

Service delivery models for injectable opioid agonist treatment in Canada: 2 sequential environmental scans

Erin Eydt M^{OST}, Stephanie Glegg PhD, Christy Sutherland MD, Karine Meador MD, Michael Trew MD, Michel Perreault PhD, Marie-Ève Goyer MD, Bernard Le Foll MD, Jeffrey Turnbull MD, Nadia Fairbairn MD M^{HSc}

Abstract

Background: Injectable opioid agonist treatment (iOAT) is an emerging evidence-based option in the continuum of care for opioid use disorder in parts of Canada. Our study objective was to identify and describe iOAT programs operating during the ongoing opioid overdose crisis.

Methods: We conducted 2 sequential environmental scans. Programs were eligible to participate if they were in operation as of Sept. 1, 2018, and Mar. 1, 2019. Information was collected over 2–3 months for each scan (September–October 2018, March–May 2019). Programs that participated in the first scan and newly established programs were invited to participate in the second scan. The scans included questions about location, service delivery model, clinical and operational characteristics, numbers and demographic characteristics of clients, and program barriers and facilitators. Descriptive analysis was performed.

Results: We identified 14 unique programs across the 2 scans. Eleven programs located in urban centres in British Columbia and Ontario participated in the first scan. At the time of the second scan, 2 of these programs were on hold and 2 of 3 newly established programs were in Alberta. The total capacity of all participating programs was 420 clients at most. Four service delivery models were identified; iOAT was most commonly integrated within existing health and social services. All programs offered hydromorphone, and 1 program also offered diacetylmorphine. In the first scan, 73% of clients (133/183) were male; the mean age of clients was 47 years. Limited capacity, pharmacy operations and lack of diacetylmorphine access were among the most frequently reported barriers. The most commonly reported facilitators included client-centred care, client relationships and access to other health and social support.

Interpretation: Evidence indicates that iOAT can be successfully implemented using diverse service delivery models. Future work should facilitate scale-up of this evidence-based treatment where gaps persist in high-risk communities.

Canada is experiencing an overdose crisis driven by the contamination of illicit drugs with fentanyl and fentanyl-related analogues.¹ Between January 2016 and September 2019, over 14 700 apparent opioid-related deaths occurred.¹ Strategies to address the ongoing crisis are an urgent public health priority.² Improved access to opioid agonist treatment (OAT) is a key approach to reducing the morbidity and mortality associated with illicit drug use.^{3,4} Buprenorphine–naloxone and methadone are first- and second-line OAT medications, and slow-release oral morphine is increasingly being used as an alternative.⁵

Injectable OAT (iOAT) is a cost-effective,^{6–9} evidence-based option for people who are not benefiting from oral OAT.^{10–15} Diacetylmorphine (medical heroin), long available in the United Kingdom and Europe,^{11–15} has demonstrated superior efficacy over methadone for refractory opioid use disorder.^{10,12} Hydromorphone, a common analgesic, demonstrated noninferiority to diacetylmorphine in a Vancouver-based clinical trial as an alternative iOAT medication.¹⁶ As iOAT treatment is an emerging resource-intensive option within the continuum of care for opioid use disorder, national

monitoring of iOAT programs is required to inform rapidly evolving policy and practice amid the ongoing overdose crisis.

The Canadian Research Initiative in Substance Misuse (CRISM) national network is mandated to translate evidence-based substance use interventions into clinical practice,

Competing interests: Christy Sutherland reports family investment in Adamis Pharmaceuticals during the conduct of the study. Marie-Ève Goyer reports receiving an honorarium and training support from Gilead Sciences, outside of the submitted work. Bernard Le Foll reports receiving grants from Pfizer, BrainsWay, Bioprojet, Alkermes, Canopy Growth and the American Chemical Society, as well as nonfinancial support from Aurora Cannabis, outside the submitted work. Christy Sutherland, Karine Meador, Michael Trew, Jeffrey Turnbull and Nadia Fairbairn were involved in the clinical provision of injectable opioid agonist treatment during the conduct of the study. No other competing interests were declared.

This article has been peer reviewed.

Correspondence to: Nadia Fairbairn, nadia.fairbairn@bccsu.ubc.ca

CMAJ Open 2021. DOI:10.9778/cmajo.20200021

community-based prevention, harm reduction and health system changes. Modelled after the National Institute on Drug Abuse Clinical Trials Network in the United States, and funded by the Canadian Institutes of Health Research, CRISM operates interdisciplinary networks across 4 nodes: British Columbia, the Prairies, Ontario and Quebec–Atlantic. Coordinated by the BC node, through the BC Centre on Substance Use, a national initiative seeks to facilitate successful iOAT service delivery. There have been calls to establish a public inventory of Canadian iOAT programs.¹⁷

The objective of our study was to identify the number and location of iOAT programs, describe their service delivery models, characterize clinical and operational features of the programs, and document service delivery barriers and facilitators. This information will inform policy and practice that support iOAT implementation and scale-up in Canada.

Methods

Setting

Federal and provincial regulations require stringent oversight of iOAT in Canada. Because substantial resources are needed to set up and maintain iOAT programs, operational funding has generally come from regional health authorities, with implementation conducted through well-established community service provider networks. These factors facilitate up-to-date information-gathering nationwide.

Design

We used environmental scans to identify iOAT programs and describe service delivery occurring nationally. Environmental scans employ systematic, objective methods to review formal and tacit knowledge efficiently; their value is increasingly being recognized in health care.¹⁸ Methods typically involve grey and primary literature searches, as well as surveys or interviews or both, to detect trends, challenges and successful strategies in other jurisdictions. This information can inform service planning and delivery.¹⁸⁻²⁰

We conducted 2 sequential scans to capture the dynamic nature of service delivery within a rapidly evolving policy and practice landscape. Scan 1 examined programs operating as of Sep. 1, 2018, and scan 2 was conducted 6 months later (Mar. 1, 2019). At scan 2, programs that were operating at the time of scan 1 and newly established programs were eligible to participate. Programs from scan 1 that had ceased operation were ineligible to participate in scan 2, but they were asked why they had ceased to operate. Data were collected in September–October 2018 for scan 1 and March–May 2019 for scan 2.

Steering committee

A steering committee was formed to coordinate the scan as part of the CRISM mandate, with 2 members per node (C.S., K.M., M.T., M.P., M.-È.G., B.L.F., J.T., N.F.). The members of the committee were expert addiction medicine physicians and researchers leading planning, implementation and research for iOAT programs in their provinces.

Recruitment

Any operational program prescribing OAT for supervised injection in Canada was eligible to participate in the study. We identified programs by searching PubMed and by conducting a Google search to find program websites; members of the author group added some programs that were not identified in these searches.

Both the PubMed and Google searches used the following keywords: injectable opioid agonist treatment, iOAT, diacetylmorphine, hydromorphone. No medical subject heading (MeSH) terms were employed for the PubMed search and no search limits were applied because of the small body of literature. We screened the Google search results using the title and summary text of entries from the first 10 pages of listings and checked which programs were operational on Sept. 1, 2018 (for scan 1), and Mar. 1, 2019 (for scan 2). All searching activities were conducted by E.E. The searches for scan 1 were conducted in August 2018 and the searches for scan 2 were conducted in February 2019 (each search period spanned 1 month). All identified programs were invited to participate.

One participant per program was nominated by program staff (e.g., nurse, physician, clinic manager). Nomination criteria included involvement in day-to-day operations, detailed and up-to-date knowledge of programs and clients, and available capacity to participate. Following a phone briefing on the environmental scan's purpose, methods and timeline, the electronic data collection form (described below) was emailed to participants. When completing the form, participants were directed to consult with other staff (e.g., nurses, physicians, peer support workers, pharmacists) to ensure that the characterization of the program was representative. Participants returned the form by email.

Data sources

We developed an electronic data collection form to collect data (Appendix 1, available at www.cmajopen.ca/content/9/1/E115/suppl/DC1). Steering committee members leveraged their extensive research and clinical practice experience in iOAT to determine which data fields would be most valuable in fulfilling the scans' objectives. In addition to their knowledge and expertise, steering committee members drew on 3 key resources to inform the selection of metrics for data capture. The first was a European Monitoring Centre for Drugs and Drug Addiction publication that provided a detailed overview of operational and clinical elements of iOAT programs in Europe, and offered benchmarks for comparison.¹¹ The others were the CRISM iOAT operational and clinical guidance documents,^{3,21} which were generated through a national collaborative process within the CRISM network involving research scientists, service providers, policy-makers, community leaders and people with lived experience of substance use. Together they provide a comprehensive overview of the most pertinent elements involved in setting up and operating safe and effective iOAT services. Many of the authors contributed to these documents. The data fields identified by the steering committee were used by BC Centre on Substance Use staff to

formulate questions during the form’s design; the form was then piloted with steering committee members (C.S., N.F.).

Twenty-eight open-ended and closed questions covered location, service delivery model, clinical characteristics (e.g., medications), operational characteristics (e.g., hours, staffing), client numbers (e.g., wait list) and demographic characteristics, and program facilitators and barriers. Client demographic characteristics were collected for active clients, defined as clients who had had at least 1 iOAT dose in the week preceding the scan reference date.

Following scan 1, further steering committee feedback informed question refinement and the addition of 9 new questions, for example, probing if oral OAT was coprescribed and available onsite and how barriers identified in scan 1 had been addressed (for programs that had participated in scan 1). This refined version was administered in scan 2 to ongoing programs that had participated in scan 1 and programs that were established after scan 1. The data collection form included in Appendix 1 contains all scan 1 questions as well as the additional questions used in scan 2.

E.E. reviewed the responses and clarified any unclear responses by email to ensure accuracy. S.G. validated the final collated data set with participants by email and phone before data analysis. For phone correspondence, a written record was made in the tabular data set if applicable.

Data analysis

Data extracted from data collection forms were organized in tables in Excel. Quantitative data were summarized descriptively, including national tallies (e.g., number of clients starting treatment, wait-list totals) and means and ranges (e.g., age). Program-specific data were not collected for all client-related data fields for 7 programs because of lack of internal utility; organization-level data are presented instead for the 2 organizations operating these programs. Open-ended responses were summarized using keywords extracted from the text and grouped with similar or synonymous responses;

they were reported with frequency counts and percentages. The most representative keywords were used where possible to categorize groupings. Data from the 2 scans were analyzed together.

Ethics approval

The University of British Columbia – Providence Health Care Research Ethics Board approved the study.

Results

Fourteen unique programs were identified as eligible to participate across the 2 scans. There were 11 eligible programs at scan 1 and 12 at scan 2. The programs that participated in scan 2 consisted of 9 programs from scan 1 that were still operational and 3 new programs established since scan 1; 2 programs from scan 1 were on hold and not eligible to participate in scan 2, except to offer the rationale for discontinuation (Figure 1). Searching yielded 9 of these programs (1 PubMed, 8 grey literature from websites). All 9 programs were known to the steering committee, which added 5 additional eligible programs to the list.

All invited programs responded at scan 1 and scan 2 (Table 1). Six organizations operated programs at scan 1, and 7 operated programs at scan 2. Two organizations operating multiple programs nominated a single participant because programs were coordinated centrally by this person. Participants were consistent for both scans for all but 2 programs, because of staff turnover. Two nurses, 2 physicians and 3 clinic coordinators or managers participated in scan 1, and 2 nurses, 2 physicians and 4 clinic coordinators or managers participated in scan 2.

For the 9 programs that participated in both scans, much of the information was consistent across the 2 scans, including location and service delivery model, as well as many clinical and operational characteristics and program barriers and facilitators. In response to the new questions that were added to

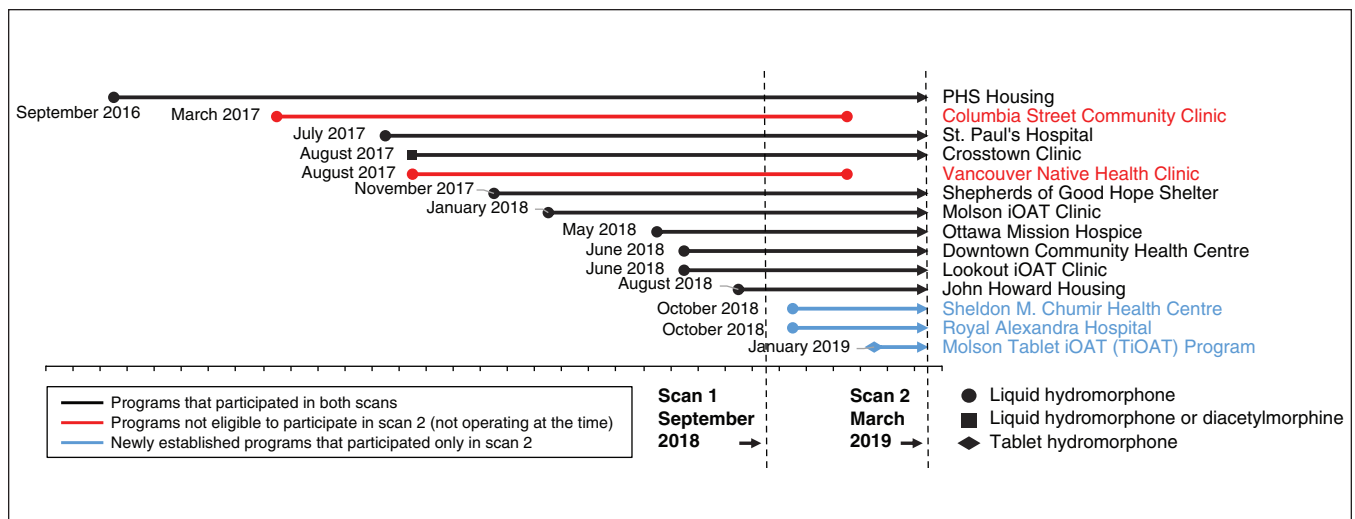


Figure 1: Timeline of injectable opioid agonist treatment (iOAT) program start and end dates (where applicable).

Table 1: Summary of service delivery models for injectable opioid agonist treatment by organization

Organization*	Program	City	Province†	Start date	Service delivery model‡
PHS Community Services Society	A: PHS Housing§	Vancouver	BC	Sept. 2016	Embedded and integrated; supported housing
	B: Columbia Street Community Clinic	Vancouver	BC	Mar. 2017	Pharmacy based
	C: Molson iOAT Clinic	Vancouver	BC	Jan. 2018	Embedded and integrated; overdose prevention site — separate entrance and injection space
	D: Molson Tablet iOAT Program	Vancouver	BC	Jan. 2019	Embedded and integrated; overdose prevention site — shared entrance and injection space
Providence Health Care	E: St. Paul's Hospital	Vancouver	BC	July 2017¶	Hospital based; inpatient within ward setting
	F: Crosstown Clinic**	Vancouver	BC	Aug. 2017	Comprehensive and dedicated; standalone clinic
Vancouver Native Health Society	G: Vancouver Native Health Clinic	Vancouver	BC	Aug. 2017	Pharmacy based
Vancouver Coastal Health	H: Downtown Community Health Centre	Vancouver	BC	June 2018	Embedded and integrated; community health centre — shared entrance, separate injection space
Fraser Health	I: Lookout iOAT Clinic	Surrey	BC	June 2018	Embedded and integrated; community health centre — separate entrance and injection space
Ottawa Inner City Health	J: Shepherds of Good Hope Shelter	Ottawa	ON	Nov. 2017	Embedded and integrated; shelter
	K: Ottawa Mission Hospice	Ottawa	ON	May 2018	Embedded and integrated; hospice
	L: John Howard Housing	Ottawa	ON	Aug. 2018	Embedded and integrated; supported housing
Alberta Health Services (N: in partnership with Inner City Health and Wellness)	M: Sheldon M. Chumir Health Centre	Calgary	AB	Oct. 2018	Comprehensive and dedicated; colocated with community health centre
	N: Royal Alexandra Hospital	Edmonton	AB	Oct. 2018	Hospital based; inpatient (and outpatient temporarily until community clinic opens) via hospital supervised consumption site

Note: AB = Alberta, BC = British Columbia, iOAT = injectable opioid agonist treatment, ON = Ontario, PHS = Portland Hotel Society.
 *Regional health authorities and community not-for-profit organizations, commonly with an operational or funding partnership.
 †Canadian provinces reporting iOAT programs as of Mar. 1, 2019, were BC, ON and AB.
 ‡Based on diverse pharmacy partnerships for dispensing, including private and health authority facilities located onsite, in the community or in a hospital.
 §PHS operates 3 supported housing units in which iOAT has been offered as of Mar. 1, 2019; this housing program is implemented at all units by the same staff members.
 ¶Start date represents initiation of formal prescribing within the hospital using preprinted orders; iOAT was prescribed earlier using other methods.
 **Site of 2 iOAT clinical trials running between 2005 and 2014; start date refers to the date on which new clients (other than participants in the clinical trials) began receiving iOAT.

scan 2, participants reported the requested additional information. Some of the programs reported additional facilitators and barriers that had emerged since scan 1. All programs repeating the scan updated client numbers and demographic information (where available).

Service delivery models

The earliest period that iOAT was provided to people who had not participated in a clinical trial was September 2016 (Figure 1). The 11 programs in scan 1 were in urban centres in BC and Ontario (Table 1). The 12 programs in scan 2 included 2 new urban centres in Alberta and 1 new program

in BC; 2 of the programs in BC that had participated in scan 1 were on hold.

Four service delivery models were identified: a comprehensive and dedicated model (wraparound care exclusively for iOAT clients, 2 programs), an embedded and integrated model (incorporating iOAT within existing health and social services, 8 programs), a hospital-based model (iOAT provision during acute care, 2 programs) and a pharmacy-based model (iOAT induction in community health centres with pharmacy maintenance, 2 programs sharing a community-based pharmacy). Appendix 2 (available at www.cmajopen.ca/content/9/1/E115/suppl/DC1) provides additional details.

Clinical and operational characteristics

Program characteristics are summarized in Table 2. Program capacity varied from 6 to over 130 clients. The total iOAT

capacity among all participating programs was 330–345 at scan 1 and 405–420 at scan 2; this excludes an inpatient hospital-based program because it offered iOAT for the duration of the acute

Table 2: Summary of clinical and operational characteristics of injectable opioid agonist treatment programs

Program	Hours*	Core onsite staff†	iOAT‡	Capacity (no. of clients); scan		No. of available daily doses; scan		Dose access structure;§ scan	
				Scan 1 (Sept. 2018)	Scan 2 (Mar. 2019)	Scan 1 (Sept. 2018)	Scan 2 (Mar. 2019)	Scan 1 (Sept. 2018)	Scan 2 (Mar. 2019)
				A: PHS Housing	6–7	Nurses, mental health workers (depending on housing unit)	HDM	6	6
B: Columbia Street Community Clinic	6.75¶	Nurses, peer support workers, pharmacists, pharmacist technicians	HDM	65¶	–	2	–	Open	–
C: Molson iOAT Clinic	7	Nurses, mental health workers, peer support workers	HDM	30	60	2	2	Open	Open
D: Molson Tablet iOAT Program	9	Nurses, mental health workers, peer support workers	tHDM	–	60	–	5	–	Open
E: St. Paul's Hospital	24	All inpatient service staff	HDM	No limit	No limit	**	**	**	**
F: Crosstown Clinic	13.5	Nurses, clinic assistants	HDM DAM	130–145	130–145	3	3	Group	Open
G: Vancouver Native Health Clinic	6.75¶	Nurses, peer support workers, pharmacists, pharmacist technicians	HDM	65¶	–	2	–	Open	–
H: Downtown Community Health Centre	7	Nurses, physicians, nurse practitioners, community liaison workers, pharmacists, pharmacist technicians	HDM	14	14	2	2	Open	Open
I: Lookout iOAT Clinic	10	Nurses, harm reduction workers, clinic coordinators	HDM	50	50	2	2	Group	Open
J: Shepherds of Good Hope Shelter	24	Client care workers	HDM	6	6	7	4–5	Open	Open
K: Ottawa Mission Hospice	24	Nurse coordinators	HDM	8	8	7	4–5	Open	Open
L: John Howard Housing	24	Nurse coordinators	HDM	21	21	7	4–5	Open	Open
M: Sheldon M. Chumir Health Centre	10.5	Nurses, peer support workers, clinic managers, office assistants	HDM	–	35	–	3	–	Group
N: Royal Alexandra Hospital	9	Nurses, physicians, peer support workers, addiction counsellors, office assistant	HDM	–	15	–	3	–	Booking

Note: DAM = diacetylmorphine, HDM = hydromorphone, iOAT = injectable opioid agonist treatment, tHDM = tablet hydromorphone.
 *The approximate amount of time the program was available for clients per day (may include closure for staff breaks or handover sessions).
 †Staff available during all opening hours and providing the foundation for day-to-day operations. Other staff (e.g., physician, psychiatrist, dietitian) were available at varying times.
 ‡Available iOAT medications: liquid HDM, liquid DAM (medical heroin) and tHDM.
 §Several dose access structures were in use: open = clients attended any time, group = clients were allocated to a treatment group with specified times, booking = clients received individual appointments.
 ¶The Columbia Street Community Clinic and the Vancouver Native Health Clinic shared a single community pharmacy partner for maintenance doses; these data represent the pharmacy characteristics only.
 **As clinically indicated during acute care admission; iOAT dose administered directly by nursing staff.

care admission only and relied on community-based program capacity for maintenance. Nationally, the number of people on a wait list increased by 47% between scans (from ≥ 400 to ≥ 587) (Table 3).

All programs operated daily and were accessible for between 6 and 24 hours each day. Programs without 24-hour access generally held formal clinical sessions (i.e., morning, afternoon, evening). Most programs offered clients a choice in terms of when to dose (with a minimum time between doses; the most common dosage was 2 doses per day). Alternatively, clients booked individual appointments or attended scheduled treatment groups.

Clients self-injected iOAT under the supervision of a health care professional, typically a nurse. The only exception was the hospital-based inpatient program, where nurses administered doses in compliance with institutional protocols prohibiting self-injection of drugs onsite. Peer workers provided support for engagement and clinical flow at 6 programs.

All programs offered hydromorphone; 1 also offered diacetylmorphine. At scan 2, 1 program prescribed only hydromorphone tablets, which, according to client preference, could be crushed and injected or consumed orally under supervision. Oral OAT was universally coprescribed with iOAT and was

Table 3: Summary of clients' characteristics by injectable opioid agonist treatment program, with national-level tallies

Program	Total no. of client starts; scan		No. of active clients;* scan		No. on wait list; scan		Age, yr, mean (range)		No. of clients; scan; gender						
	Scan 1 (Sept. 2018)	Scan 2 (Mar. 2019)	Scan 1 (Sept. 2018)	Scan 2 (Mar. 2019)	Scan 1 (Sept. 2018)	Scan 2 (Mar. 2019)	Scan 1 (Sept. 2018)	Scan 2 (Mar. 2019)	Scan 1 (Sept. 2018)			Scan 2 (Mar. 2019)			
									F	M	T†	F	M	T†	
A–D: All PHS programs‡§	286	312	67	119	0	112	‡	‡	‡	‡	‡	‡	‡	‡	‡
tHDM			–	60											
E: St. Paul's Hospital‡	‡	‡	8	8	0	0	‡	‡	2	6	0	2	6	0	
F: Crosstown Clinic	259	291	126	125	345	400	44 (21–69)	44 (21–69)	31	94	1	39	85	1	
DAM			106	107											
G: Vancouver Native Health Clinic	10	–	1	–	0	–	53 (53)	–	0	1	0	–	–	–	
H: Downtown Community Health Centre	7	18	4	11	0	0	51 (36–68)	48 (36–68)	1	3	0	4	7	0	
I: Lookout iOAT Clinic	37	77	22	18	0	0	45 (30–61)	44 (27–62)	4	18	0	4	14	0	
J–L: All Ottawa Inner City Health programs‡	26	29	22	22	≥ 55	≥ 75	40 (25–57)	43 (25–57)	11	11	0	12	10	0	
M: Sheldon M. Chumir Health Centre	–	45	–	22	–	0	–	35 (22–48)	–	–	–	4	18	0	
N: Royal Alexandra Hospital	–	9	–	6	–	0	–	44 (29–64)	–	–	–	3	3	0	
National-level tallies	625	781	250	331	≥ 400	≥ 587	47 (21–69)	43 (21–69)	49	133	1	68	143	1	

Note: DAM = diacetylmorphine, F = female, iOAT = injectable opioid agonist treatment, M = male, T = transgender or nonbinary, tHDM = tablet hydromorphone.
 *Clients receiving at least 1 dose of iOAT in the 7 days before the scan reference date. All numbers represent clients receiving liquid hydromorphone except where programs provided DAM or tHDM (tablet iOAT) in addition to liquid hydromorphone; in these cases, the number of active clients receiving DAM and tHDM is reported underneath the total number of active clients, to indicate the size of these specific client groups.
 †There was variable reporting for this gender category across sites.
 ‡Data not available or data stratified by program not available where more than 1 program was operated by a single organization.
 §Age and gender data available only at follow-up for the 312 client starts: mean age 41 (20–73) yr, 230 men (74%), 77 women (25%), 5 transgender or nonbinary people (2%).

generally available onsite. All programs facilitated engagement with other health and social supports through onsite ancillary services, colocation within an existing facility with these supports, or referrals to proximate services.

Client characteristics

Program-specific data were not collected for all client-related data fields by 2 organizations that each operated more than 1 program (7 programs in total); organization-level data are presented instead for these organizations (Table 3; programs A–D and J–L). Data were also missing across both scans for 4 of the programs (Table 3, programs A–D) for age and gender, and total clients starts and age data were missing for 1 additional program (Table 3, program E).

Most new starts and active clients were registered by the programs operated by long-standing providers in which capacity was highest. In scan 1, 144 clients (58%) received liquid hydromorphone and 106 (42%) received diacetylmorphine. In scan 2, 164 clients (50%) received liquid hydromorphone, 107 (32%) received diacetylmorphine and 60 (18%) received tablet hydromorphone (Table 3). Clients in the new tablet hydromorphone program largely accounted for the increased number of active clients at scan 2 (60 of 81 additional clients, 74%).

Nationally, the mean age of clients decreased slightly over time (from 47 to 43 yr) and their age range (21–69 yr) remained unchanged; most active clients were male (73% [133/183] in scan 1 and 67% [143/212] in scan 2).

Barriers and facilitators

Service delivery barriers and facilitators were influenced by local resources, infrastructure and regulatory context (Table 4). Commonly reported barriers were limited program capacity, pharmacy operations (e.g., dispensing delays for programs with an internal pharmacy and lack of community pharmacy partnership options for other programs) and lack of diacetylmorphine access. Two pharmacy-based programs were put on operational hold; the rationales for this action included inadequate missed-dose protocols and challenges with dose adjustments at the shared community pharmacy. These issues had created substantial workload for staff and delays for clients.

Client-centred care, client relationships and access to other health and social services were among the most commonly identified facilitators. In programs that employed peer workers, they were almost universally reported as a strength.

Program modifications

Program modifications between scans sought to address unmet client need or improve sustainability; they included renovating facilities to increase capacity, modifying procedures to decrease prescription fill timelines (from a few days to next day), providing hepatitis C and HIV treatment onsite, offering access to one-on-one counselling, reducing the daily dose frequency to decrease staff workload and transitioning from group allocation to flexible open access.

Interpretation

Canadian iOAT programs operate in the provinces with the highest overdose death rates;¹ however, stark service gaps persist. In March 2019, national capacity was still limited, with only 405–420 places across 12 programs. Several programs had growing wait lists and many jurisdictions had no services at all despite need, including small and suburban communities²² and Canada's most populous city (Toronto), where 20% of Ontario's opioid overdose deaths occurred in 2018.²³

Where available, the provision of iOAT as an open-ended option is consistent with national and international practice and policy,^{3,11,13,14,24} as it affords flexibility to meet changing needs. A Swiss study found that approximately 30% of iOAT clients transitioned to oral OAT annually.³ Differences between the numbers of total client starts and active clients in this study may reflect similar trajectories within the opioid use disorder continuum of care. The comprehensive and dedicated model and the embedded and integrated model are being used internationally;^{3,11,15} notably Canadian implementation of the latter has extended the types of services into which iOAT has been incorporated beyond addiction centre settings. Challenges with dose adjustments and missed doses at a shared community pharmacy led to 2 pharmacy-based programs being put on hold; however, this issue appears to be amenable to mitigation with robust clinical protocols. Across all models, other health and social support provided by multidisciplinary teams was central to care, aligning with international practice,^{11,15} although peer workers appear to be employed exclusively in Canada.

In 2019, Health Canada approved injectable diacetylmorphine for urgent public health need.²⁵ Canada was the first country to approve injectable hydromorphone (also in 2019) to treat severe opioid use disorder.²⁵ These regulatory shifts removed barriers and brought Canada in line with Switzerland, Germany and the Netherlands, where a definitive legal basis exists for ongoing iOAT provision.¹¹ However, further action to improve iOAT access, particularly to diacetylmorphine, has been too slow for communities facing daily harm from a fentanyl-contaminated illicit drug supply²⁶ and the front-line workers supporting them.²⁷ Access to diacetylmorphine in Canada has remained limited to Vancouver's Crosstown Clinic, a former clinical trial site,²⁸ primarily because of regulations and because this product must be imported by licensed dealers from the manufacturer in Switzerland.³ Further changes are needed to facilitate medication access, such as domestic diacetylmorphine manufacturing to improve supply chain operations and reduce costs, and medication coverage, including for the high-concentration hydromorphone formulation, under provincial drug benefit plans. Additional funding could enable existing programs to address ongoing barriers and improve access.

Limitations

Some of the programs included in this study may have employed approaches, activities and processes that were not reported by participants. The accuracy of the study data

Table 4: Frequency with which barriers and facilitators of injectable opioid agonist programs for ongoing service delivery were reported

Barriers	No. (%) of programs	Facilitators	No. (%) of programs
Limited program capacity	7 (50)	Client-centred care (e.g., responsive to client goals and needs)	13 (93)
Pharmacy operations (e.g., dispensing delays, inadequate missed dose or dose adjustment protocols, lack of community pharmacy partner options for maintenance doses or syringe preparation)	6 (43)	Relationships with clients (e.g., rapport, trust, sense of community, client involvement in care plan)	10 (71)
Lack of diacetylmorphine access (i.e., medical heroin)	5 (36)	Access to ancillary services (e.g., other health and social services to provide wraparound care)	7 (50)
Strength of available medication too low (e.g., only 10 mg/mL in Ontario)	5 (36)	Strong relationship with community partners (e.g., overdose outreach team, other health services such as primary care, community iOAT service providers)	7 (50)
Physical space restrictions	5 (36)	Low-barrier access (e.g., service in supported housing)	6 (43)
Inadequate staff coverage or capacity	4 (29)	Harm reduction approach	5 (36)
Issues associated with oral OAT provision (e.g., none onsite, lack of access to preferred medication)	4 (29)	Rapid and simple process for new starts (e.g., same day)	5 (36)
Issues associated with management of stimulant use (e.g., ongoing concurrent use, presence of fentanyl and carfentanil in stimulants)	4 (29)	Peer workers to support engagement and clinical flow	5 (36)
Inadequate ancillary services and facilities (e.g., lack of community housing and counselling support)	4 (29)	Active client follow-up to support engagement	4 (29)
Challenges with continuity of care (e.g., from community to jail, prison or acute care; from acute care to community)	4 (29)	Pharmacy relationship (e.g., onsite pharmacy, strong partnership with community pharmacy dispensing iOAT)	4 (29)
Treatment induction issues (e.g., lag time between eligibility approval and first dose, inadequate titration protocols, prolonged wait times for split doses)	3 (21)	Housing First approach (e.g., shelter into housing)	2 (14)
Limited opening hours	3 (21)	Well-trained and knowledgeable nursing staff	2 (14)
Issues associated with group allocation as dose access structure (e.g., access barrier for clients, management challenges for staff)	3 (21)	Multiple physician prescribers to provide adequate cover for assessments, dose adjustments and oral OAT	1
Inadequate client records or tracking (e.g., paper-based records, lack of monitoring and active follow-up to support engagement)	2 (14)	Access to diacetylmorphine (i.e., medical heroin)	1
Challenges associated with engaging clients (e.g., clinical adherence, following rules and responsibilities of service)	2 (14)	Regular communication within a multidisciplinary team	1
Lack of programming for specific groups: females, youth, Indigenous people (e.g., female-only sessions)	1	Onsite provision of all medications prescribed to client	1
Lack of access to brand-name medications (i.e., access to generic hydromorphone only)	1	Establishment of a provincial reference number for hydromorphone dispensing within electronic system	1

Note: Barriers and facilitators are reported only once when: a) reported in baseline and follow-up; b) barriers/facilitators fall within the same theme for the same program. Participants reported barriers and facilitators in response to open-ended questions. iOAT = injectable opioid agonist treatment, OAT = opioid agonist treatment.

depended on the accuracy of program records and participants' engagement with other staff to gather information. To improve accountability, in future scans we will ask participants to identify all of the people who supply information they use

in their responses. Demographic data, including ethnicity and nonbinary gender data, were incomplete because of record variability. These gaps are important given the disproportionate impact of the overdose crisis on Indigenous people, as

evident in BC,²⁹ and the ongoing racial discrimination that hinders health care access in Canada.^{29,30} Gender data inaccuracies are a limitation because of the unique barriers experienced by women and gender-diverse people within male-dominated overdose-focused intervention settings.³¹ More detailed data are required to improve understanding of the racial, gender and sexual identities of iOAT clients and address inequities by responding to specific needs.^{31,32} The response bias inherent in self-report data may further limit the generalizability of the findings. It is possible that we may have missed some programs because of a lack of publicly available information and our reliance on CRISM networks. To ensure the comprehensiveness of future studies, communities of practice and provincial training and regulatory bodies should be consulted.

Conclusion

There is an urgent need to scale up iOAT, an evidence-based treatment, in Canada. This study demonstrated that iOAT can be implemented successfully using diverse service delivery models that respond to local contexts and client needs but that access remains limited. This standardized data set will enable ongoing monitoring and evaluation to inform iOAT policy and practice. Other CRISM projects will further support iOAT best practice and scale-up, including a qualitative study examining in greater depth the barriers and facilitators associated with the various service delivery models. A comprehensive mixed-methods evaluation of client experiences is underway in BC, with national expansion anticipated.

References

- Special Advisory Committee on the Epidemic of Opioid Overdoses. Opioid-related harms in Canada. Ottawa: Public Health Agency of Canada; modified 2020 Sept. 30. Available: <https://health-infobase.canada.ca/substance-related-harms/opioids> (accessed 2020 June 15).
- Wood E. Strategies for reducing opioid-overdose deaths. *N Engl J Med* 2018;378:1565-7.
- National injectable opioid agonist treatment for opioid use disorder operational guideline. Canadian Research Initiative in Substance Misuse; 2019. Available: https://crism.ca/wp-content/uploads/2019/09/CRISM_National_IOAT_Operational_Guideline-17Sept2019-English-FINAL.pdf (accessed 2019 Dec. 7).
- Irvine MA, Kuo M, Buxton JA, et al. Modelling the combined impact of interventions in averting deaths during a synthetic-opioid overdose epidemic. *Addiction* 2019;114:1602-13.
- Bruneau J, Ahamad K, Goyer M-È, et al.; CIHR Canadian Research Initiative in Substance Misuse. Management of opioid use disorders: a national clinical practice guideline. *CMAJ* 2018;190:E247-57.
- Nosyk B, Guh DP, Bansback NJ, et al. Cost-effectiveness of diacetylmorphine versus methadone for chronic opioid dependence refractory to treatment. *CMAJ* 2012;184:E317-28.
- Byford S, Barrett B, Metrebian N, et al. Cost-effectiveness of injectable opioid treatment v. oral methadone for chronic heroin addiction. *Br J Psychiatry* 2013;203:341-9.
- Dijkgraaf MGW, van der Zanden BP, de Borgie CAJM, et al. Cost utility analysis of co-prescribed heroin compared with methadone maintenance treatment in heroin addicts in two randomised trials. *BMJ* 2005;330:1297.
- Bansback N, Guh D, Oviedo-Joekes E, et al. Cost-effectiveness of hydromorphone for severe opioid use disorder: findings from the SALOME randomized clinical trial. *Addiction* 2018;113:1264-73.
- Ferri M, Davoli M, Perucci CA. Heroin maintenance for chronic heroin-dependent individuals. *Cochrane Database Syst Rev* 2011; (12):CD003410.
- Strang J, Groshkova T, Metrebian N. *New heroin-assisted treatment: recent evidence and current practices of supervised injectable heroin treatment in Europe and beyond*. Lisbon (Portugal): European Monitoring Centre for Drugs and Drug Addiction; 2012.
- Strang J, Groshkova T, Uchtenhagen A, et al. Heroin on trial: systematic review and meta-analysis of randomised trials of diamorphine-prescribing as treatment for refractory heroin addiction. *Br J Psychiatry* 2015;207:5-14.
- Guidance for injectable opioid agonist treatment for opioid use disorder. Vancouver: British Columbia Centre on Substance Use and British Columbia Ministry of Health; 2017.
- Strang L, Taylor J. *Heroin-assisted treatment and supervised consumption sites: experience from four countries*. Santa Monica (CA): RAND Corporation; 2018.
- Leece P, Tenenbaum M. *Effectiveness of supervised injectable opioid agonist treatment (sIOAT) for opioid use disorder* [evidence brief]. Toronto: Public Health Ontario; 2017.
- Oviedo-Joekes E, Guh D, Brissette S, et al. Hydromorphone compared with diacetylmorphine for long-term opioid dependence: a randomized clinical trial. *JAMA Psychiatry* 2016;73:447-55.
- Maghsoudi N, Bowles J, Werb D. Expanding access to diacetylmorphine and hydromorphone for people who use opioids in Canada. *Can J Public Health* 2020;111:606-9.
- Graham P, Evitts T, Thomas-MacLean R. Environmental scans: How useful are they for primary care research? *Can Fam Physician* 2008;54:1022-3.
- Baezconde-Garbanati L, Lienemann BA, Robles M, et al. Implementation of HPV vaccination guidelines in a diverse population in Los Angeles: results from an environmental scan of local HPV resources and needs. *Vaccine* 2017;35:4930-5.
- Bednar EM, Walsh MT Jr, Baker E, et al. Creation and implementation of an environmental scan to assess cancer genetics services at three oncology care settings. *J Genet Couns* 2018 May 16 [Epub ahead of print]. doi: 10.1007/s10897-018-0262-4.
- National injectable opioid agonist treatment for opioid use disorder clinical guideline. Canadian Research Initiative in Substance Misuse; 2019. Available: https://crism.ca/wp-content/uploads/2019/09/CRISM_National_IOAT_Clinical_Guideline-10Sep2019-English-FINAL.pdf (accessed 2019 Dec. 7).
- Opioid-related harms in Canada [report]. Ottawa: Canadian Institute for Health Information; 2018. Available: www.cihi.ca/sites/default/files/document/opioid-related-harms-report-2018-en-web.pdf (accessed 2019 Dec. 7).
- Toronto Overdose Information System: deaths (September 2019). Toronto: City of Toronto; 2019. Available: www.toronto.ca/community-people/health-wellness-care/health-inspections-monitoring/toronto-overdose-information-system/ (accessed 2019 Dec. 7).
- Atlas on substance use (2010): resources for the prevention and treatment of substance use disorders. Geneva: World Health Organization; 2010.
- Government of Canada approves new treatment options for opioid use disorder and supports research, treatment and harm reduction projects in Ontario [news release]. Ottawa: Health Canada; 2019 May 15. Available: www.canada.ca/en/health-canada/news/2019/05/government-of-canada-approves-new-treatment-options-for-opioid-use-disorder-and-supports-research-treatment-and-harm-reduction-projects-in-ontario.html (accessed 2019 Dec. 7).
- Lovgreen T. Barriers remain for accessing pharmaceutical-grade heroin. *CBC News* 2018 Mar. 28. Available: www.cbc.ca/news/canada/british-columbia/heroin-prescription-by-doctors-now-say-drug-users-1.4596170 (accessed 2019 Dec. 7).
- Kolla G, Dodd Z, Ko J, et al. Canada's overdose crisis: authorities are not acting fast enough. *Lancet Public Health* 2019;4:e180.
- Oviedo-Joekes E, Brissette S, Marsh DC, et al. Diacetylmorphine versus methadone for the treatment of opioid addiction. *N Engl J Med* 2009; 361:777-86.
- Overdose data and First Nations in BC: preliminary findings. West Vancouver (BC): First Nations Health Authority; 2017.
- LaValley J, Kastor S, Valleriani J, et al. Reconciliation and Canada's overdose crisis: responding to the needs of Indigenous Peoples. *CMAJ* 2018; 190:E1466-7.
- Boyd J, Collins A, Mayer S, et al. Gendered violence and overdose prevention sites: a rapid ethnographic study during an overdose epidemic in Vancouver, Canada. *Addiction* 2018;113:2261-70.
- Collins AB, Bardwell G, McNeil R, et al. Gender and the overdose crisis in North America: moving past gender-neutral approaches in the public health response. *Int J Drug Policy* 2019;69:43-5.

Affiliations: British Columbia Centre on Substance Use (Eydt, Glegg, Sutherland, Fairbairn); Department of Medicine (Glegg, Fairbairn), University of British Columbia, St. Paul's Hospital; Department of Family Medicine (Sutherland), University of British Columbia; PHS Community Services Society (Sutherland), Vancouver, BC; Alberta Health Services (Meador), Royal Alexandra Hospital; Department of Family Medicine (Meador), University of Alberta, Edmonton, Alta.; Alberta Health Services (Trew), Foothills Medical Centre; Department of Psychiatry (Trew), University of Calgary, Calgary, Alta.; Department of Psychiatry (Perreault), McGill University; Douglas Hospital Research Centre (Perreault); Department of Family Medicine (Goyer), University of Montreal, Montréal, Que.; Centre for Addiction and Mental Health (Le Foll), Toronto, Ont.; Ottawa Inner City Health (Turnbull), Ottawa, Ont.

Contributors: Erin Eydt created the scan framework, collected and analyzed data, drafted the manuscript and led the revision process.

Nadia Fairbairn conceptualized the environmental scan and provided guidance and feedback on all aspects of the scan process and manuscript development. Christy Sutherland, Karine Meador, Michael Trew, Michel Perreault, Marie-Ève Goyer, Bernard Le Foll and Jeff Turnbull reviewed and approved the scan framework. Stephanie Glegg analyzed data and conducted the data validation process before publication. All authors were involved in the revision of the manuscript, gave final approval of the version to be published and agreed to be accountable for all aspects of the work.

Funding: This work was undertaken through a Canadian Institutes of Health Research (CIHR) Emergency Health Threat grant awarded to the Canadian Research Initiative in Substance Misuse (FRN 154824). Stephanie Glegg is supported by a CIHR fellowship. Nadia Fairbairn is supported by a Michael Smith Foundation for Health Research – St. Paul’s Foundation Scholar Award. The BC Ministry of Health provided funding for some of the injectable opioid agonist treatment (iOAT) programs in BC. The views expressed by the authors are their own and not an official position of the funders or the authors’ institutions.

Content licence: This is an Open Access article distributed in accordance with the terms of the Creative Commons Attribution (CC BY-NC-ND 4.0) licence, which permits use, distribution and reproduction in any medium, provided that the original publication is properly cited, the use

is noncommercial (i.e., research or educational use), and no modifications or adaptations are made. See: <https://creativecommons.org/licenses/by-nc-nd/4.0/>

Data sharing: De-identified participant data and the electronic data collection form are available for noncommercial use from karen.mccrae@bccsu.ubc.ca.

Acknowledgements: The authors thank all participants and other staff who participated in this scan for sharing their knowledge, experiences and reflections of clinical iOAT service delivery. The authors also thank Nirupa Goel and Shirley Wong for their support as the Canadian Research Initiative in Substance Misuse node managers for British Columbia, as well as Cheyenne Johnson, Seonaid Nolan, Steffanie Fisher, Chiarine Hsu, Kevin Hollett and Sandra Smiley. Furthermore, the authors extend thanks to the Canadian Research Initiative in Substance Misuse principal investigators, Evan Wood, Jürgen Rehm, Cameron Wild and Julie Bruneau, and other staff, for ongoing support of the Canadian Research Initiative in Substance Misuse program of research.

Supplemental information: For reviewer comments and the original submission of this manuscript, please see www.cmajopen.ca/content/9/1/E115/suppl/DC1.