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# Impact of the COVID-19 pandemic on the prevalence of opioid agonist therapy discontinuation in Ontario, Canada: A population-based time series analysis

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## ABSTRACT

**Background:** We assessed the impact of COVID-19, which includes the declaration of a state of emergency and subsequent release of pandemic-specific OAT guidance (March 17, 2020 to March 23, 2020) on the prevalence of OAT discontinuation.

**Methods:** We conducted a population-based time series analysis using interventional autoregressive integrated moving average models among Ontario residents who were stable (>60 days of continuous use) and not yet stable on OAT. Specifically, we examined whether COVID-19 impacted the weekly percentage of individuals who discontinued OAT, overall and stratified by treatment type (methadone vs. buprenorphine/naloxone). Additionally, we compared demographic characteristics and patient outcomes among people stable on OAT who discontinued treatment during (March 17, 2020 to November 30, 2020) and prior (July 3, 2019 to March 16, 2020) to the pandemic.

**Results:** The weekly prevalence of OAT discontinuation across the study period ranged between 0.6% and 1.1%, among those stable on treatment compared to 7.3% and 16.6%, among those not stable on treatment. Following COVID-19, there was no significant change in the percentage of Ontarians who discontinued OAT, regardless of whether they were stabilized on treatment. Among those stable on OAT, a similar proportion of patients restarted therapy and experienced opioid-related harm following an OAT discontinuation. However, mortality following OAT discontinuation must be noted, as approximately 1.4% and 0.8% of people who discontinued methadone and buprenorphine/naloxone respectively, died within 30 days of discontinuation.

**Conclusions:** Trends in the prevalence of OAT discontinuation did not significantly change during the first eight months of the COVID-19 pandemic.

## 1. Introduction

Opioid agonist therapy (OAT) with methadone or buprenorphine/

naloxone reduces the risk of all-cause and opioid-related mortality in patients with opioid use disorder (OUD) (Sordo et al., 2017; Bruneau et al., 2018; Medications for Opioid Use Disorder, 2018). Despite strong

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evidence supporting the use of OAT, access and adherence to treatment are limited by a combination of factors including the need for frequent supervised dosing, frequent medical appointments, inequitable access to trained clinicians, and avoidance of methadone clinics due to patient perceived stigma (Bell and Strang, 2020; Yarborough et al., 2016; Timko et al., 2016; Sharma et al., 2017). The onset of the COVID-19 pandemic has further exacerbated these barriers, with stay-at-home orders and the need for physical distancing adversely impacting access to in-person healthcare services including prescriber visits for clinical assessments and OAT prescriptions, along with pharmacy attendance for medication dispensing (Dong et al., 2020; Federal Guidelines for Opioid Treatment Programs, 2021). Consequently, concern has been raised that COVID-19 could further undermine treatment adherence and retention in OAT, thereby increasing the risk of overdose and death in patients with OUD (Dunlop et al., 2020).

In Ontario, Canada, a state of emergency for COVID-19 was declared on March 17, 2020 (Government of Ontario, 2020), including public health measures such as stay-at-home orders, physical distancing and reduced work hours at many healthcare facilities to prevent the spread of COVID-19. To mitigate the impact of these changes on OAT recipients, new guidance for the management of OAT was developed by Ontario clinicians with expertise in addiction medicine, and was released on March 22, 2020 (Lam et al., 2020). Specifically, to support physical distancing and reduce the risk of exposure to COVID-19 while maintaining continuity of OAT, this guidance recommended increasing access to take-home doses, utilizing telephone or virtual clinical assessments, and reducing the requirement for urine drug screens (Lam et al., 2020). However, it is currently unknown how the declaration of state of emergency for COVID-19 and the subsequent change in OAT prescribing guidance has impacted treatment adherence among patients on OAT.

Therefore, our objective was to investigate the impact of COVID-19, which includes the declaration of a state of emergency and subsequent change in OAT guidance, on OAT discontinuation in order to inform long-term strategies for the delivery of OAT in Canada.

## 2. Methods

### 2.1. Study design and setting

We conducted a retrospective, population-based time series analysis using interventional autoregressive integrated moving average models to examine the prevalence of discontinuation for methadone and buprenorphine/naloxone among residents of Ontario, Canada between April 2, 2019, and November 30, 2020.

### 2.2. Data sources

We used Ontario's administrative health databases, which are securely linked using unique, encoded identifiers and analyzed at ICES. ICES (formerly known as the Institute for Clinical Evaluative Sciences) is an independent, non-profit research institute whose legal status under Ontario's health information privacy law allows it to collect and analyze health care and demographic data, without consent, for health system evaluation and improvement. To identify pharmacy claims for methadone, buprenorphine/naloxone, and other opioids, we used the Narcotics Monitoring System (NMS), which captures all prescriptions for controlled substances dispensed from community pharmacies in Ontario, regardless of payer. We used the Registered Persons Database, a registry of all individuals eligible for the publicly funded Ontario Health Insurance Plan (OHIP), to ascertain demographic characteristics for all people dispensed OAT over the study period. Additionally, we identified hospital admissions and emergency department visits using the Canadian Institute for Health Information's Discharge Abstract Database and National Ambulatory Care Reporting System, respectively. Data used in this project is authorized under section 45 of Ontario's Personal Health

Information Protection Act, which does not require review by a Research Ethics Board.

### 2.3. Study population and outcome measures

We constructed three cohorts, comprising individuals prescribed 1) OAT overall, 2) methadone, or 3) sublingual buprenorphine/naloxone by a physician or nurse practitioner at any point during the study period. First, we identified continuous use periods of OAT on the basis of no gaps in therapy of 14 days or more. Specifically, we defined OAT discontinuation as the absence of a subsequent pharmacy claim (i.e., refill) for methadone or buprenorphine/naloxone within 14 days beyond the day's supply of the previously dispensed prescription. We included multiple periods of continuous use over the study period for those individuals meeting our inclusion criteria several times over the study period. Patients receiving slow-release oral morphine (SROM) were not included in our cohort definition because SROM is not as commonly prescribed for the purposes of OAT in Ontario, Canada. Within each cohort, we excluded continuous use period(s) among individuals without a valid Ontario health card number to allow for linkage to the ICES data repository. In our primary analysis, to restrict to individuals stabilized on OAT, we excluded continuous use periods where an individual received OAT for less than or equal to 60 days. We chose 60 days of continuous treatment as the threshold for stabilization based on Ontario's OAT prescribing guidelines, which considers an individual eligible for take-home doses after 2 months of continuous therapy (Centre for Addiction and Mental Health, 2021). Individuals stabilized on therapy were followed forward from day 61 to assess the primary outcome of OAT discontinuation, discontinuations that resulted because of death or a switch to long-acting buprenorphine were censored and not included in the primary outcome definition (Supplementary table 1). In analyses stratified by OAT type, we also censored individuals upon switch between OAT types (i.e. from methadone to buprenorphine or vice versa) (Supplementary table 1). In the primary analysis, the numerator was defined as the weekly count of individuals who discontinued OAT, and the denominator was the total number of individuals stable on OAT during the week of interest.

In a secondary analysis, we compared demographic characteristics and patient outcomes between individuals who discontinued OAT during the pandemic (between March 17, 2020 and November 30, 2020) and those who discontinued OAT over an identical time period prior to the pandemic (July 3, 2019, to March 16, 2020). Specifically, we assessed age, sex and rurality of residence on the start date of each period, and described several patient outcomes following OAT discontinuation, including re-initiation of methadone, sublingual buprenorphine/naloxone or long acting buprenorphine within 60 days and dispensing of slow-release oral morphine (SROM) or hydromorphone within 14 days, as SROM is considered second-line therapy for OUD and hydromorphone has been used in several community-based 'safer supply' programs (Harris et al., 2021). Along with any emergency department visit or inpatient hospitalization with a diagnosis of opioid toxicity within 14 days (International Statistical Classification of Diseases and Related Health Problems, 10th Revision, diagnosis codes T40.0, T40.1, T40.2, T40.3, T40.4, T40.6), and death from any cause within 14- and 30-days following OAT discontinuation.

### 2.4. Sensitivity analysis

In a post-hoc sensitivity analysis, we explored the prevalence of OAT discontinuation among individuals who were not yet stable on therapy and did not receive a prescription for OAT in the 14 days prior to the start of their continuous use period. Individuals included in the sensitivity analysis met all inclusion criteria with the exception of the requirement of stabilization on OAT for at least 60 days. Instead, we restricted the cohort to those individuals who were in their first 60 days of OAT, thus representing a population not yet stable on therapy. In this

analysis, individuals were followed until they experienced the outcome (OAT discontinuation), or were censored due to death. The weekly prevalence of OAT discontinuation was calculated as the weekly number of individuals who discontinued OAT within the first 60 days of treatment among the denominator of all individuals in their first 60 days of therapy with an overlapping continuous use period for OAT during the week of interest.

2.5. Statistical analysis

We used autoregressive integrated moving average (ARIMA) (Schaffer et al., 2021) models to assess changes in the percentage of people who discontinued OAT, overall and stratified by treatment type, between April 2, 2019 and November 30, 2020. Specifically, we examined the impacts of COVID-19, which included the declaration of the state of emergency and the subsequent change in guidance for OAT management during the week of March 17, 2020 to March 23, 2020, on trends in the prevalence of OAT discontinuation. We included ramp and step transfer functions to test for gradual and immediate changes in rates of discontinuation after the intervention, respectively. To achieve stationarity in the models, we used differencing terms and confirmed stationarity using the augmented Dickey-Fuller test. We selected model parameters using the residual autocorrelation function (ACF), partial autocorrelation function (PACF), and inverse autocorrelation function (IACF) correlograms. Lastly, we chose the final model using the autocorrelation plots and the Ljung-Box chi-square test for white noise. We used standardized differences to compare demographic characteristics and outcomes between individuals who discontinued methadone or

buprenorphine/naloxone in the pre-pandemic and pandemic periods, with differences greater than 0.1 considered meaningful (Andrade et al., 2012). All analyses were conducted using SAS (Enterprise Guide v 7.1, SAS Institute, Cary, NC) and used a type 1 error rate of 0.05.

2.6. Involvement of people with lived experience

The Ontario Drug Policy Research Network hosts a Lived Experience Advisory Group (LEAG), which consists of people with living and lived experience with opioid use. The LEAG provided feedback on the study approach and the measures included. We also engaged with LEAG member, Charlotte Munro, who provided feedback on study methods and helped contextualize the results.

3. Results

After application of our exclusion criteria, we identified 80,799 stable use periods of OAT (51,195 methadone; 30,446 buprenorphine/naloxone; Fig. 1 in supplementary materials) among 63,941 unique individuals (41,919 methadone; 24,320 buprenorphine/naloxone). Additionally, we identified 641 and 2632 unique prescribers for methadone and buprenorphine/naloxone, respectively.

Over the study period, the weekly prevalence of overall OAT discontinuation ranged between 0.6% and 1.1%, with some variation according to type of OAT. Specifically, discontinuation of buprenorphine/naloxone was generally more frequent (range 0.7–1.5%) than discontinuation of methadone (range 0.6–1.0%; Fig. 1). Despite some small fluctuations, the prevalence of OAT discontinuation remained

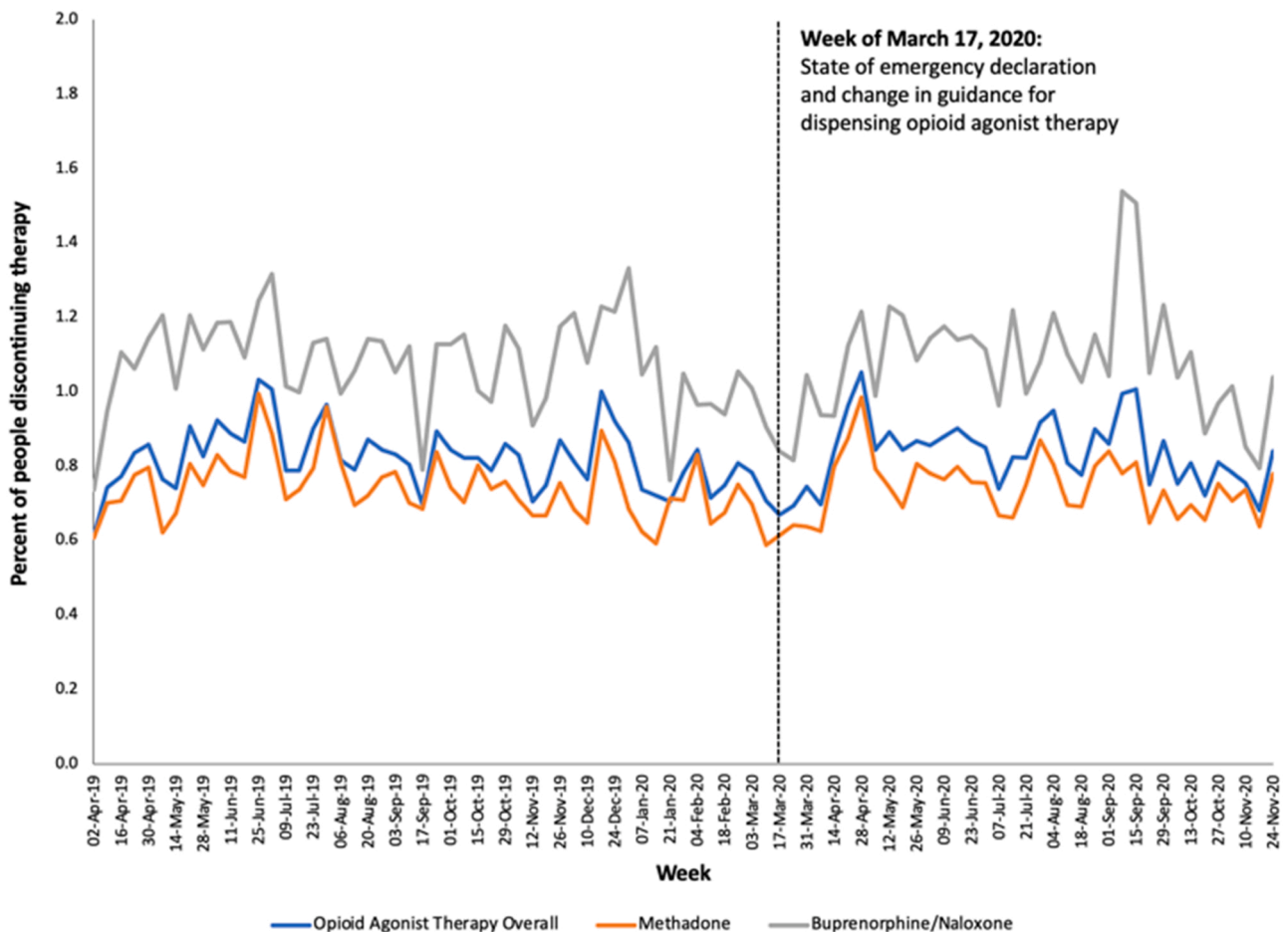


Fig. 1. Weekly percentage of people who discontinued 1) opioid agonist therapy overall, 2) methadone and 3) buprenorphine/naloxone, among those previously stable on OAT between April 2nd, 2019, to November 30th, 2020, Ontario.

largely stable over the study period among those stable and not yet stable on therapy. In our main analysis, we observed no significant step change in the weekly percentage of Ontarians who discontinued OAT overall (−0.05%; 95% confidence interval (CI) − 0.20–0.09%;  $p = 0.48$ ), methadone (−0.01%; 95% CI −0.14% to 0.12%;  $p = 0.93$ ) or buprenorphine/naloxone (−0.08%; 95% CI −0.39% to 0.04%;  $p = 0.48$ ) following the declaration of the state of emergency in Ontario and subsequent release of new guidance for OAT provision. Similarly, there were no significant changes in the slope of weekly percentage of OAT discontinuation during the study period, overall (0.00%; 95% CI −0.01% to 0.02%;  $p = 0.72$ ), and in stratified analyses of methadone (0.00%; 95% CI −0.01% to 0.01%;  $p = 0.64$ ) or buprenorphine/naloxone (0.00%; 95% CI −0.02% to 0.02%;  $p = 0.87$ ) (Table 1).

### 3.1. Sensitivity analysis

After application of our exclusion criteria, we identified 84,325 unstable use periods of OAT (49,486 methadone; 41,773 buprenorphine/naloxone; Fig. 1 in supplementary materials) among 41,172 unique individuals (24,887 methadone; 24,353 buprenorphine/naloxone). Among individuals not yet stable on therapy, the weekly prevalence of OAT discontinuation ranged between 7.3% and 16.6%, with discontinuation of methadone being generally more frequent (range 6.5–21.5%) than that of buprenorphine/naloxone (range 7.6–12.3%; Fig. 2). Results of time series analyses were consistent with the primary analysis. Among those not yet stable on therapy, we observed no significant step or slope change in the weekly percentage of Ontarians who discontinued OAT overall (step function:  $p = 0.62$ ; slope function:  $p = 0.63$ ), or by OAT type (methadone: step function:  $p = 0.82$ ; slope function:  $p = 0.73$ ; buprenorphine/naloxone: step function:  $p = 0.28$ ; slope function:  $p = 0.53$ ; Table 1).

In the secondary analysis comparing demographic characteristics and outcomes, we identified 12,586 people who discontinued OAT prior to the pandemic, of which 7395 (58.8%) discontinued methadone and 5191 (41.2%) discontinued buprenorphine/naloxone. During the pandemic, 10,475 people discontinued OAT, of which 5947 (56.8%) discontinued methadone and 4528 (43.2%) discontinued buprenorphine/naloxone. The majority of individuals who discontinued either methadone or buprenorphine/naloxone were between the ages of 25 and 44 years, approximately two-thirds were male, and over 80% resided in urban settings (Table 2). There were no meaningful differences between the demographic characteristics of people who discontinued OAT prior to and during the pandemic (Table 2).

Patient outcomes after methadone discontinuation did not meaningfully differ between the pre-pandemic and pandemic periods (Table 3). Specifically, the proportion of individuals re-starting OAT

within 60 days of methadone discontinuation in the pre-pandemic and pandemic periods were 52.7% (N = 3900) and 49.8% (N = 2960), respectively. Respective values for patients discontinuing buprenorphine/naloxone was 54.0% (N = 2804) and 56.8% (N = 2571). The only meaningful change was the proportion of individuals who restarted long-acting buprenorphine within 60 days of discontinuation, rising to 2.2% (N = 98) during the pandemic period (standardized difference > 0.1). In addition, the proportion of patients hospitalized for opioid toxicity within 14 days of discontinuing methadone was 0.5% (N = 38) and 0.8% (N = 47) in the pre-pandemic and pandemic periods, respectively. Similarly, 0.6% of buprenorphine/naloxone patients were hospitalized for opioid toxicity within 14 days of discontinuing this drug, in both the pre-pandemic (N = 30) and pandemic periods (N = 25). The proportion of patients who died within 30 days of methadone discontinuation in the pre-pandemic and pandemic periods was 1.5% (N = 114) and 1.4% (N = 83), respectively. Finally, respective values for patients discontinuing buprenorphine/naloxone were 0.9% (N = 49) and 0.8% (N = 38) (Table 3).

## 4. Discussion

In this large, population-based study, the declaration of a state of emergency and subsequent change in guidance for the management of OAT did not lead to significant changes in the prevalence of OAT discontinuation among Ontarians receiving OAT, regardless of whether they were stabilized on treatment. Among those stable on OAT, patient outcomes following treatment discontinuation were comparable between pre-pandemic and pandemic periods, with a similar proportion of patients restarting therapy and experiencing opioid-related harm. However, it should be noted that approximately 0.6% of people who discontinued OAT were hospitalized for opioid toxicity within 14 days, and an even larger proportion of people (approximately 0.8%) died within 30 days of OAT discontinuation. These findings reinforce the need for interventions, such as expansion of harm reduction services (i.e., safer spaces to use drugs, access to naloxone and recovery support services) and low-barrier OAT to support treatment retention and stem occurrence of opioid poisonings.

Disruptions in OAT are associated with considerable morbidity and mortality in patients with OUD, with a Canadian study demonstrating a 2-fold increase in mortality upon treatment discontinuation (Pearce et al., 2020). Importantly, this risk further increases in settings where the unregulated drug supply predominantly contains fentanyl, such as Ontario (Pearce et al., 2020; Gomes et al., 2022). Our findings further support the protective benefits of pandemic-specific OAT guidance, as the prevalence of OAT discontinuation remained stable during the pandemic and pre-pandemic time periods of our study, suggesting

**Table 1**  
Results of the Interventional ARIMA Analysis.

Primary Analysis: Individuals stable on OAT	Model 1: Overall OAT		Model 2: Methadone		Model 3: Buprenorphine/Naloxone	
	(3,1,0) no intercept		(4,1,0) no intercept		(3,1,0) no intercept	
ARIMA Model	Estimate (95% CI)	p-value	Estimate	p-value	Estimate	p-value
Interventions:						
COVID-19 pandemic <sup>a</sup> : (step function)	-0.05 (−0.20, 0.09)	0.48	-0.01 (−0.14, 0.12)	0.93	-0.08 (−0.39, 0.04)	0.48
COVID-19 pandemic <sup>a</sup> : (ramp function)	0.00 (−0.01, 0.02)	0.72	0.00 (−0.01, 0.01)	0.64	0.00 (−0.02, 0.02)	0.87
<b>Sensitivity Analysis: Individuals not stable on OAT</b>						
ARIMA Model	(6,1,0) no intercept		(7,1,0) no intercept		(2,1,0) no intercept	
Interventions:	Estimate (95% CI)	p-value	Estimate	p-value	Estimate	p-value
COVID-19 pandemic <sup>a</sup> : (step function)	-0.48 (−2.38, 1.43)	0.62	-0.31 (−3.04, 2.43)	0.82	-0.82 (−2.31, 0.66)	0.28
COVID-19 pandemic <sup>a</sup> : (ramp function)	0.04 (−0.12, 0.20)	0.63	0.04 (−0.17, 0.24)	0.73	0.05 (−0.11, 0.21)	0.53

<sup>a</sup> Impacts of the COVID-19 pandemic include the declaration of state of emergency in Ontario, Canada and the subsequent release of new guidance of the provision of OAT.

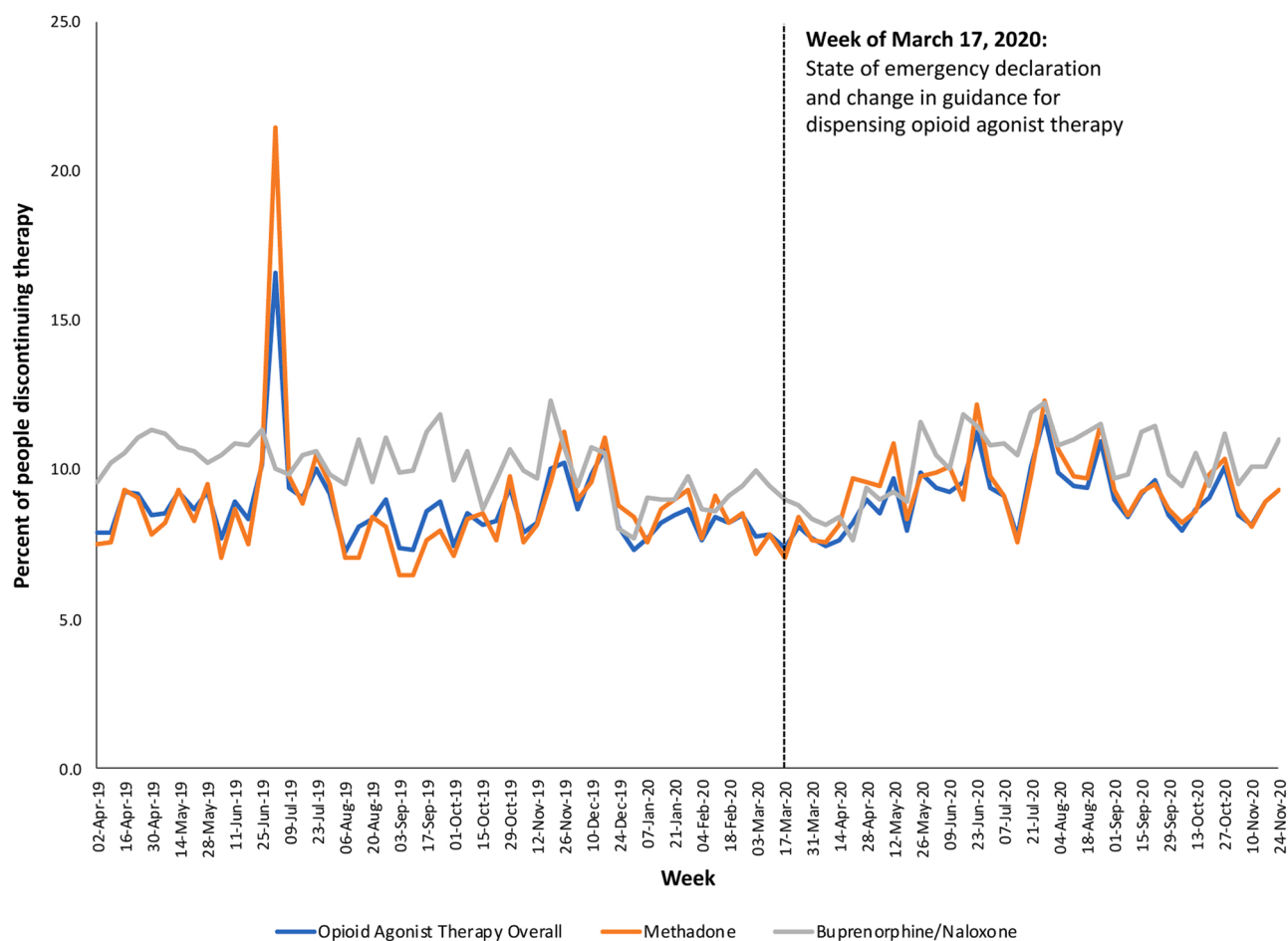


Fig. 2. Weekly percentage of people who discontinued 1) opioid agonist therapy overall, 2) methadone and 3) buprenorphine/naloxone, among those previously not stable on OAT between April 2nd, 2019, to November 30th, 2020, Ontario.

patients with OUD were able to access care during the first eight months of the pandemic. The pandemic specific OAT guidance offered many recommendations, such as increased access to take-home doses, utilization of telemedicine, and reduced requirements for urine drug screens, all aimed towards supporting provision of OAT despite disrupted access to in-person care (Lam et al., 2020). While we cannot disentangle the effects of each recommendation, we believe increased access to take-home dosing among patients previously not eligible for this type of dispensing including those stable and unstable on OAT, most likely supported treatment retention, as patients often describe the need for daily or nearly-daily witnessed dispensing as the primary reason for treatment discontinuation (Frank et al., 2021; Amram et al., 2021). These findings align with a study conducted by Gomes et al., that found increased access to take-home dosing during the pandemic was significantly associated with lower rates of OAT discontinuation and did not significantly increase the occurrence of opioid-related overdoses in Ontario, Canada (Gomes et al., 2022).

The majority of individuals who discontinued after being stabilized on therapy were between the ages of 24–44, male and resided in urban locations. This is consistent with the current literature and the demographics of the majority of OAT recipients (Gomes et al., 2022; Ontario Drug Policy Research Network, 2018). Additionally, the prevalence of buprenorphine/naloxone discontinuation was greater than methadone among individuals stable on therapy. This finding is well established in previous literature, as treatment retention rates have been historically greater among methadone recipients in comparison to buprenorphine/naloxone (Hser et al., 2014). Lastly, while a considerable number of individuals previously stable on therapy discontinued

OAT throughout the study period, the prevalence of OAT re-initiation following discontinuation remained stable over the pandemic and pre-pandemic time periods, with approximately 50% of study participants re-starting OAT within two months of treatment discontinuation. Our results align with findings from the BC Centre of Disease Control, who state the number of unique patients dispensed OAT in the Canadian province of British Columbia (released similar pandemic-specific OAT guidance) remained largely stable throughout the pandemic (BC Centre of Disease Control, 2021). Overall, findings suggest the rapid dissemination of guidance early in the pandemic allowed for patients to remain engaged with a healthcare provider despite pandemic related disruptions in healthcare services.

Indeed, retaining individuals on OAT during the pandemic likely prevented a considerable increase in opioid-related harms. While the prevalence of opioid toxicity events and all-cause mortality subsequent to OAT discontinuation remained stable during the pandemic, the high occurrence of all-cause mortality following disengagement from OAT must be noted. This is especially apparent following methadone discontinuation, where 1.4% of individuals died within 30 days of discontinuation during the pandemic. These results align with other literature demonstrating the high risk of overdose and death following methadone discontinuation (Pearce et al., 2020), and further highlight the need for harm reduction services to support safer opioid use, particularly soon after OAT discontinuation. Additionally, adjunctive psychosocial supports, such as contingency management and cognitive behavioural therapy, have been shown to improve treatment retention compared to standard therapy (i.e., OAT only) alone (Rice et al., 2020; George et al., 2021; Dugosh et al., 2016).

**Table 2**

Comparative demographics among individuals previously stable on therapy who discontinued methadone or buprenorphine/naloxone prior to, and during the COVID-19 pandemic.

Demographic Characteristic	Discontinued OAT Prior to the Pandemic <sup>a</sup>	Discontinued OAT During the Pandemic <sup>b</sup>	Standardized difference
Methadone	N = 7395	N = 5947	
Age			
0–24	397 (5.4%)	274 (4.6%)	0.03
25–44	5001 (67.6%)	4097 (68.9%)	0.03
45–64	1847 (25.0%)	1472 (24.8%)	0.01
≥ 65	150 (2.0%)	104 (1.7%)	0.02
Sex			
Female	2695 (36.4%)	2184 (36.7%)	0.01
Male	4700 (63.6%)	3763 (63.3%)	0.01
Residence			
Rural	870 (11.8%)	706 (11.9%)	0.00
Urban	6453 (87.3%)	5170 (86.9%)	0.01
Buprenorphine/naloxone	N = 5191	N = 4528	
Age			
0–24	361 (7.0%)	314 (6.9%)	0.00
25–44	3042 (58.6%)	2699 (59.6%)	0.02
45–64	1536 (29.6%)	1331 (29.4%)	0.00
≥ 65	252 (4.9%)	184 (4.1%)	0.04
Sex			
Female	2001 (38.5%)	1718 (37.9%)	0.01
Male	3190 (61.5%)	2810 (62.1%)	0.01
Residence			
Rural	849 (16.4%)	900 (19.9%)	0.09
Urban	4310 (83.0%)	3596 (79.4%)	0.09

<sup>a</sup> Discontinued opioid agonist therapy between July 3rd, 2019, to March 16th, 2020.

<sup>b</sup> Discontinued opioid agonist therapy between March 17th, 2020, to November 30th, 2020.

Our results align with, and build upon, studies conducted in countries that have also expanded OAT take-home dose capacities during the COVID-19 pandemic. Specifically, in the United States, the Substance Abuse and Mental Health Services Administration (SAMHSA) released guidance to support patients recommending greater flexibility in the provision of take-home OAT doses during the pandemic. One study examining the impact of this guidance found an increase in buprenorphine/naloxone claims dispensed from March through August 2020 (Clement et al., 2021). In addition, the number of patients receiving 14-day take-home doses of methadone in the State of Connecticut, increased by 89% following the onset of COVID-19 and SAMHSA’s change in guidance, with no subsequent increase in methadone-involved fatalities (Brothers et al., 2021). Finally, a cross-sectional study in Ukraine reported a modest increase in the number of patients receiving both methadone and buprenorphine in June 2020 when compared to March 2020, suggesting trends in OAT use remained largely unchanged (Meteliuk et al., 2021). Our study advances the literature by conducting a large population-based analysis of the impact of COVID-19 on the prevalence of OAT discontinuation and patient outcomes after discontinuation, specifically among individuals who were stable on therapy. Additionally, by determining the prevalence of OAT discontinuation overall and when stratified by medication, we were able to determine the impacts of COVID-19 on methadone and buprenorphine/naloxone discontinuation separately.

A core strength of our study is the use of a large, population-based database of prescription dispensing records which comprehensively capture all individuals stable on methadone and buprenorphine/naloxone. However, our study has some limitations. First, due to the close proximity of the declaration of state of emergency (March 17, 2020) and release of new OAT management guidance (March 22, 2020), we were unable to disentangle the impacts of these two events on the prevalence of OAT discontinuation. However, it is likely that release of the new OAT guidance prevented disruptions in therapy that may have

**Table 3**

Comparative patient outcomes after methadone or buprenorphine/naloxone discontinuation among those previously stable on therapy prior to, and during the COVID-19 pandemic.

Patient Outcome	Discontinued OAT Prior to the Pandemic <sup>a</sup>	Discontinued OAT During the Pandemic <sup>b</sup>	Standardized difference
Methadone	N = 7395	N = 5947	
Restart OAT within 60 days of discontinuation <sup>c</sup>	3900 (52.7%)	2960 (49.8%)	0.06
Restart methadone	3366 (45.5%)	2580 (43.4%)	0.04
Restart buprenorphine/naloxone	704 (9.5%)	509 (8.6%)	0.03
Restart long-acting buprenorphine	0 (0.0%)	19 (0.3%)	0.08
Start opioid prescription within 14 days of discontinuation			
Slow release oral morphine	61 (0.8%)	48 (0.8%)	0.00
Hydromorphone immediate release	96 (1.3%)	85 (1.4%)	0.01
Hydromorphone long acting	52 (0.7%)	43 (0.7%)	0.00
Death after discontinuation			
Within 14 days	97 (1.3%)	56 (0.9%)	0.04
Within 30 days	114 (1.5%)	83 (1.4%)	0.01
Hospital visit for opioid toxicity within 14 days of discontinuation	38 (0.5%)	47 (0.8%)	0.03
Buprenorphine/naloxone	N = 5911	N = 4528	
Restart OAT within 60 days of discontinuation <sup>c</sup>	2804 (54.0%)	2571 (56.8%)	0.06
Restart methadone	421 (8.1%)	467 (10.3%)	0.08
Restart buprenorphine/naloxone	2434 (46.9%)	2110 (46.6%)	0.00
Restart long-acting buprenorphine	≤ 5	98 (2.2%)	> 0.10
Start opioid prescription within 14 days of discontinuation			
Slow release oral morphine	31 (0.6%)	17 (0.4%)	0.03
Hydromorphone immediate release	101 (1.9%)	63 (1.4%)	0.04
Hydromorphone long acting	41(0.8%)	26 (0.6%)	0.03
Death after discontinuation			
Within 14 days	32 (0.6%)	26 (0.6%)	0.00
Within 30 days	49 (0.9%)	38 (0.8%)	0.01
Hospital visit for opioid toxicity within 14 days of discontinuation	30 (0.6%)	25 (0.6%)	0.00

<sup>a</sup> Discontinued opioid agonist therapy between July 3rd, 2019, to March 16th, 2020.

<sup>b</sup> Discontinued opioid agonist therapy between March 17th, 2020, to November 30th, 2020.

<sup>c</sup> Categories are not mutually exclusive.

occurred due to the declaration of state of emergency in Ontario. Next, our data does not capture dispensing records among individuals in correctional institutions or those administered as part of treatment while in hospital; however, this is likely to represent a small fraction of all individuals who are stable on OAT in Ontario. Additionally, we were unable to examine the impacts of demographic and structural barriers to

OAT adherence, including race, immigration status and housing status.

## 5. Conclusion

Despite concerns that the pandemic and associated changes in health care access and delivery would result in the destabilization of individuals on OAT, trends in the prevalence of treatment discontinuation among OAT recipients did not significantly change during the first eight months of the pandemic. Importantly, this finding was consistent both among those stabilized on therapy, and those who had more recently initiated OAT. This suggests that, despite pandemic-related changes to the provision of care across the province, rapid dissemination of guidance for the management of OAT early in the pandemic that included increased access to take home doses, adoption of virtual visits, and reduced frequency of urine drug screening may have supported continuity of care among this population of people who frequently interact with the healthcare system. Future research is needed to further elucidate the impacts of this changing guidance on patient outcomes, particularly with expanded access to longer take-home doses of methadone and buprenorphine/naloxone.

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## CRediT authorship contribution statement

All authors contributed to study design and provided a critical revision of manuscript. SK and SM were the primary data analyst for this study. RG, SK, TC and TG contributed to data interpretation. RG drafted the manuscript.

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## Conflict of interest

Jennifer Wyman participated as an author in the March 2020 opioid agonist therapy guidance document that was released in Ontario in March 2020 and is referred to in this manuscript. No other authors have any competing interests to declare.

## Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at [doi:10.1016/j.drugalcdep.2022.109459](https://doi.org/10.1016/j.drugalcdep.2022.109459).

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