ACCH Report:

A Report on the Effectiveness of the Community-Based Take Home Naloxone Program

Contents

Abbreviations:

ACCH = Alberta Community Council on HIV
ACCHN = Alberta Community Council on HIV take-home naloxone program
AHS = Alberta Health Services
BC = British Columbia
CBA = Cost Benefit Analysis
CBO = Community-Based Organizations
CBTHN = Community-Based Take-Home Naloxone Program
CIHI = Canadian Institute for Health Information
ED = Emergency Department
EMS = Emergency Medical Services
NPV = Net Present Value
OAT = Opioid Agonist Therapy
OUD = Opioid Use Disorder
OPS = Overdose Prevention Site
SCS = Supervised Consumption Sites
TBC = Treasury Board of Canada
THN = Take-Home Naloxone Program
WHO = World Health Organization

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Definitions

Apparent Opioid Overdose/Drug Poisoning
In Opioid Surveillance Reporting, Alberta Health defines overdose as a "drug poisoning event requiring intervention including, but not limited to, the provision of oxygen, administration of naloxone, and/or requesting medical attendance." Apparent opioid overdose and drug poisoning are interchangeable.

Reversal
A reversal occurs when a person uses a naloxone kit to reverse an apparent opioid overdose, improving breathing and consciousness. Reversals are self-reported to naloxone staff when they return for replacement kits. People who used naloxone kits are also encouraged to complete the AHS *Naloxone Kit Usage Survey*.

Naloxone Training
There are three types of naloxone training provided by ACCHN funded projects:
(a) staff training – number of staff trained in the naloxone module
(b) community training – number of people who receive naloxone training, but did not receive a kit
(c) candidate training – number of people given a kit and trained to administer naloxone

Naloxone training aligns with AHS approved naloxone training modules and resources. For more information about training content, please see https://www.albertahealthservices.ca/info/page13663.aspx.

Internal Referral
An internal referral is when naloxone staff (nurse and outreach workers), involved in a one-on-one interaction with a client, refers the client to one of the in-house services and programs. Examples of internal referrals offered by naloxone staff include HIV and Hepatitis C programs, pregnancy programs, and housing supports.

External Referral
An external referral occurs when naloxone staff (nurse and outreach workers), involved in a one-on-one interaction with a client, suggest an external service, program, or healthcare professional (e.g., physician). Examples of external referrals offered by naloxone staff include STBBI testing, primary care, social services, and addiction/treatment services.

Executive Summary

The Alberta Community Council on HIV (ACCH) Take Home Naloxone project is a cost-effective delivery of naloxone kits with minimal overhead, and numerous benefits that reduce health care spending. Delivered as a simplified, cost effective project, ACCHN provides kit distribution, training, and the performance of basic nursing skills that divert cases from the health care services and prevent the escalation of treatable medical concerns. Finally, the structure of the ACCH project ensures a community of support and collaboration to smooth out delivery in all sites, ensuring the investment in this project is applied to service provision completely.

Alberta is currently experiencing a preventable opioid overdose and death crisis. 2,397 people have died from opioid-related poisoning in Alberta since 2016. The surge of fentanyl in the illicit drug supply caused most of these deaths.

Despite these grim facts, opioid poisoning is reversible using a naloxone kit. Beginning in April 2015, the Alberta Community Council on HIV (ACCH) started administering the Community-Based Take Home Naloxone (CBTHN) program. The program included the purchase and assembly of 3500 kits. CBTHN was funded by Alberta Health to implement naloxone programs at seven community-based organizations, including:

- ARCHES in Lethbridge
- HIV Community Link in Medicine Hat
- Options (formally HIV West Yellowhead) in Edson
- Northreach (formally HIV North) in Grande Prairie and Fort McMurray
- Safeworks in Calgary
- Streetworks in Edmonton
- Turning Point in Red Deer

Alberta Health Services (AHS) started the Take-Home Naloxone (THN) provincial program in August 2016, focused on the distribution of free naloxone kits to registered sites. The CBTHN sites began accessing AHS provided naloxone kits in August 2016 because the ACCH purchased kits had all been distributed by that point. In November 2017, the community program was re-named the Alberta Community Council on HIV Take-Home Naloxone project (ACCHN) and expanded to provide a full-time nurse and outreach worker at each participating site.

Community-based naloxone programming has had a hugely positive impact on improving the health and safety of people who use drugs. ACCHN supports all Albertans' access to training, naloxone kits, and professional staff.

Evidence from five-years of the ACCHN program demonstrates its efficiency and impact on Albertans health, with highlights including:

- 78,533 naloxone kits distributed from April 2015 to December 2019
    - Seven ACCHN agencies distribute 36% of all THN program kits through outreach and Supervised Consumptions Sites (2,160 registered naloxone sites in Alberta)
- 9,251 overdose reversals from naloxone kit use, saving an estimated 925 lives
- 72,208 Albertans provided naloxone and opioid awareness training, and over 400 organizational partnerships established
- Survey results (N = 464) show a 40% increase in knowledge after training
- ACCHN reach Albertans at the highest risk of opioid overdose
- THN is a highly cost-effective program, with one study finding a $2,742 saved by deaths avoided for every dollar spent (Naumann et al., 2019)

Section 1:
Take-Home Naloxone Programs: A review of the evidence

A. A deadly change in the illicit drug supply: fentanyl-related deaths have skyrocketed

As part of Alberta's opioid response, the government has released quarterly surveillance reports since 2016.[1] From January 2016 to September 2019, a total of 2,397 people in Alberta died of opioid-related poisoning.

When surveillance reports first started tracking the proportion of fentanyl and non-fentanyl in opioid deaths in Q1 2016, they found a nearly even split: 56% for fentanyl and 44% for non-fentanyl opioids. That has dramatically changed over the last three years: the most recent data from Q3 2019 shows that 86% of opioid deaths are now fentanyl-related (Alberta Health, 2019a). Since Q3 2017, fentanyl was responsible for more than 80% of all opioid deaths. Alberta Health's coroner's report, Opioid-related deaths in Alberta in 2017: Review of medical examiner data, provides further details about the source of drugs in 647 deaths (Alberta Health, 2019b). A total of 527 opioid-related deaths (81%) involved illicit street drugs as a cause or contributing factor in the death. Most of the time (74%, N = 478), illicit substances were the only drug source listed as a cause of death. In another 49 deaths (8%), illicit street drugs were a contributing factor mixed with prescription opioids. Prescription drugs contributed or caused death in 26% of cases (N = 169), with 14% involving a valid opioid prescription and the other 12% from diverted prescriptions.

A comprehensive review of fentanyl's impact on the overdose crisis by the RAND Corporation concluded that the surge in fentanyl deaths is related to illicit *supply-side* changes, finding that "synthetic opioids drive up deaths rather than the number of users" (Pardo et al., 2019: 142). The rise of synthetic opioids, like fentanyl and carfentanil, is primarily due to changes in the production and distribution of illicit drugs. Synthetic opioids are ideal for large-scale drug cartels because of their smaller size, rise of e-commerce, and simplified production methods (e.g., laboratory rather than agricultural production). These external forces in illicit drug production and distribution have put people who use drugs at extreme risk, as consumers and street-level dealers have no idea what is in their drugs.

Illicit opioids are not the only source of fentanyl. Health Canada's Drug Analysis Services has confirmed that fentanyl is showing up in non-opioid samples, such as methamphetamines and cocaine (Belzak and Halverson, 2018). However, the scale of fentanyl in non-opioid substances is unknown.

Surveillance data from Alberta shows that (a) most opioid overdoses are from fentanyl; (b) most opioid deaths involve illicit drugs; (c) and an unknown amount of fentanyl is present in non-

[1] Alberta's Opioid Surveillance Reports can be found here: https://www.alberta.ca/opioid-reports.aspx.

opioid substances. The risks have rapidly escalated for people who use illegal drugs, resulting in an overdose death crisis.

> ***World Health Organization***:
> "Increased access to naloxone for people likely to witness an overdose could significantly reduce the high numbers of opioid overdose deaths"
> WHO, 2014

B. Take-Home Naloxone Programs: A review of the evidence

Opioid use can slow a person's breathing and cause drug poisoning (i.e., overdose death). Naloxone administration reverses the effects of opioid poisoning and assists a person to breathe and regain consciousnesses. Opioid overdose is reversable with naloxone, but until recently in Alberta, access was limited by policy and resources.

In November 2014, the World Health Organization (WHO) released its Community Management of Opioid Overdose guidelines to reduce opioid-related deaths globally through low barrier naloxone kit access (World Health Organization, 2014). A central tenant of the guidance states that "increased access to naloxone for people likely to witness an overdose could significantly reduce the high numbers of opioid overdose deaths" (World Health Organization, 2014: ix). THN is highly feasible for widespread adoption within communities at risk.

According to the WHO review, people at the highest overdose risk have an opioid dependency and recently had a reduction in their drug tolerance, as a period of abstinence significantly increases risk. Reduction of drug tolerance is especially risky the first few weeks after release from incarceration and discharge from in-patient or residential detox. As British Columbia's (B.C.) clinical guidelines on Opioid Use Disorder (OUD) state,

> Withdrawal management alone (i.e., detoxification without immediate transition to long-term addiction treatment) is not recommended, since this approach has been associated with elevated rates of relapse, HIV infection and overdose death (British Columbia Centre on Substance Use, 2017).

The WHO review found that most opioid overdoses occur in private residences and are observed by people close to the person who uses drugs. Data from Alberta shows that people who use drugs alone are at high risk of dying. According to the 2017 Alberta medical examiner's review of opioid deaths (Alberta Health, 2019b), the majority of fatal overdoses occurred in a private residence (80%). Training bystanders who are likely to witness an overdose and encouraging those people to carry naloxone kits can significantly reduce the opioid death rate. The other key group of individuals expected to witness overdoses are health professionals and first responders such as ambulance, police, fire departments, drug treatment workers, and outreach workers.

Naloxone has been effectively used to manage opioid overdoses for over 40 years, and during that time, minimal adverse effects documented. Naloxone itself carries no potential for abuse (Jasinski, Martin, and Haertzen, 1967). However, high doses may lead to immediate and unpleasant opioid withdrawal symptoms such as vomiting, muscle cramps, and agitation. Learning to recognize those signs and manage people after reversing their overdose is part of naloxone training.

C. Dispelling Myths About Take-Home Naloxone

Unfortunately, myths and false narratives about take-home naloxone could reduce public acceptance of this life-saving program. Myths persist despite evidence from peer-review publications and the experience of programming across the globe.

As part of naloxone training and outreach activity, our ACCHN program sites continue to hear these eight myths about naloxone, and so it is worth refuting them here:

1. *Myth*: Naloxone encourages people to increase their drug use
   Fact: Naloxone does *not* increase drug use (Jones et al., 2017), and when it's integrated into a broader training and support program may decrease drug use (Wagner et al., 2010). People carry naloxone so they can breathe, not so they can use more drugs.

2. *Myth*: Naloxone is a drug of abuse
   Fact: People use naloxone to reverse overdoses. Naloxone is a rapid opioid antagonist, which means that high doses may lead to unpleasant and immediate opioid withdrawal symptoms such as vomiting, muscle cramps, and agitation. Naloxone has no potential for abuse. Scientists have known this fact since the 1960s (Jasinski, Martin, and Haertzen, 1967).

3. *Myth*: People are "yo-yoing" naloxone alongside opioids to improve the high
   Fact: This is an urban myth and misunderstanding of the science (Crabtree and Masuda, 2019). Naloxone blocks a user's opioid receptors, eliminating the euphoria of use and sometimes causing immediate painful withdrawal symptoms, making yo-yoing (or mixing with opioids) nonsensical.

4. *Myth*: People attend “naloxone parties” to intentionally overdose and revive themselves
   Fact: Naloxone parties are an urban myth invented by a few law enforcement personnel and first responders reporting unverified rumours to the media (Crabtree and Masuda, 2019). We have not found a single verified case of a “naloxone party,” and at the time of publication, no witness has come forward on record claiming to have direct first-hand knowledge of such an event.

5. *Myth*: Naloxone makes people violent
   Fact: A common side effect of naloxone is confusion (Buajordet et al., 2004). It is rare for someone to wake up and become aggressive – typically, the context exacerbates the situation (e.g., police officer trying to arrest someone recovering from an overdose). Naloxone training teaches de-escalation skills and responses to support people after naloxone administration.

6. *Myth*: Naloxone prevents people from seeking treatment
   Fact: Naloxone keeps people alive – dead people cannot get treatment. According to OUD treatment guidelines, naloxone kits are an essential tool in the recovery process (British Columbia Centre on Substance Use, 2017). Naloxone kit distribution *increases* the opportunity of someone seeking treatment by keeping people alive and providing a contact point with peers and healthcare staff. Studies show that naloxone kits do not prevent people from seeking treatment (Bazazi et al., 2010). Providing a naloxone kit to someone at risk, even if they have overdosed multiple times (e.g., ten overdoses), shows their life matters. Letting someone reach the so-called “rock bottom” or limiting the number of chances someone may access naloxone kits, especially with deadly fentanyl in the drug supply, is highly dangerous, unethical, and violates professional obligations.

7. *Myth*: Only medical professionals can deliver naloxone and diagnose an overdose
   Fact: Community naloxone training is effective, and people retain knowledge (Dietze et al., 2018). Studies show that, when properly implemented, THN training is a highly effective public health intervention that prevents death (Strang et al., 2019).

8. *Myth*: Academic studies of naloxone are funded by pharmaceutical companies to make money and fudge results
   Fact: Completely unfounded. All peer-reviewed academic studies declare who funded the research and conflicts of interest. Pharmaceutical companies produce and sell naloxone because it is a highly effective medication to prevent opioid poisoning, not because of a vast academic conspiracy.

We have over 40 years of experience and evidence that naloxone is highly effective in a healthcare setting. Across the globe, we have more than 20 years of data showing that THN programs prevent death and improve health outcomes in the community. A foundational objective of the ACCHN program is to ensure that all Albertans have access to up to date scientific evidence and best practices in delivering take-home naloxone.

Section 2:
ACCHN Naloxone Program History

Canada's first take-home naloxone kit distribution was started in 2005 by Streetworks in Edmonton. Health Canada provided funding for the program, but the following year funding was eliminated with a change of government and drug policy. It took a decade to get THN up and running again in Alberta.

As previously mentioned, in November 2014, the WHO recommended that countries adopt low barrier THN programs to reduce opioid-related deaths. Around this same time in Alberta, fentanyl was emerging as a notable cause of death: in 2014, 117 people died of fentanyl overdoses, and 2015 saw a 123% jump to 257 deaths (Alberta Health, 2016).

In response to this emerging crisis, seven organizations sprang to action and jointly formed the CBTHN program in April 2015, including:

- ARCHES in Lethbridge
- HIV Community Link in Medicine Hat
- Options (formally HIV West Yellowhead) in Edson
- Northreach (formally HIV North) in Grande Prairie and Fort McMurray
- Safeworks in Calgary
- Streetworks in Edmonton
- Turning Point in Red Deer

Alberta Health provided funding to the ACCH to administer the original grant. Individual kit contents were ordered and put together by hand by the ACCH. Funding supported a part-time (two days) nursing staff at each of the eight sites. The part-time nurse supported the development of naloxone kit instructions and training modules to support education. During those initial nine months (April to December 2015), 789 naloxone kits were distributed, and 51 reversals reported. A total of 3500 kits were distributed between April 2015 and August 2016.

The program expanded in August 2016. AHS formally started the THN provincial program at this time, implementing several crucial resources to scale-up of the program, such as:

- Sole source supplier contract with McKesson to support scale-up and quality assurance
- Access to free naloxone kits for Albertans who meet program criteria
- Registration of naloxone distribution sites, who can order naloxone kits free of charge
- Low barrier access – no name, I.D., health card, or address required
- Monthly reporting and program evaluation
- Further development of training and education resources
- Quarterly opioid surveillance reporting

Despite these essential program developments, naloxone was still a scheduled drug requiring a prescription. Some community agencies (especially in rural locations) struggled to find a naloxone prescriber for their clients to access the program. In March 2016, Health Canada amended its prescription rules for the use of naloxone during an emergency (opioid overdose crisis), allowing for its purchase and distribution without prescription. In February 2017, Alberta

descheduled naloxone for community use. This critical policy change meant that frontline staff no longer needed a prescription from a physician to distribute take-home naloxone kits in the community. As a result, the number of kits distributed, especially in rural settings increased significantly.

Another barrier to improving safety at the time was Canada's *Controlled Drugs and Substances Act*. It discouraged people from calling 911 out of fear of arrest and harassment from police. In May 2017, the federal government introduced the *Good Samaritan Drug Overdose Act*, which provides limited legal protections for people who call 911 after witnessing an overdose. The Act amended Section 4 of the *Controlled Drugs and Substances* by removing charges for illicit drugs and breach of conditions related to drug possession.

In November 2017, the community program was re-named ACCHN. Resources were expanded to provide a full-time nurse and outreach worker at each participating site to facilitate expanded kit distribution, community training, and support more integrated referral and health services for people accessing the program. Starting in November 2017, Supervised Consumption Sites (SCS) services also emerged as a critical access point for people to obtain kits.

The table below provides a timeline of the THN program in Alberta.

ACCH Table #1: Take-Home Naloxone Program Timeline

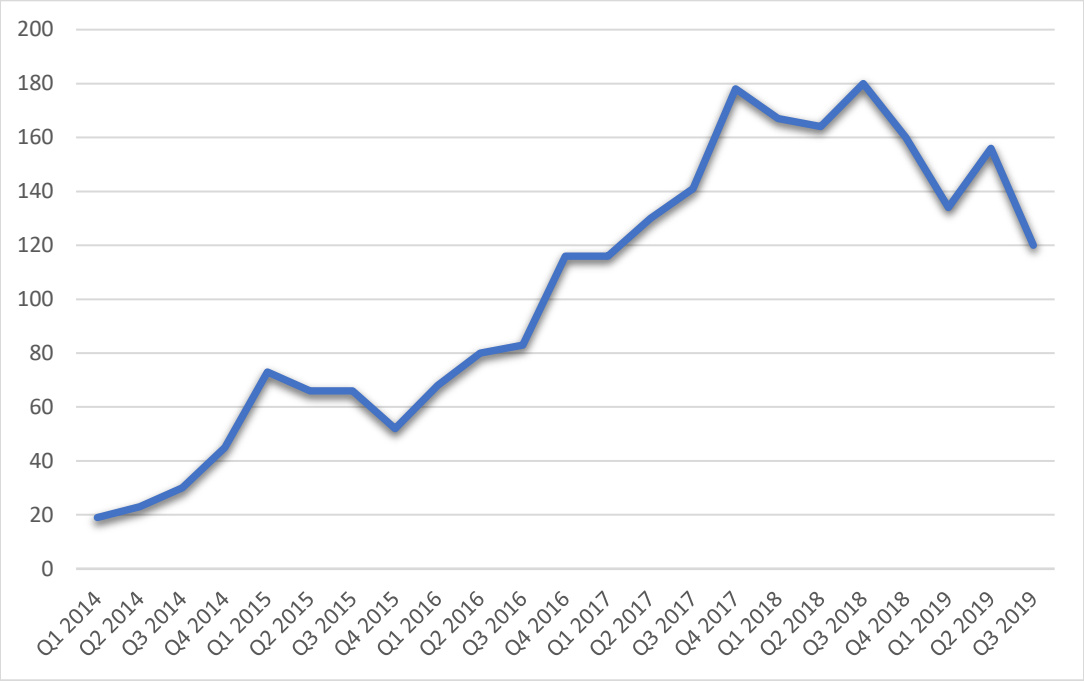
Date	Implementation
March 2005	Streetworks (Edmonton) begins distributing naloxone, the first program to do so in Canada.
November 2014	WHO recommends THN programs as a best practice opioid response.
April 2015 to October 2017	ACCH is funded through the CBHTN grant to make naloxone kits (until August 2016), with a part-time nurse at seven community agencies providing training and kit distribution.
August 2016	A sole source supplier contract is signed with McKesson to provide naloxone kits at scale for widespread distribution and quality assurance.
October 2016	Alberta starts publishing the Opioid Surveillance Death Report each quarter.
May 2017	*Good Samaritan Drug Overdose Act* amends drug possession law to protect people from arrest who call 911 during an overdose.
February 2017	Naloxone is descheduled in Alberta (no longer requires a prescription).
November 2017 – present	ACCHN grant supports a full-time nurse and outreach worker at seven community agencies to provide naloxone training and distribution.
November 2017 – various dates	SCS services integrate naloxone kit distribution in Edmonton, Calgary, Lethbridge, Grande Prairie, and Red Deer (OPS).

Section 3: Summary of Evidence

A. 78,533 Naloxone Kits Distributed by ACCHN Organizations

Opioid-related poisoning is the single greatest *preventable* crisis facing Alberta. According to the 2017 Alberta medical examiner's review of 647 opioid-related deaths, 82% (N = 527) of those deaths were caused or contributed to by illicit opioids (Alberta Health, 2019b). Fentanyl tainted illicit drugs now cause the majority of opioid deaths. A spike in fentanyl deaths occurred in 2015 and continued through to Q3 2018, but has started trending down since then:

ACCH Figure #1: Number of fentanyl deaths in Alberta per quarter

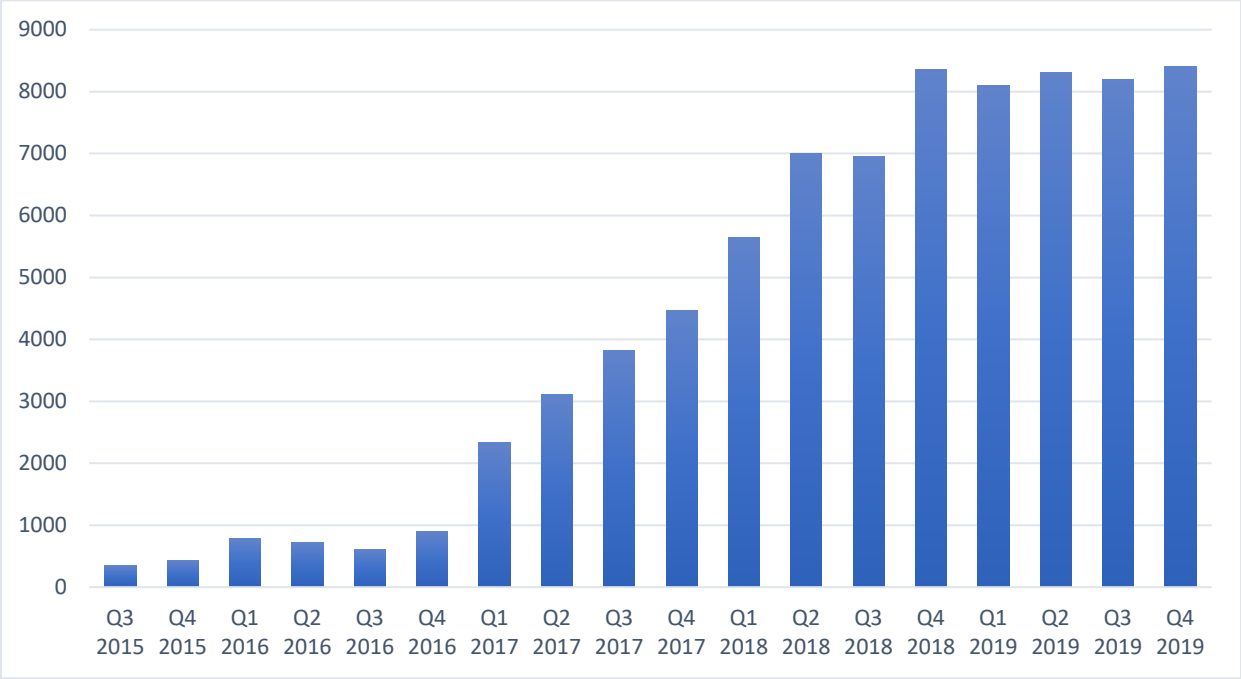


ACCH Figure, Source: Alberta Health, 2019a

Naloxone kits are critical to averting opioid overdose death and empowering people in their communities to save lives. Since starting the THN program in 2016, AHS has supported the rapid scale-up of the THN program with 2,135 registered distribution sites, including key stakeholders such as community pharmacies, emergency departments, addiction and mental health services, opioid dependency programs, detoxification and residential treatment programs, correctional facilities, health centres, and Indigenous sites. A total of 219,578 kits were distributed from January 2016 to December 2019 to Albertans through the THN program (Alberta Health, 2019a).

The seven community-based organizations play a central role in THN program growth, distributing **36% of all naloxone program kits** during this period.[2] By comparison, community pharmacies represent 57% (N = 1,224) of all registered sites in Alberta but distribute fewer overall kits (N = 66,227 kits). From April 2015 to December 2019, ACCHN community organizations distributed **78,533 naloxone kits** through outreach and SCS services.

ACCH Figure #2: Number of naloxone kits distributed by ACCHN agencies per quarter



ACCH Figure, source: ACCHN monthly reporting data and monthly SCS naloxone site reports

Three key factors likely explain the rapid increase in kit distribution to meet urgent demand.

First, the descheduling of naloxone in February 2017 had an immediate impact. Six months prior (Aug 2016 to Jan 2017), an average of 334 kits were going out per month; the six months following the policy change (March to August 2017) averaged 1,030 kits. Kits increased during this period, but also reached a natural limit, ranging between 900 to 1,100 kits in those six months.

[2] From January 2016 to December 2019, the seven sites distributed 78,533 kits through outreach and SCS/OPS locations.

Second, most kits have been distributed since November 2017, after the ACCHN grant added additional nursing hours (from two to five days a week) and outreach workers to each site. 83% of all kits were distributed during the ACCHN grant period. In the six months before that date (May to October 2017), an average of 1,151 kits were distributed per month; in the six months after (December 2017 to May 2018), kit distribution immediately jumped 65% with a monthly average of 1,902 kits.

The third increase since 2018 occurred during the implementation of SCS services, which opened up in Calgary (November 2017), Lethbridge (February 2018), Red Deer (October 2018), Grande Prairie (March 2019), and various times at three Edmonton sites (March 2018, November 2018, and March 2019). For a more detailed analysis of SCS, see the ACCH report: A community-based report on Alberta's SCS effectiveness (Alberta Community Council on HIV, 2019). A total of 19,662 kits were provided to clients between April 2018 to December 2019 through SCS services.[3]

Four organizations currently manage both SCS and naloxone programs: ARCHES (Lethbridge), Northreach (Grande Prairie), Safeworks (Calgary), and Turning Point (Red Deer). During a nine-month snapshot period (April to December 2019) at these four agencies, 53% (N = 9,358) of kits were distributed through the SCS/OPS and 47% (N = 8,401) through outreach. This data demonstrates that the crucial role that SCS services play in naloxone program implementation. A restriction or elimination in SCS services could have a significant negative impact on Alberta's THN program.

B. ACCHN agencies reported 9,251 naloxone reversals, saving an estimated 925 lives

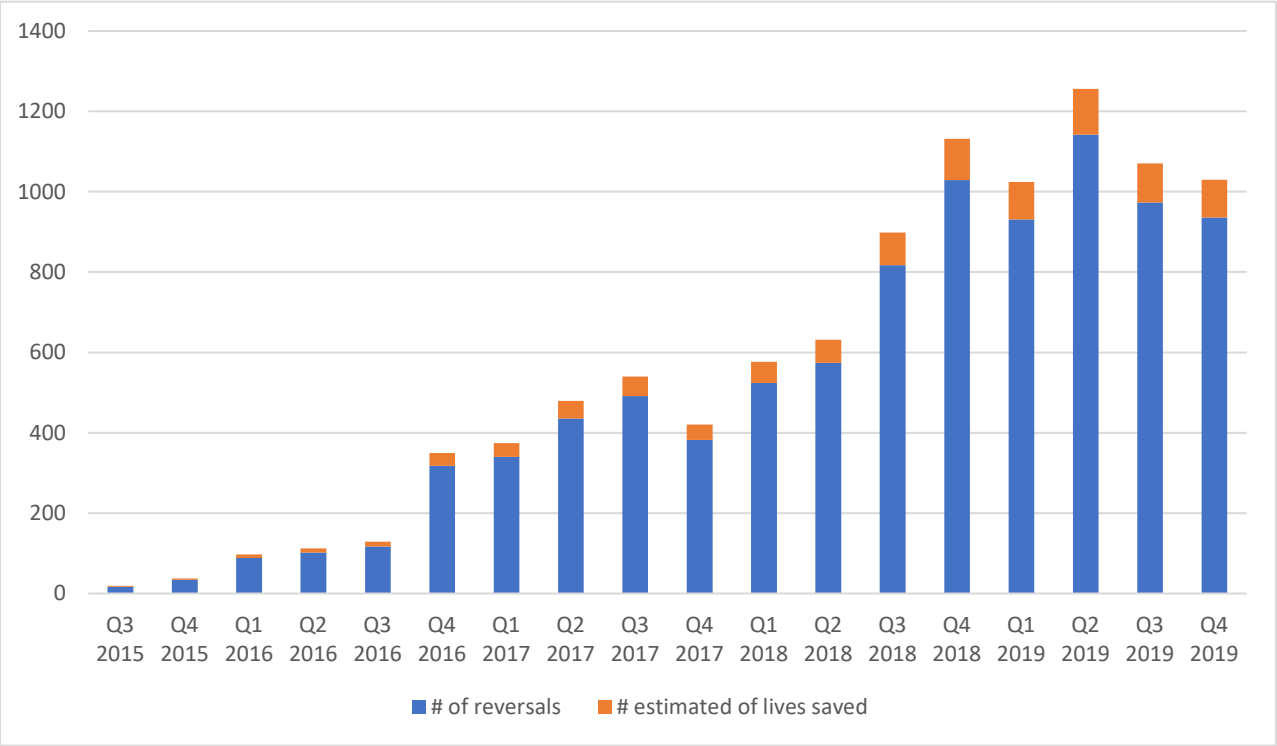
Naloxone kits save lives. How many lives did ACCHN agencies save? From June 2015 to December 2019, a total of **9,251 reversals from naloxone kit use** were reported by ACCHN sites, including through outreach and SCS distribution.

However, because not every reversed overdose event would likely cause death, we need a model to measure the impact of this intervention. A 2018 modeling study of British Columbia's THN program, found that for every ten naloxone kits used (reported reversal), an estimated one overdose death was averted (Irving et al., 2018). Using this analysis for the ACCHN program impact, an estimated **925 deaths were prevented** through the community-based naloxone program since it started in 2015.

The chart below shows the number of reversals and estimated lives saved:

[3] Data source is internal ACCHN monthly data and THN monthly data from SCS locations.

ACCH Figure #3: Number of overdose reversal and estimated lives saved by ACCHN sites



ACCH Figure, source: ACCHN monthly reporting data and monthly SCS naloxone site reports

The table below further breaks this data down into a zone level analysis, highlighting the regional patterns and impacts of the ACCHN program.

ACCH Table #2: ACCHN Naloxone Kit Data by AHS Zone: April 2015 to December 2019

AHS Zone	Naloxone Kits Distributed	Reversals Reported	Estimated Lives Saved
North Zone	14,243	855	86
Edmonton Zone	12,559	1,813	181
Calgary Zone	16,185	1,888	189
Central Zone	18,686	2,061	206
South Zone	16,860	2,634	263
TOTALS	**78,533**	**9,251**	**925**

ACCH Figure, source: ACCHN monthly reporting data and monthly SCS naloxone site reports

The ACCHN naloxone program is highly effective at averting opioid death in Alberta. On average over the program, for every 8.5 kits distributed (N = 78,533), there is one reported reversal (N = 9,251). Using the B.C. naloxone modeling estimates, for every 85 kits distributed, one death was prevented in Alberta.

C. Cost-Effectiveness of Take-Home Naloxone Programs

> "Naloxone distribution to [opioid] users for lay overdose reversal is highly likely to reduce overdose deaths in target communities and is robustly cost-effective"
> Coffin & Sullivan, 2013

Is the ACCHN take-home program effective at lowering the death rate? Is the program cost-effective?

To date, there is no published modeling study of Alberta's THN program. An investigation is currently underway, led by Dr. Elden Spackman from the University of Calgary (Health Economics), to assess the impact of the program and its cost-effectiveness using Alberta data.

However, until that more in-depth analysis is completed, a cost-benefit analysis of the ACCHN program data offers preliminary evidence that the program is highly effective (see *Appendix A: Cost-Benefit Analysis of Take-Home Naloxone*). The report found that the cost per kit, including shipping, is $33.87, plus the ACCHN program costs for the nurse and outreach worker at each site. The benefit, or money saved through the program intervention, includes a reduction in EMS calls and hospitalization.[4] In Alberta, a typical EMS response costs about $940 per event and hospitalization costs on average $7,900.[5] The report found that the net present value (NPV) for the program was positive, ranging in estimates from a net benefit of $442,704.20 to $6,931,318.44 depending on your data set. If every reversal report is considered one overdose death averted, the cost benefit ratio is 23.96 or 23.93 depending on the discount rate. When one estimates one overdose death averted for every ten reversals reported the cost benefit ratio is 2.61 regardless of which discount rate you utilize. Rates greater than one are considered a safe and cost-effective investment. These calculations show that ACCHN is highly cost-effective, due to the low operating costs (e.g., kit and staff) compared to the high costs avoided in the health care system (e.g., EMS and hospitalization).

Recent epidemiological modeling from B.C.'s THN program, which is similar to Alberta's implementation and opioid overdose profile, provides further evidence of THN program effectiveness. A modeling study led by Dr. Michael Irving, from B.C.'s Centre for Disease Control, has provided an important analysis of B.C.'s THN program (see Irving et al., 2019). Evidence from the B.C. program shows that the THN program has a significant impact on the reduction of opioid death. The interventions used in B.C. are the same as Alberta's response, including naloxone kits, supervised consumption sites, and opioid agonist therapy (OAT). During the study period (April 2016 to December 2017), 2,177 people in B.C. died of an opioid overdose. The combined interventions averted an estimated 3,030 deaths during those same 21

[4] Data from the reversal report forms found that ACCHN participants called 911 about 33% of the time after using a naloxone kit. Approximately 67% of the time people use ACCHN kits, the EMS and hospitalization costs are diverted.
[5] A limitation of this study is that the costs of an opioid specific response for EMS and hospitalization was not available. Estimated costs refer to average costs per event.

months, including take-home naloxone (1,580), overdose prevention sites (230), and opioid agonist therapy (590). The study concludes that without those interventions, an estimated 5,207 people would have died of opioids during that period, which is a 239% increase in opioid poisoning death.

Since hitting its peak in Q3 2018 with 180 fentanyl deaths in Alberta, the number of people dying is on the decline. In the most recent quarter (Q4 2019), 109 people died of fentanyl – the lowest number since Q3 2016. A total of 523 people died of fentanyl-related poisoning in 2019, compared to 668 in 2018, for a 27.7% year to year decline.

Data from Alberta is consistent with peer-reviewed studies that show THN programs are highly effective at reversing overdose events. A study of naloxone programs in 19 Massachusetts communities found that areas with higher training saw a 46% reduction in overdose deaths (Walley et al., 2013). A systematic review of 22 studies found that a fatal outcome was rare in THN programs, with one death reported for every 123 successful reversals (0.8%) (McDonald and Strang, 2016). Another meta-review of THN studies concluded that "administration by bystanders was associated with a significantly increased odds of recovery compared with no naloxone administration" (Giglio, Li, and DiMaggio, 2015).

Other jurisdictions report that take-home naloxone is a highly cost-effective intervention. Kit distribution and training is relatively affordable and has a direct impact on reducing overdose deaths and related healthcare costs such as hospitalization (Walley et al., 2013; Giglio, Li, and DiMaggio, 2015; Naumann et al., 2019). A systematic review of THN studies by McDonald and Strang (2016) concludes that "THN is cost-effective even under conservative circumstances, i.e., when the cost of naloxone increases and the rate of observed overdoses decreases" (1184).

Consider Naumann et al.'s (2019) study of THN cost savings from North Carolina's program. The study compared the mortality data before and after implementation of THN at the county level by tracking the impact of kit distribution on overdose rates. Naumann et al. found that 352 lives were saved over three years. For **every dollar spent on THN, an estimated $2,742 was saved**, concluding that the "program generated substantial societal benefits due to averted [overdoses]." In the case of ACCHN, the total savings in Canadian dollars would be $3,842.41 * $1,260,000 = $4,841,436,600. The ACCHN program is saving Albertan lives, and preliminary evidence from the ACCHN program and other THN programs, shows that it is a highly effective use of public funds.

D. 72,208 people provided naloxone training by ACCHN agencies

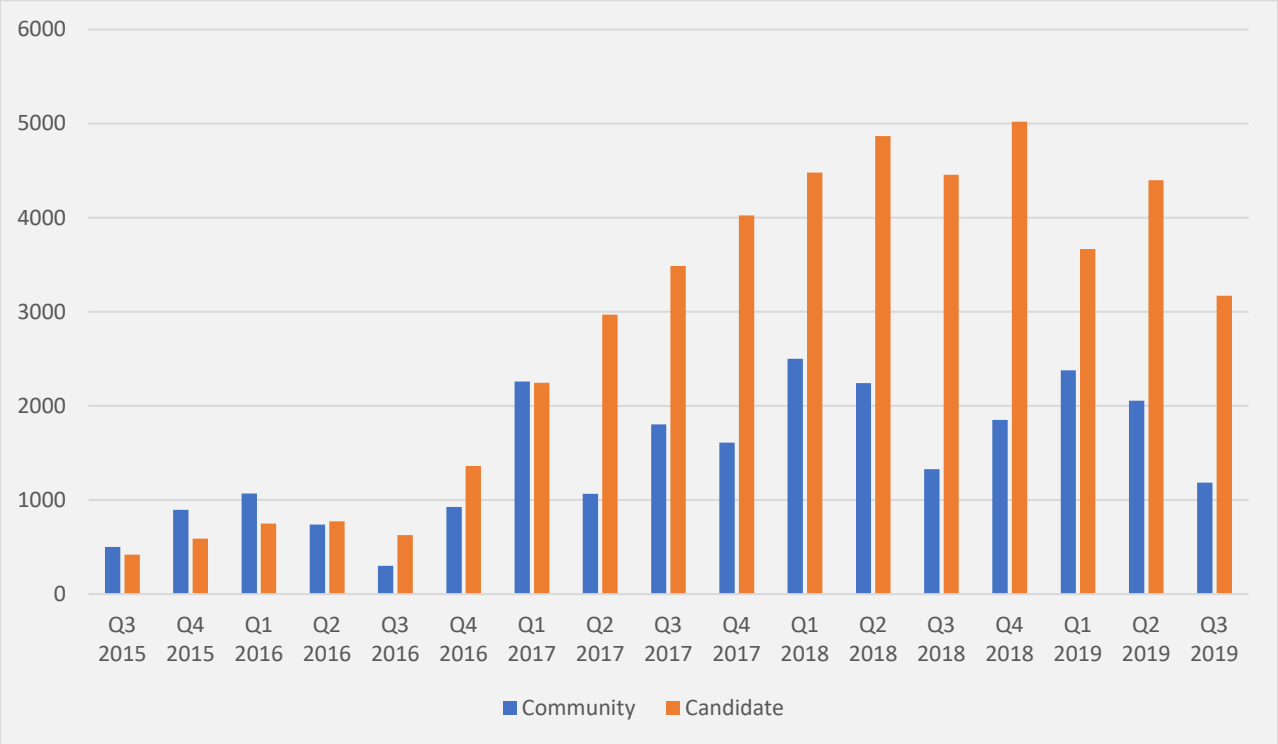
Since 2015, ACCHN agencies have made a significant push to improve awareness about opioids and how to use naloxone kits. A significant barrier to this training is stigma and discrimination. Still, through education and creating space for dialogue, the ACCHN naloxone trainers support families and communities in responding to this crisis.

From April 2015 to September 2019, **72,208 people were** trained in take-home naloxone knowledge and opioid use by ACCHN trainers. Of that total, 35% (N = 24,868) was for community training (opioid awareness and naloxone training), but no kit distributed. Most of the training, 65% (N = 47,340), was for people to learn how to administer naloxone safely and effectively (along with safe use, referral, and treatment information).

The ACCHN program has been highly effective in communicating appropriate knowledge. Results from 464 surveys from the pre/post naloxone training evaluation with each ACCHN agency show overwhelmingly positive results. Across six core knowledge areas, including preventing overdoses, fentanyl and opioids, signs of an opioid overdose, responding to an overdose, safety needles, and using and giving naloxone, people self-reported improvement in each area. On average, there was a 40% increase in reported knowledge compared to peoples' knowledge of naloxone before training (2.5/5) and after training (4.5/5).

During the same time, staff from Turning Point in Red Deer collected an additional 347 surveys using an eight-question true/false test to assess core knowledge. The results showed a significant improvement in outcomes (36%), from a score of 53% (4.3/8) before the training session and an impressive 89% (7.1/8) after the naloxone training.

ACCH Figure #4: Naloxone Training provided by ACCHN Agencies per Quarter: Community and Candidate Breakdown



ACCH Figure, source: ACCHN monthly reporting data

The chart below provides a zone level breakdown of naloxone training:

ACCH Table #4: ACCHN Naloxone Training Data

Zone	Community	Candidate
North	8403	5900
Edmonton	6153	10648
Central	5136	14481
Calgary	2428	8578
South	2748	7733
TOTALS	**24,868**	**47,340**

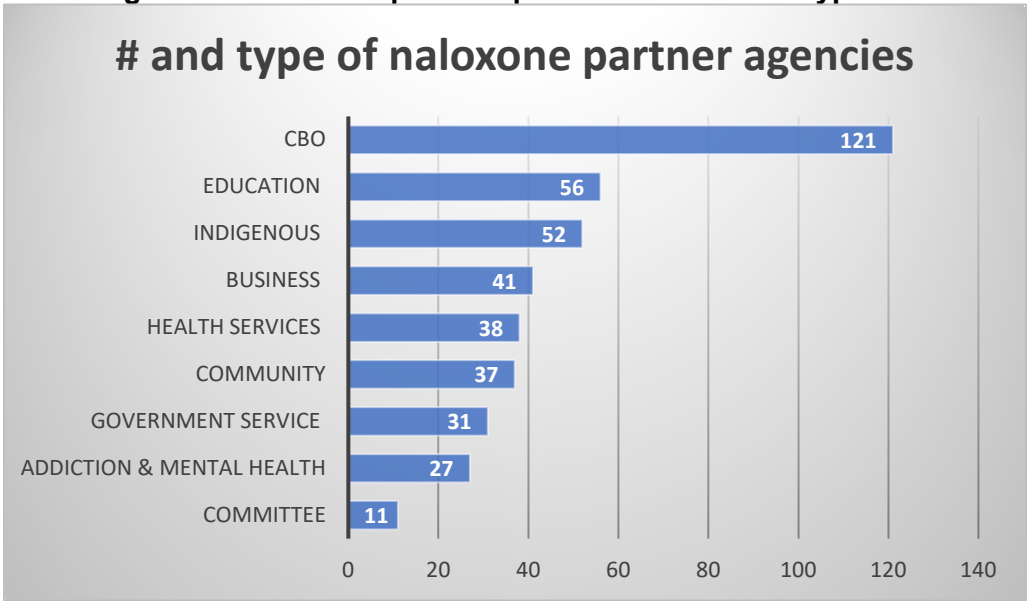
ACCH Table, source: ACCHN monthly reporting data

A unique impact of the ACCHN program, in contrast to all other naloxone distribution sites in Alberta, is the dedicated resources (naloxone staff and travel budget) have supported agencies to train the public as well as clients.

E. ACCHN agencies partnered with 414 external organizations

From June 2018 to May 2019, ACCHN members engaged with **414 external organizational partners** with naloxone training and opioid awareness education.

ACCH Figure #5: Partnership Development: Number and Type of Partners



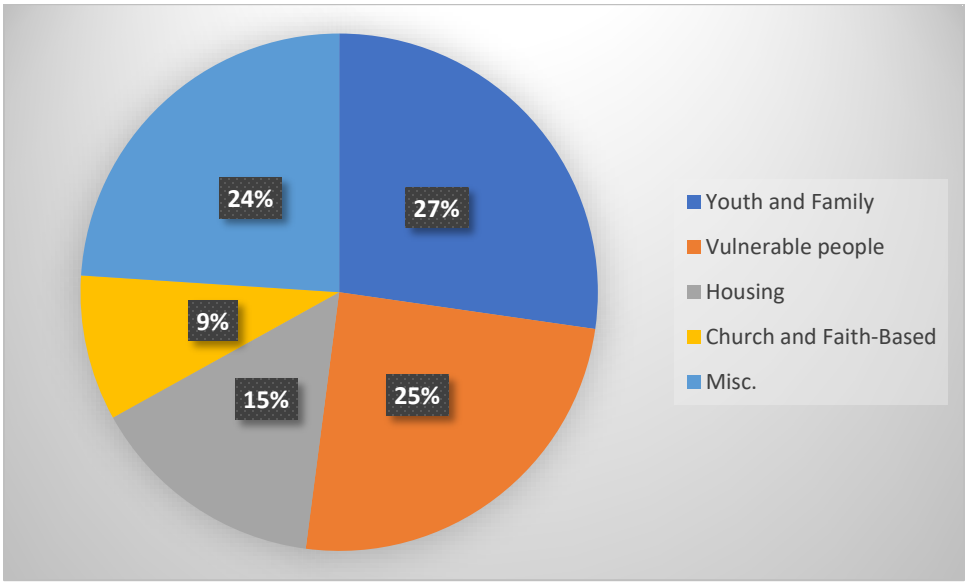
ACCH Figure, source: ACCHN partnership development reporting

Agencies established partnerships with nine types of organizations: community-based organizations (CBO), education, Indigenous, business, health services, community, government service, addiction & mental health, and committee.

Partnership development with other agencies is a core part of the capacity building work that the ACCHN program supports.[6] The ability to talk openly and honestly about difficult topics – like drug use, naloxone administration, harm reduction and safe supplies – forms the backbone of the partnership work: building links with people, communities and organizations to develop community capacity to respond to the crisis. However, this reach and spread goes well beyond the emergency response to the opioid crisis, as these touchpoints are often the building blocks toward establishing trusting relationships and enhancing community resilience to respond to the root causes of the problem.

CBOs (N = 121) accounted for 29% of all opioid and naloxone training with a wide range of agencies, including:

ACCH Figure #6: CBO Partnerships



ACCH Figure, source: ACCHN partnership development reporting

Youth and family support agencies (N = 33) covered both vulnerable youth and more mainstream youth organizations, including eight sessions with Family and Community Support Services. 25% of CBOs served vulnerable people (N = 30), and another 15% involved housing (N = 18), such as shelters' and agencies trying to place people in stable housing, many of whom have clients at overdose risk. For example, the Calgary Drop-In Centre responded to 134

[6] An organizational partner is defined as a new external agency who was provided naloxone training and opioid awareness education.

overdoses from January to August 2019, a 300% increase compared to the previous year (Villani, 2019). Partnership development included 9% with local churches or faith-based organizations involved in outreach (N = 11) and 24% (N = 29) into smaller sub-categories, such as trauma, disabilities, sexual equality, victim services, and seniors living.

The second most common partnership (N = 56) was with educational agencies accounting for 14% of total partnerships, with about 70% of those with post-secondary institutions and 30% with high schools. Naloxone training was provided at 20 individual post-secondary facilities. 64% (7/11) of all publicly funded colleges in Alberta have had at least one naloxone training session on campus (the vast majority have had multiple and ongoing training). Five out of the six publicly funded Universities have had a training session. Training sessions with targeted departments in nursing, occupational therapy, medicine, and addictions prepares them for overdose response in their careers.

In High School, about 30% (N = 17) of training sessions were with staff, parents, students (no kits distributed), and parent councils. Naloxone staff was invited to educate schools responding to overdoses and deaths in their communities. The focus on these sessions is educational – to build awareness about the risks of overdose and how to respond.

Engagement with Indigenous organizations (N = 52) continues to be a high priority for partnership development, as this accounted for 13% of training sessions. According to the 2017 review of opioid death in Alberta, 18% of people who died were Indigenous, which is three times higher than the Indigenous population in Alberta (6.5%) (Alberta Health, 2019b). THN training with Indigenous agencies occurred in different locations and levels of governance, including:

- 50% (N = 26) were on First Nation reserve or Métis settlement through invitations and collaboration with medical centres and band councils
- 31% (N = 16) were with urban agencies, such as friendship centres and Indigenous organizations providing community programming
- 19% were with regional or provincial partners, including Indigenous councils, associations, and committees

While most Indigenous partnerships were with First Nations groups (N = 44), there were collaborations formed with eight Métis agencies. ACCHN organizations act as ally and partner agencies to support Indigenous-led responses to the opioid crisis (and harm reduction in general) in their communities.

As part of program outreach, ACCHN members are also building strong relationships with businesses (N = 41), accounting for 10% of training, such as:

- Companies involved in trades like oil/gas, forestry, excavation, construction, manufacturing, and chemicals
- Staff at restaurants (N = 5) and bars (N = 4), who often respond to opioid overdoses
- Hotels and apartments (N = 8) are another overdose hot spot (especially in North Zone)
- A variety of commercial businesses impacted by opioids have also been trained, including pharmacies, security companies, finance, resort company, cannabis, employment agency, vending company, casino, and funeral home

Some of the requests for training are unexpected and unique. For example, vending machine employees who work with drop-in centres experiencing overdoses wanted training to be ready and prepared. Much of the business training is in expected locations, either places where people might use drugs (e.g., bars) and in industries with elevated risk. According to the 2017 opioid death data, people involved in trades, transport, and equipment operators accounted for 53% of deaths (Alberta Health, 2019b).

The next most common group was health services (N = 38), which accounted for 9% of all collaborations, such as:

- Primary Care Networks (N = 5)
- Community Health centres (N = 4)
- Healthcare professionals impacted by the opioid crisis, including nursing, EMS, physicians, social workers, healthcare aides, massage therapists, pharmacists, and physical therapists
- Programs such as pregnancy, counseling, assisted living, youth/family, STI clinic, FASD, and residency

A crucial part of these partnership developments has been sharing the harm reduction and anti-stigma approach, as well as establishing collaborations and pathways to support care.

Community engagement and public events (N = 37) accounted for 9% of all partnerships. ACCHN agencies are involved in significant community outreach into small, rural communities (N = 22) where drug use and the opioid crisis is often ignored and hidden. Staff also engage with more targeted agencies like community leagues, councils, and business associations to open a dialogue with impacted stakeholders.

Organizations have also established relationships with local government agencies (N = 31) as they emerge as frontline responders to opioid use, accounting for 7% of partnerships, including Libraries (N = 9), Corrections (N = 4), Fire departments (N = 4), and the RCMP (N = 3). ACCHN harm reduction agencies fill essential gaps in training and awareness with (non-traditional) agencies impacted by the opioid overdose crisis. Most of these local government agencies have limited formal support outside these partnerships.

ACCHN members continue to engage with stakeholders from addiction and mental health (N = 27) for 7% of total partnerships, sharing their experience and perspective on people who use drugs, stigma, and how to approach naloxone training within agencies involved in drug treatment, recovery, detox, and counseling. This outreach is important because people who leave treatment and recovery programs are at elevated risks of overdose (WHO, 2014; BCCSU, 2017). Low barrier access to kits upon release is a critical support for people in treatment.

ACCHN agencies also participate on various committees (N = 11) related to harm reduction and the opioid crisis, the Opioid Response Initiative, Sherwood Park Opioid Project, and other coalitions related to supporting vulnerable populations. These outreach and advocacy opportunities allow members to contribute their knowledge and experience from the frontline.

Of particular note here, even with the limited travel budget, the ACCHN agencies continue to establish relationships with isolated rural communities. The ability to build capacity of people in communities with limited support, and in some cases no access to kits at their local pharmacy, has been crucial to creating more equal access to the naloxone program across Alberta.

F. ACCHN Data Collection and Program Evaluation

The ACCHN program also plays an important role in data collection in Alberta. Despite having less than 1% (N = 8) of total registered naloxone sites (N = 2,135), ACCHN sites distributed 29% of all naloxone kits since 2015. As the table below demonstrates, the ACCHN sites are highly effective at distributing kits compared to other registered naloxone programs:

ACCH Table #5: Number of Kits Distributed per Registered Naloxone Sites

Type of naloxone site	# of registered distribution sites	# of naloxone kits distributed	% of total kits distributed	Average kits distributed per site
ACCHN outreach sites	8	63,154	29%	7,894
SCS/OPS	9	21,601	10%	2,400
Supportive/temporary housing	21	5,067	2%	241
Corrections	11	2,580	1%	235
Emergency Department	114	22,316	10%	196
Youth/family/community services	36	4,543	2%	126
Indigenous	59	7,137	3%	121
AHS addition and MH	125	9,456	4%	76
AHS outpatient	54	3,791	2%	70
Community pharmacies	1224	66,227	30%	54
EMS	57	2,956	1%	52
Inpatient	101	4,585	2%	45
Residential treatment and detox	17	458	0%	27
Other	297	5,707	3%	19
TOTALS	**2,133**	**219,578**	NA	NA

ACCH Table, source: AHS Opioid Response Surveillance Reports

In terms of raw numbers, community pharmacies are now the largest distributor of kits in Alberta. However, a closer look at the number of distribution sites shows that ACCHN outreach sites average 7,894 kits and SCS/OPS locations 2,400 kits per location, compared to the much lower volume of 54 kits per community pharmacy. Kit distribution in Alberta is highly concentrated in a few key locations – namely, the SCS/OPS and ACCHN sites.[7]

A central goal of the ACCHN program is continuous improvement in program evaluation so that we can make evidence-based decisions. In addition to the basic monthly reporting required by all participating naloxone distribution sites, the ACCHN program has undertaken additional evaluation initiatives, including:

1. **Community of practice and feedback loop that integrates emerging trends reported by community agencies directly into Provincial policy and practice**

   ACCH has several platforms, including monthly reporting and regular meetings, for sites and stakeholders to share their experience with the program. Some recent examples of this feedback loop in action are:

   - Reports from ACCHN staff on the frontlines experiencing trauma related to supporting people who overdose and sometimes die. In response, the Addressing Vicarious Trauma project was launched in June 2018, to provide confidential and anonymous access to a trained psychologist who can deliver a trauma workshop and one-on-one sessions.
   - Based on a successful local approach developed by Northreach with pharmacies to support supply distribution, the ACCH is developing a provincial model to expand access to supplies with interested pharmacies across Alberta. The THN working group was an important platform to collaborate with RxA in this implementation.
   - ACCHN sites report that the referral pathway from the community based ACCHN program to OAT prescribers has many barriers and challenges for vulnerable populations. In response, ACCH is working with key stakeholders (such as ACT Medical) to improve the care pathway so that people can access best practice recovery and addiction treatment.

[7] Four of the SCS/OPS locations are also administered by community agencies in the ACCHN program, including Northreach (Grande Prairie), Safeworks (Calgary), Turning Point (Red Deer), and ARCHES (Lethbridge).

2. **ACCHN sites report 84% of reversal report forms in Alberta**

   Each time a client in the THN program reports an overdose event, all registered naloxone sites are encouraged to support clients to fill out the *Naloxone Kit Usage Survey*. In practice, however, the vast majority of forms are filled out by ACCHN staff, who take extra time with clients to fill out the form. There are 2,133 registered naloxone sites in Alberta, but with less than 1% of sites, the ACCHN clients completed 84% of the all reports. The reversal report forms provide crucial insights into an array of program impacts, such as:

   - Demographics
   - Location of overdose
   - 911 call data
   - Number of naloxone doses used per overdose event
   - Experience with first responders
   - Barriers to carrying a kit
   - Recommendations for program improvement

   None of that analysis would be possible without the extra dedication to this data collection by ACCHN staff. The reality is that pharmacists, first responders, and ED staff do not have time to help clients complete extra reversal reports.

3. **Tracking the impact of partnership developments with external agencies across Alberta engaged in the ACCHN program**

   The ACCHN program is also unique because, in addition to the kit distribution, naloxone staff actively build relationships with agencies across Alberta to increase awareness about opioids and the THN program. To document this work, the ACCHN organizations report each new partnership development, and ACCH compiles reports for AH as part of regular program evaluation.

   No other naloxone distribution sites report on their partnership development activities. ACCHN sites, again, provide the only evidence-based insight into this important outreach and collaboration network.

4. **Development of a pre/post test naloxone evaluation survey to assess the effectiveness of training**

   The ACCHN program has also developed shared tools to assess the pre/post impact of THN training on knowledge. The shared tool, developed collaboratively with feedback from each site, provides validation of the THN training provided by ACCHN staff. Results from 464 surveys found a 40% increase in reported knowledge after the training session.

   The ACCHN program is the only naloxone distribution site in Alberta who has developed a shared evaluation tool to track THN learning outcomes. Other distribution sites (e.g., pharmacies, ED, etc.) were invited to develop and use the tool at the provincial THN working group, but they all reported it was not feasible to undertake this data collection.

5. **Assessment of the impact SCS/OPS locations have had on where and how clients access naloxone kits**

   There are four agencies involved in the ACCHN program who also administer SCS/OPS locations: Northreach (Grande Prairie), Safeworks (Calgary), Turning Point (Red Deer), and ARCHES (Lethbridge). During a five-month snapshot at those four agencies, the results highlight the enormous impact that SCS/OPS programming had on kit distribution: most kits (58%) at those agencies are now distributed through the SCS/OPS locations, demonstrating a shift in where and how clients accessed the THN program. Naloxone staff played an important role in training and supporting the implementation of THN at the SCS/OPS sites.

   The ACCHN program is uniquely positioned to assess the trends and interactions between programs as they roll out across Alberta.

6. **Developing the capacity to anonymously track individual clients who use the ACCHN program**

   As part of improved data collection, all ACCHN programs are also implementing databases to collect anonymous, client specific data. Currently, data collection is limited in the THN program because it is low barrier and anonymous. It is impractical for naloxone distribution sites to know some basic program data, such as the number of clients who use THN in Alberta.

   Once implementation is complete, however, the ACCHN program will be the only naloxone distribution site in Alberta capable of knowing client level trends and patterns.

The ACCHN program has played a critical role in the improved THN data collection and program evaluation in Alberta. Dedicated naloxone staff at each site and dedicated ACCH staff have made this improved data collection possible, and without those staff resources in place, there would be a significant loss of program evaluation capacity.

G. Client Profile

Who is using the naloxone program with ACCHN agencies? Is the program reaching the people who are dying in Alberta?

Since the start of the program in 2015, there have been over 9,000 individual reversals using naloxone kits. However, that data set does not include any demographic information. In March 2017, AHS started collecting more detailed reversal information from people who overdosed using the *Naloxone Kit Usage Survey*. The first round of analysis on 1,840 reversal reports from March 1, 2017 to November 8, 2018 is now complete (Alberta Health Services, 2020).

Those reports show several notable demographic trends, including:

- Most clients were male and older (median age of 33); females were younger (median age of 27)
- The median age of someone who overdosed was 30 years old, with some variation:
    - Central and North Zone had comparatively younger clients in their late 20s, whereas Edmonton, Calgary, and South Zone had median ages in their early 30s
- Private residence[8] is the most common overdose location
    - North Zone was the only exception, which reported the highest overdose location as hotel
    - Street, shelter, and other sites (e.g., park, mall, train station) were also common

Is the ACCHN program reaching the people who are dying in Alberta? Yes, according to the medical examiner's review of 653 opioid-related deaths in Alberta (Alberta Health, 2019b).

- 77% of people who died of opioid-related deaths were male
- The mean age was 38.1 years, and the most common age group was 30-34 years
- Most fatal overdoses occurred in a private residence (80%) – including 62% in a person's own home and 19% in another persons' private residence (19%)

ACCH Table #6: Comparing ACCHN reversal data and Medical Examiner Review

Data Source	Gender	Age	Location of Overdose
ACCHN member reversal reports (March 2017 to November 2018)	62% male 30% female 8% other[9]	30 year median age	Private residence (52%) Street (20%) Other (9%) Shelter (7%)
2017 Medical Examiner Review of Opioid-Related Death Data	77% male 23% female	30 to 34 most common age range	Private residence (80%) Public place (10%)

ACCH Figure, source: Alberta Health Services, 2020 and Alberta Health, 2019b

[8] A limitation of this data is the lack of a definition for private residence, which could refer to a permanent living situation, temporary, or a friends' place.
[9] The other gender category may also include don't know or didn't say responses.

The most significant difference between the two data sets is that, in the reversal data, the vast majority of clients survived the naloxone reversal successfully. Data shows that the ACCHN program is reaching the people in Alberta who are most at risk of overdose death and that THN is saving people from preventable death.

Conclusion

Since starting in mid-2015, the ACCHN naloxone program has had a cost-effective approach to saving lives and supporting people to access the care they need. The seven ACCHN sites are the largest naloxone kit distributor in Alberta, and according to the coroner's death report data and reversal report form analysis, they are reaching people at the high overdose risk.

Community-based harm reduction interventions, including THN, SCS, and OAT, are saving lives. Evidence suggests that the decline in fentanyl deaths in Alberta is likely a result of these harm reduction strategies, with the take-home naloxone program responsible for saving the most lives.

While we cannot draw a causal line from the THN program to the overdose death numbers in Alberta, we know the interventions work. The facts are compelling:

a. 27.7% decline in fentanyl deaths over the last year
b. Rapid scale-up of the THN program, with over 78,000 kits distributed since 2015 through community sites, reaching people at high risk
c. 9,251 overdose reversals from naloxone kit use, saving an estimated 925 lives from ACCHN sites
d. Over 72,000 Albertans provided naloxone and opioid awareness training, and over 400 organizational partnerships established across impacted communities
e. THN is a highly cost-effective program, with one study finding a $2,742 saved by deaths avoided for every dollar spent (Naumann et al., 2019) and preliminary evidence from the ACCHN program showing effectiveness
f. Compelling evidence from a B.C. study documenting that Alberta's interventions save lives and reduce opioid death.

The ACCHN program, with eight locations across the Province in Calgary, Edmonton, Red Deer, Lethbridge, Grande Prairie, Fort McMurray, Medicine Hat, and Edson, is a highly effective and low barrier intervention that works. Continued expansion of the program into areas of need, such as the hidden rural and suburban population, as well as enhanced kit availability and training following release from corrections and residential treatment, are crucial areas of improvement.

Appendix A: Cost-Benefit Analysis for Take-Home Naloxone Kits

Background

Since 2014, 2,732 people in Alberta have died from opioid-related overdoses. The same year, the World Health Organization (WHO) released its guidelines to manage global opioid overdoses through low-barrier intramuscular Naloxone kit access. Intramuscular Naloxone, sold under the name of Narcan, is administered with a needle. Intramuscular means it is injected into a muscle.

In Alberta, Naloxone is unscheduled, which means it does not require a prescription from a health professional to access. Addressing the issue in April 2015, and funded by Alberta Health, the Alberta Community Council on HIV (ACCH) began administration of the Community- Based Take-Home Naloxone (CBTHN) program. This project was a bystander administration project, which meant it did not require a health professional to administer Naloxone.

Renamed in 2017, The Alberta Community Council on HIV – Take-Home Naloxone (ACCHN) expanded to include and distribute full-time nursing care, outreach workers, wider catchment areas, and broadened naloxone training. The central tenat of this project continues to be bystander administration. The ACCHN program has provided low-barrier access to both the most vulnerable people at risk of opioid overdose and to those at risk of witnessing such an overdose.

Research reveals that bystander administration of Naloxone saves lives, which means projects like ACCHN saves lives. The impact of the program in British Columbia is shown in its study released in 2019, the results of which are relevant to Alberta, as both provinces use the same interventions. Conducted between April 2016 and December 2017, the results reveal 2,177 confirmed opioid deaths (Irvine et al., 2019). Interventions stopped an estimated 3,030 deaths, half of which were through the Take-Home Naloxone program. Further, the same study concludes that the take-home Naloxone program has prevented the deaths of an estimated 3,757 people due to opioids during the period of study. Without Naloxone, that would amount to an increase of 73% in opioid poisoning deaths.

Assumptions

The primary assumption made is that each Naloxone kit leads to lifelong recovery without further hospitalization.

1) There are no start-up costs for the ACCHN project, and thus no K_0. All project costs are applied annually and are part of the formula.
2) The estimated number of overdose related deaths averted assumes that for every ten kits used, one overdose death is averted.

Data

The Alberta Health Service (AHS) cost per kit, including shipping, is $33.87. AHS provides all registered sites with kits on a monthly basis. Each ACCHN site is registered and receives the kits free of charge from AHS. The costs of the ACCHN project include the number of kits distributed multiplied by the cost per kit, plus the ACCHN project cost. The benefit is the estimated cost of EMS plus the hospital stay per estimated lives saved. For this report two analysis were used to assess sensitivity. The first analysis used the assumption that every reversal reported is equal to one overdose death averted. The second analysis completed assumed that for every ten reversals reported there is one life saved. We know that the number is most likely higher because reversal reporting is not 100% reported back.

Cost of Hospital Stay

The Canadian Institute for Health Information (CIHI) compiles information from various healthcare sources to assess the performance of Canada's healthcare systems and make recommendations. The CIHI found that the costs of a patient's stay in a hospital vary widely across the country. In 2017-2018, a typical stay at a hospital in Alberta cost $7,983 on average, which is the highest cost in the country (CIHI, 2020). This number was used to calculate the costs of hospitalizations due to opioid poisoning.

Cost of Emergency Medical Services (EMS) Ambulance Responses

Every fiscal year, Alberta Health Services (AHS) releases detailed data operations, finances, and other statistics to assess its performance. In its reports, AHS provides figures on the annual expenses for each of its functions. For ambulance services, AHS details the total number of "EMS events" and the actual operating cost for that year, which is often higher than the budgeted amount. However, AHS does not provide a cost per EMS event, and it does not differentiate between the costs of different types of EMS events. AHS does not provide a breakdown of ambulance service costs that distinguishes between fixed and variable costs.

To determine a dollar value estimate for each EMS event, the actual costs for ambulance services were divided by the number of reported EMS events for each fiscal year. It is assumed that this provides a close estimate of the average cost per EMS event, including those related to opioid poisoning. All dollar amounts are nominal.

2016-2017 (see AHS, 2017)

- Actual costs for ambulance services: $497,686,000 = $971.73 per EMS event
- Total EMS events: 512,167

2017-2018 (see AHS, 2018)

- Actual costs for ambulance services: $512,410,000 = $940.64 per EMS event
- Total EMS events: 544,744

2018-2019 (see AHS, 2019)

- Actual costs for ambulance services: $528,045,000 = $942.21 per EMS event
- Total EMS events: 560,434

Discount Rates

In 2007, the Treasury Board of Canada (TBC) Secretariat released the *Canadian Cost Benefit Analysis Guide* to assist policymakers in their regulatory decision making (Treasury Board of Canada Secretariat, 2007). According to the TBC, discounting is essential to determining the net present value of a regulatory decision.

In Canada, the TBC determined that the best rate for programs that required capital market funds is 8 percent. However, the TBC suggests that a lower rate of 3 percent be applied for social and health care initiatives since "factors other than the economic opportunity cost of funds" need to be considered (Treasury Board of Canada Secretariat, 2007).

Results

When we consider the number of overdose deaths averted as equal to every reversal reported, we found the following:

The net present value (NPV) of the ACCHN project using the discount rate of 8% is equal to $61,885,480.44, which indicates that the ACCHN project is an excellent investment. The difference in the NPV when using the social discount rate of 3% is higher by $6,931,318.44, with an NVP of $68,816,798.88. This result supports the existence of the ACCHN project. The cost benefit analysis (CBA) provides a ratio of 23.96 when using the normal discount rate of 8% and 23.93 when using the social discount rate of 3%. Confirming the results of the NVP in both regards.

When we consider the number of overdose deaths averted as one per every ten reversals reported, we found the following:

The NPV of the ACCHN project using the discount rate of 8% is equal to $3,982,786.71, which indicates that the ACCHN project is an excellent investment. The difference in the NPV when using the social discount rate of 3% is higher by $442,704.20, with an NVP of $4,425,490.92. This result supports the existence of the ACCHN project. The CBA provides a ratio of 2.61 when using the normal discount rate of 8% and 2.61 when using the social discount rate of 3%. Confirming the results of the NVP in both regards.

Limitations:

1. Lack of data when associated with costs relevant to the administration of Naloxone by the Alberta Fire Department.
2. The study is limited to decision-making through CBA. Sensitivity analysis needs to be used to quantify the impact of Naloxone on benefits including reduction in mortality

rate, which is complicated to quantify.

3. The time horizon for performing the CBA is three years since the data was available for the calendar years: 2017-2019.
4. Potential additional benefits of Naloxone distribution, such as a reduction in the usage of drugs or a decline in risky behaviors due to education are notincluded.

Conclusion

Take-home Naloxone kit distribution is a cost-effective tool for reversing opioid overdose. From our analysis, we found a positive association between the Naloxone kit distribution and overdose reversals. The results confirm the position of the WHO that Naloxone should be made available to substance users and those who have substance users in their lives.

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