 2005 and 2010 (Chief Coroner, 2013). Between 2005 and 2009, there were 152 opioid-related deaths in Québec, making opioids the most common substance involved in all medication and drug overdose deaths during that period (41% of total drug-related deaths). Of those 152 deaths, 91% involved POs and 9% involved heroin (Gagné et al., 2013). In Ontario, a total of 3406 opioid-related deaths occurred between 1991 and 2004, during which time the rate doubled (Fischer, Jones, & Rehm, 2013).

It is noteworthy that among the deaths in Ontario, the majority occurred in individuals who had sought medical care for pain or who had received a mental health diagnosis within the four weeks prior their deaths. Similarly, a study conducted in Victoria and Toronto showed that most opioid users were introduced to the substance via a legitimate personal prescription (Fischer et al., 2009). It is often difficult to draw clear distinctions between medical and non-medical uses. A sizeable portion of those who use opioids without a prescription nevertheless do so to manage various forms of pain, and overdose can occur among those who hold a prescription as well (Zacny & Lichtor, 2008; Colliver & Gfroerer, 2008).

¹ Terminology is imperfect: in this document we refer to opioid drugs (both legally made and counterfeited) as *pharmaceutical opioids*. When such drugs are used by an individual in doses as prescribed by a physician, we refer to that as *prescribed use*; when they are consumed not as prescribed, either through non-prescribed doses or consumption modes, or by someone who was not prescribed the drug, we refer to that as *non-prescribed use*. For data that count the two forms of use together, we use the term *opioid-related*. However, sometimes these lines are blurry and can be difficult to distinguish.



Of those who do not hold a prescription, a variety of avenues are used to access opioids. In a study of Toronto opioid users, 37% reported receiving opioids solely from physician prescriptions, 26% from both a prescription and street dealings, and 21% from the street only (Sproule, Brands, Li, & Catz-Biro, 2009). Common PO sourcing tactics include diverting opioids from medical sources (known as ‘doctor-shopping’, ‘double doctoring’ or ‘over-scripting’), committing theft and robbery, using Internet sources, and buying from traditional drug dealers (Fischer et al., 2008; Fischer et al., 2009). Due to their ubiquity, however, many people can obtain POs, with or without express permission, from family, friends and acquaintances who do hold prescriptions. A study of youth in grades 7-12 in Ontario found that 14% had used POs non-medically at least once in the past year, coming in third only behind alcohol (55%) and cannabis (22%). Most (67%) obtained the opioids from someone within the home (Paglia-Boak, Adlaf, & Mann, 2011).

COMMON MORBIDITIES OF NON-FATAL OVERDOSES

The result of an overdose is not always death, but non-fatal overdoses deprive the brain of oxygen for extended periods of time. This can lead to potentially serious health consequences:

- Pulmonary conditions such as oedema and pneumonia (Duberstein & Kaufman, 1971);
- Cardiac complications such as arrhythmia and haemoglobinaemia (Ghuran & Nolan, 2000);
- Muscular problems such as rhabdomyolysis (Crowe, Howse, Bell, & Henry, 2000);
- Neurological disorders and cognitive impairment (Darke, Sims, McDonald, & Wickes, 2000).

OVERDOSE RISK AND PROTECTIVE FACTORS

“We need new medications for opioid addiction, and we need new medications for the treatment of pain that have less adverse affects and are less likely to be diverted” - Dr. Nora Volkow, Director, US National Institute on Drug Abuse (Summit on Heroin and Prescription Drugs: Federal, State, and Community Responses, June 19, 2014, Washington, DC).

Opioid overdose occurs when the brain’s opioid receptors become saturated with the amount of drug in the body, which causes respiratory depression (difficulty breathing). This is a complex phenomenon with biological, social and situational risk and protective factors. A recent systematic review of 47 studies (King, Fraser, Boikos, Richardson, &

Harper, 2014) has identified a number of intertwined factors associated with increased opioid mortality, grouped into three major themes, which are listed here alongside other factors found in additional literature:

Prescriber behaviour

- Higher-volume prescribing: Consumption of prescribed opioids in Canada doubled between 2000 and 2010 (Fischer & Argento, 2012; Kolodny et al., 2015);
- Dosage: Prescribed doses have also increased, and there is evidence of a dose-response relationship between daily prescribed dose and the risk of overdose, with significant risk increase at doses ranging from 40 to 200 mg/day (morphine equivalent), especially at >100mg/day (Bohnert, 2011; Dunn et al., 2010; Gomes, Mamdani, Dhalla, Paterson, & Juurlink, 2011; Gomes, Mamdani, Paterson, Dhalla, & Juurlink, 2014).

User behaviour, characteristics and history

- Behaviour: Polydrug use, especially mixing opioids with benzodiazepines or alcohol; diversion of pharmaceutical opioids to people for whom it was not prescribed, regardless of motive; and doctor/pharmacy shopping: visiting multiple sources to obtain prescriptions are behaviours that are related to opioid overdose (King et al., 2014);
- Characteristics: In general, opioid overdose is higher among white, middle-aged men of lower socioeconomic status in rural areas, but there is also considerable variety amid such patterns depending on time, place, and specific opioid (King et al., 2014);
- History : A history of substance abuse and/or experimentation with prescribed opioids, injecting frequently and/or alone and/or in public increases the risk of opioid-related overdose (Brugal et al., 2002; Fischer et al., 2004; Toronto Public Health, 2012); and having previously experienced a non-fatal overdose also is a factor (Kinner et al., 2012).

Situational, environmental, and systemic determinants

- Guidelines and policies endorsing the expansion of opioid prescription for chronic noncancer pain treatment (King et al., 2014);

- Living in areas of high income inequality and/or with high poverty rates (King et al., 2014);
- Being less educated and/or unemployed (Albert et al., 2011);
- Having been released from prison or detox (Binswanger et al., 2012; Clausen, Anchesen, & Wall, 2008; Wines et al., 2007; Zlodre & Fazel, 2012)
- Working in physical labour and injury-prone jobs (Paulozzi et al., 2012);
- Inadequate housing (Fischer et al., 2005; Pauly, Reist, Belle-Isle, & Schactman, 2013; Shannon, Ishida, Lai, & Tyndall, 2006).

Some suggested protective factors include:

- *Social Characteristics* such as having strong social and socioeconomic support (Binswanger et al., 2012; Williams & Latkin, 2007);
- *Medical Interventions* such as methadone maintenance treatment (Degenhardt et al., 2014), buprenorphine treatment (Bell, Trinh, Butler, Randall, & Rubin, 2009) and buprenorphine/naloxone treatment (Fudula et al., 2003);
- *Health Service Interventions* such as prescription drug monitoring programs (Mello et al., 2013), educating physicians on opioid risk, monitoring opioid patients, and prescribing alternative pain management methods (Kahan, Wilson, Mailis-Gagnon, & Srivastava, 2011), and identifying and dealing with problematic interactions between the pharmaceutical industry and medical training (Persaud, 2013);
- *Preventive Interventions* such as preventing or diverting users away from injection as the mode of consumption (Degenhardt et al., 2011), low-barrier housing (Havinga et al., 2014) and other low-threshold services (Marshall, Milloy, Wood, Montaner, & Kerr, 2011), and naloxone programming (Clark, Wilder, & Winstanley, 2014).

As these risk and protective factors illustrate, opioid use is an extremely complex matter. As such, many avenues can be taken to address its detrimental effects. Some of these avenues are long-term, large-scale projects. They entail cultivating collaborative and intersectoral strategies to address deep, systemic issues such as poverty and social marginalization, institutional norms such as medical protocols and prescribing practices, or market forces such as the pharmaceutical industry. On the other hand, and ideally in tandem with these larger

projects, one can work on a smaller scale to reduce mortality and morbidity through local harm-reduction programs that can be rolled out to suit specific populations. The next section focuses on one such harm reduction approach – naloxone programs – in more detail.

Overdose prevention with education & naloxone distribution

Naloxone, commonly known in Canada by its trade name Narcan®, is an opioid antagonist that can be administered to reverse the physiological effects of opioids. Overdose-related deaths occur through a variety of mechanisms. High doses of opioids may saturate the brain's opioid receptors, causing respiratory depression (difficulty breathing). When opioids are taken with other prescribed or illegal drugs, or with alcohol, they may lead to life-threatening respiratory, neurological, or cardiac abnormalities. These effects may be more severe in people with other underlying health conditions. Naloxone is fast-acting and works by displacing opioids from their receptors and thereby reversing the physiological effects of opioids for about 45 minutes.

Naloxone programs are usually run by health departments and/or not-for-profit groups through hospitals, clinics, pharmacies, prisons, community offices, needle exchanges, or emergency services. They typically consist of training people who use opioids (and their friends and families who may be witnesses to overdoses) about high-risk drug use and ways to reduce risky behaviours (such as by never consuming alone), the signs and symptoms of an overdose, and first response measures including the proper administration of naloxone.

A number of reviews and policy analyses have attested to the safety and efficacy of naloxone programs for decreasing overdose mortalities, which presumably also indicates reductions in overdose-related morbidities. Many call for the expansion of such initiatives, including the Government of Canada, the World Health Organization (WHO), and the United Nations (Ambrose, 2014; Clark et al., 2014; Green, Heimer, & Grau, 2008; Kim, Irwin, & Khoshnood, 2009; Mello et al., 2013; Wheeler, Davidson, Jones, & Irwin, 2012; United Nations Commission on Narcotic Drugs, 2012; WHO, 2014). Such programs exist in many parts of the world, including the USA, the UK, parts of Europe and

Central Asia. Naloxone is fast-acting, has minimal side effects, has no pharmacological or adverse effects in the absence of exogenous opioids, and therefore has no potential problematic use and will not aggravate symptoms if mistakenly given to someone who is not overdosing on an opioid (Baca & Grant, 2005; Maxwell, Bigg, Stanczykiewicz, & Carlberg-Racich, 2006).

Depending on the level of participation in opioid-using populations, the incidence and gravity of the adverse consequences of overdose can be significantly reduced in a cost-effective manner. Early research suggested that peer naloxone programs could reduce opioid overdose deaths by two-thirds (Strang et al., 1999). A recent statistical modelling study (Coffin & Sullivan, 2013a) found that 6.5% of overdose deaths could be prevented for every 20% of opioid-users reached by a naloxone program, amounting to a number needed to treat (number of kits that must be distributed to prevent one overdose) of 164. Using more and less conservative estimates, the model produced a range of number needed to treat of 1:227 to 1:36, corresponding to a lifetime reduction in overdose deaths of 6% to 31%. This model produced an estimated cost per QALY gained (quality-adjusted life year saved) of \$438 USD. The financial cut-off considered 'cost-effective' is typically \$50,000. In a similar study, (Coffin & Sullivan, 2013b) the same authors found that were the program launched in Russia, where rates of injection drug use are very high, reaching 20% of heroin users could reduce overdose deaths by 13.4% in the first 5 years and 7.6% over a lifetime. The need to treat was only 1:89, and the cost per QALY gained was \$94 USD. The cost of naloxone programs, in the most pragmatic terms, can also be contrasted to the time, resources and personnel required of the health care system to intervene on and treat those who experience non-fatal overdoses.

Outside of statistical models, some programs have released data regarding their recorded uptake and overdose reversal successes. These numbers are promising, especially considering that additional overdoses may have been averted by clients who did not return to the site to refill their prescription, and thus may be missing from surveillance data:

- A seven-year review of 19 nasal naloxone programs in Massachusetts found a reduction in overdose deaths in those cities that implemented such programs versus those that did not.

Depending on whether enrolment was low (1-100 participants) or high (>100) overdose rates were reduced by 25% to 50% (Walley et al., 2013);

- A study of an overdose prevention program in Pennsylvania followed 426 participants; 89 individuals administered naloxone in 249 overdose episodes, reversing 96% of those (Bennett, Bell, Tomedi, Hulseley, & Kral, 2011);
- A program in San Francisco trained 1,942 individuals in naloxone administration. Of those, 24% returned to receive a naloxone refill, and 11% reported using naloxone during an overdose event. Of 399 overdose events where naloxone was used, participants reported that 89% were reversed (Enteen et al., 2010);
- Since January 2001 the Chicago Recovery Alliance has distributed more than 3,500 naloxone doses and received 319 reports of peer reversals. This is reflected in the county's rate of heroin overdoses, which steadily increased between 1991 and 2001 until a reverse in the trend was marked by a 20% decrease in 2001 and a 10% decrease in each of 2002 and 2003 (Maxwell et al., 2006);
- In 2005, 122 injection drug users in New York City were trained in overdose prevention and given a naloxone prescription. A review found naloxone was administered 82 times; 68 (83%) persons who had naloxone administered to them lived, and the outcomes of 14 (17%) overdoses were unknown. Ninety-seven of 118 participants (82.2%) said they felt comfortable to very comfortable using naloxone if indicated; 94 of 109 (86.2%) said they would want naloxone administered if overdosing (Piper et al., 2008);
- A comprehensive overdose prevention program in North Carolina, which included naloxone distribution among other interventions, saw the rate of overdose deaths decline from 46.6/100 000 to 29/100 000 in just one year (Albert et al., 2011).

Less research has been conducted on the few existing Canadian programs, but preliminary data show promising results:

- Since 2005, Street Works, in Edmonton Alberta, has trained 150 individuals in artificial respiration and naloxone administration, which led to nine recorded overdose reversals (Canadian AIDS Treatment Information Exchange [CATIE], 2010; Dong et al., 2012);

- The British Columbia initiative, Toward the Heart, began in 2012 and its Naloxone program, Take Home Naloxone has been named a leading public health practice by Accreditation Canada (Accreditation Canada, 2015). There are now 51 sites offering services through the program. Outside of Vancouver, over 1318 people have been trained in overdose prevention, recognition and response, 836 naloxone kits have been distributed, and 85 overdose reversals have been documented (Banjo et al., 2014). In Vancouver, the Take Home Naloxone program has trained 2000 people, has distributed 960 kits and documented 106 overdose reversals in 20 months of existence (Paré, 2014);
- Toronto's program, POINT, was launched in 2011 and has distributed 900 kits with a reported 115 overdose reversals (Eggertson, 2013).

Take-home naloxone programs are being developed in other municipalities and provinces, with outcome data as of yet unreported.

UNANTICIPATED EFFECTS

Studies of naloxone programs have determined a few unanticipated effects, both positive and negative.

- Participants in overdose prevention training have reported an improved sense of efficacy, self-determination, competency, and increased health consciousness (Maxwell et al., 2006; Sherman et al., 2008; Wagner et al., 2014)
- Some participants have reported decreased drug use following prevention training (Maxwell et al., 2006; Seal et al., 2005; Wagner et al., 2010).
- Some programs have reported that people who administer naloxone are less likely to contact Emergency Medical Services. Those who administer naloxone feel that overdose victims seem to be recovered after naloxone treatment, and/or they fear calling EMS and risking arrest (Davidson et al., 2002; Enteen et al., 2010; Tobin, Davey, & Latkin, 2005). This underscores the

need to establish cooperative relations with police and to develop and implement Good Samaritan policies, a position supported by the Minister of Health Rona Ambrose in response to the Standing Committee on Health's report entitled *Government's Role in Addressing Prescription Drug Abuse* (Ambrose, 2014).

- Participants' lessened drug use and/or feeling burdened by the stress of responding to overdoses can result in a network of people who use drugs losing some of its overall capacity to respond to overdoses because trained participants may socialize less with people who are high-risk for an overdose and thus be more likely to use drugs alone. As such, they may not be revived by a trained responder, and/or not be present to witness and respond to overdoses in others. This can be addressed by incorporating, formally or informally, a venue for psychosocial support of trainees; by including training on how to effectively communicate overdose risks within peer groups; and by expanding the scope of training to buffer against the loss of some trained individuals over time (Wagner et al., 2010).

Conclusion

Opioid use in Canada is elevated and increasing. It seems relevant to expand the reach of those interventions that show promising results. Overdose prevention programs using naloxone have shown themselves to be a cost-effective way to increase risk awareness and save lives. Naloxone is a safe and harmless substance and existing programs show few if any negative effects. These programs empower people who use opioids to be able to respond effectively in an emergency, reducing the chance of an overdose resulting in long-term disability or death. This can improve people's quality of life and can ultimately reduce the number of needless mortalities and morbidities due to opioid use.

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Author: Valerie Webber, National Collaborating Centre for Healthy Public Policy

With the collaboration of: François Gagnon, National Collaborating Centre for Healthy Public Policy

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