CoLab Network

CDA-AMC Canada's Drug Agency
L'Agence des médicaments du Canada

March 2025

Drugs Health Technologies Health Systems

Observational Study

Trends in Opioid Prescribing in Canada, 2018 to 2022

Authors: Tara Gomes, Bisola Hamzat, Alice Holton, Dana Shearer, Daniel McCormack, Joanna Yang, Dean Eurich, Jason R. Randall, Zhaoyu Liu, Houssem Missaoui, Jean-Luc Kaboré, and Grace Cheung

This observational study was conducted by the Ontario Drug Policy Research Network (ODPRN) through the Post-Market Drug Evaluation CoLab Network.

Key Messages

We conducted a population-based cross-sectional study to describe trends in prescription opioid use for pain and opioid agonist therapy (OAT) from January 2018 to December 2022 and to describe patterns in prescription opioid use before inpatient hospitalizations and emergency department (ED) visits for opioid toxicities during the same time period.

This study used **pharmacy dispensing data from 6 Canadian provinces**: British Columbia, Alberta, Saskatchewan, Manitoba, Ontario, and Quebec. Data availability varied by province and included pharmacy dispensing data, hospitalization records, and ED visit records.

Trends in Prescription Opioid Use for Pain and OAT

Monthly rates of new and overall use of prescription opioids for pain declined across all provinces. Rates of new use were similar across provinces, while rates of overall use were highest in Manitoba and lowest in British Columbia.

New use of opioids for pain was higher among females, those aged 75 years and older, those living in lower income quintile neighbourhoods, and rural residents. More than 80% of the new use of opioids for pain was at initial doses of 50 morphine milligram equivalents (MME) or less across provinces, with increasing or relatively stable proportions over time. Although types of opioids dispensed to treat pain varied widely across provinces, there was a notable increase in hydromorphone use and a decrease in oxycodone use across all provinces.

Monthly rates of new and overall use of OAT varied by province, with increasing rates in Alberta, Saskatchewan, and Manitoba, while it remained relatively stable in British Columbia, Ontario, and Quebec. Rates of overall use were highest in British Columbia and lowest in Quebec.

The rates of new OAT use were higher among males, those aged 25 to 44 years, and those living in lower income quintile neighbourhoods. Types of OAT dispensed varied by province, with a notable increase in buprenorphine use across all provinces.

Rates of overall use of slow-release oral morphine (SROM) increased over time in most provinces except Manitoba and Quebec.

The decline in prescription opioid use for pain and reduction in high-dose initiation is likely reflective of ongoing efforts to promote appropriate opioid prescribing for pain in Canada. Growth in buprenorphine dispensing is in line with the 2018 clinical guidelines applicable during the study period,

Key Messages

which recommend it as the preferred first-line treatment for opioid use disorder (OUD).

Continuous monitoring of prescription opioid use for pain and OAT by each province will be necessary as the landscape of opioid access and prescribing evolves.

Trends in Prescription Opioid Use Prior to Opioid-Related Toxicity Event

Annual rates of opioid toxicity inpatient hospitalizations varied across provinces, with British Columbia seeing the highest rates in 2022, whereas Manitoba and Quebec had the lowest.

Active prescription opioid exposure at the time of opioid toxicity hospitalization was relatively uncommon, ranging from 20% in British Columbia to 37% in Quebec in 2022, and it has declined over time except in British Columbia where it remained stable. Generally, females and people aged 65 years and older were more likely to have an active opioid exposure. Active exposure to prescription opioids for pain was more common than OAT, although this has declined over time, while active exposure to OAT has increased across most provinces.

Active prescription opioid exposure at the time of an opioid toxicity ED visit was relatively uncommon, ranging from 15% in Alberta to 26% in Quebec in 2022, and it has declined over time except in British Columbia where exposure increased (although it has remained low relative to most provinces). Similar to hospitalizations for opioid toxicities, females and people aged 65 years and older were more likely to have active opioid exposure. Active exposure to opioids for pain has declined over time, while active exposure to OAT has increased across provinces.

To effectively tackle the current drug toxicity crisis, policy efforts must address the harms caused by the unregulated drug supply.

Table of Contents

List of Tables

List of Figures

Abbreviations

CIHI	Canadian Institute for Health Information
DIN	Drug Information Number
ED	emergency department
ICD-10	International Classification of Diseases, 10th revision
IR	immediate release
MME	morphine milligram equivalents
NACRS	National Ambulatory Care Reporting System
OAT	opioid agonist therapy
OUD	opioid use disorder
RAMQ	Régie de l'assurance maladie du Québec
SOS	safer opioid supply
SROM	slow-release oral morphine

Background and Rationale

Canada is currently experiencing an ongoing opioid toxicity crisis with a total of 47,162 apparent opioid-related toxicity deaths and 44,366 hospitalizations for opioid toxicities reported between January 2016 and March 2024.[1] Particularly, opioid-related harms have worsened across most provinces since 2016, with the unregulated drug market (primarily consisting of fentanyl) driving the vast majority of opioid-related toxicity deaths in recent years.[1] Although data are available nationally on patterns of opioid-related toxicity events, information about opioid prescriptions dispensed for pain and treatment of OUD is limited to regional analyses in only parts of the country. Additionally, available reports do not generally characterize national trends in prescription opioid use and access to treatment beyond 2018, and as such do not provide context on how these patterns have been affected by the COVID-19 pandemic. Given the effectiveness of OAT in treating OUD, it is essential to determine whether patterns of OAT dispensing have changed since the beginning of the pandemic, particularly given COVID-19-related changes to OAT programs and treatment disruptions.[2-5]

To inform future policy development, policy-makers would like to determine the trends in opioid prescriptions dispensed for pain and OAT in Canada, as well as opioid-dispensing patterns preceding opioid-related toxicities, to assess the changing role of pharmaceutical opioids in these events. This includes determining differences by region, sex, age, and socioeconomic status. This information will further our understanding of the variation in opioid dispensing for pain and OAT across the country. This report addresses these objectives by describing trends in opioid prescriptions dispensed for pain and OAT and the prevalence of recent pharmaceutical opioid dispensing before opioid-related toxicities in Canada.

Main Take-Aways

Canada is facing a severe opioid-related toxicity crisis, with more than 47,000 opioid-related deaths reported between January 2016 and March 2024, primarily driven by unregulated substances like fentanyl. Although there are national statistics on opioid-related toxicity, data on opioid dispensing for pain and treatment of OUD are limited and outdated, and there is little information on trends throughout the COVID-19 pandemic. Policy-makers want to know more about trends in opioid prescribing, access to treatment, and how common active exposure to prescription opioids is at the time of an opioid-related toxicity so that they can better understand the role of prescription opioids in opioid-related harms across Canada.

Policy Questions

1. How have trends in opioid prescriptions dispensed for pain and opioid agonist therapy changed across Canada, and do these trends vary geographically or across sociodemographic groups?

2. What is the prevalence of recent pharmaceutical opioid dispensing before opioid-related toxicity events in Canada, and how has this changed over time?

Policy Impact

Policy-makers will use the findings to inform policy and programming decisions around pain management, opioid use, and OUD across Canada and to inform the government's response to opioid-related harms.

Research Questions

1. What is the rate of new and overall use of prescription opioids for pain and opioid agonist therapy in Canada annually between 2018 and 2022 (before and during the COVID-19 pandemic), overall and stratified by patient characteristics, geography, and exposure characteristics?
2. What is the prevalence of prescription opioid use for pain and opioid agonist therapy before opioid toxicity inpatient hospitalizations and emergency department visits annually between 2018 and 2022 (before and during the COVID-19 pandemic), overall and stratified by patient characteristics and opioid type?

Objectives

Objective 1: Prescription Opioid Use for Pain and OAT

- To estimate the number and rate of new users of prescription opioids for pain and OAT in Canada annually between 2018 and 2022 (before and during the COVID-19 pandemic), overall and stratified by patient characteristics, geography, and exposure characteristics.
- To estimate the number and rate of overall users of prescription opioids for pain and OAT in Canada annually between 2018 and 2022 (before and during the COVID-19 pandemic), overall and stratified by patient characteristics, geography, and exposure characteristics.

Objective 2: Prescription Opioid Use Prior to Opioid-Related Toxicity Events

- To report the number and proportion of opioid toxicity inpatient hospitalizations and ED visits with active (within ≤ 100 days, supply overlapping hospitalization or ED visit) and recent (within ≤ 30 or ≤ 180 days of hospitalization or ED visit with nonoverlapping supply) prescription opioid dispensations at the time of toxicity in Canada annually between 2018 and 2022 (before and during the COVID-19 pandemic), overall and stratified by patient characteristics and opioid type.

Methods

Study Design and Setting

A population-based serial cross-sectional study was conducted to describe trends in new and overall use of prescription opioids for pain and OAT in British Columbia, Alberta, Saskatchewan, Manitoba, Ontario, and Quebec between January 1, 2018, and December 31, 2022. Additionally, we described patterns of prescription opioid exposure before acute opioid inpatient hospitalizations and ED visits over the same period, in provinces where data were available.

Data Sources

We used dispensing data from British Columbia, Alberta, Saskatchewan, Manitoba, Ontario, and Quebec to capture opioid dispensing from community pharmacies over the study period. This study was limited to the aforementioned jurisdictions for which data were readily accessible at the time of the request. Together, these provinces represented the vast majority of the total population of Canada at the time of the study. Drug dispensation data were captured using the Canadian Institute for Health Information (CIHI) National Prescription Drug Utilization Information System for Manitoba, Saskatchewan, and British Columbia; the Narcotics Monitoring System for Ontario; the Alberta Pharmaceutical Information Network for Alberta; and the Régie de l'assurance maladie du Québec (RAMQ) database for Quebec. These databases contain all claims for prescription opioids dispensed from community pharmacies, regardless of the method of payment, with the exception of RAMQ, which contains claims for those insured by Quebec's public drug insurance plan only. Coverage under RAMQ is limited to people aged 65 and older, people on social assistance, and people without a private insurance plan — which represented approximately 46% of Quebec's population at the time of the study. Prescription dispensing data from community pharmacies were used as a proxy for prescription opioid use, and we are unable to determine if individuals used the medication as prescribed. We used the Postal Code Conversion File Plus version 8A1,[6] to capture geographic characteristics, including neighbourhood income quintile and rurality across each province (with the exception of Quebec where data were not available). Finally, we used Statistics Canada's population estimates to define population denominators in most provinces; however, in Quebec, denominators consisted of the population covered by the public drug insurance plan.

We used the CIHI Discharge Abstract Database and National Ambulatory Care Reporting System (NACRS) to capture inpatient hospitalization and ED visit data for all provinces, except for Quebec for which comparable provincial databases — Maintenance et exploitation des données pour l'étude de la clientèle hospitalière and Banque de données communes des urgencies — were used. These databases contain detailed information on diagnoses recorded during inpatient hospital admissions and ED visits, respectively. Inpatient hospitalization data were available in all 6 provinces included in the main analyses, whereas the ED analyses were restricted to Quebec, Ontario, Alberta, Saskatchewan, and British Columbia. We excluded Manitoba from the ED analyses because of major limitations in data coverage due to the fact that submission of diagnoses codes (including those required to identify opioid-related toxicities) to NACRS was not mandated over the study period. Notably, not all ED facilities in Saskatchewan and British Columbia

submitted data to NACRS over the study period, resulting in partial data coverage in both provinces. Moreover, facilities in British Columbia had limited the submission of ED discharge diagnoses over the study period (i.e., not mandated at the highest level of detail). We restricted ED analyses for Saskatchewan to April 2021 onwards, reflecting the beginning of mandatory submission of full International Classification of Diseases, 10th revision (ICD-10), Canadian Edition, diagnosis codes. Datasets in each province were linked using unique identifiers. In Ontario, datasets were linked using unique encoded identifiers and analyzed at ICES — an independent, nonprofit 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.

Identification of Opioids

A list of Drug Identification Numbers (DINs) and province-specific product identification numbers were used to identify prescription opioids dispensed over the study period. Because we were interested in opioids primarily used for pain and OAT, we excluded those used as antitussives (i.e., cough suppressants) or for antidiarrheal indications. To help harmonize data across the provinces and due to heterogeneity in the availability of over-the-counter medications across Canada, low-dose codeine products (i.e., ≤ 8 mg of codeine per tablet or ≤ 20 mg of codeine per 30 mL of liquid products) were also excluded. For objective 1, we reported SROM separately because it is commonly used for both pain and OAT. For objective 2, SROM was included in definitions of prior opioid dispensed, but it was categorized separately due to its mixed indication. DINs for methadone and buprenorphine products (either alone or in combination with naloxone) indicated for treatment of OUD were used to capture OAT dispensing. Methadone and buprenorphine-containing products used primarily for pain (including transdermal buprenorphine and methadone tablets) were categorized as opioids for pain. The list of opioid drug classes included in our analyses is reported in Appendix 1, Table 7.

Study Population

Prescription Opioid Use for Pain and OAT

The study population consisted of individuals who were dispensed a prescription opioid for pain or OAT across provinces of interest between January 1, 2018, and December 31, 2022. For each individual, the day of the first dispensing of an opioid in a given time period was considered as the index date. We identified incident users and prevalent users of opioids for pain and OAT using the following definitions:

- **Opioids for pain:** New users of opioids for pain were defined as individuals with no claim for any opioids indicated for pain or OAT dispensed in, or overlapping with, the 365 days before the index date. We extracted opioid dispensations in the 455 (365 + 90) days before the index date and used the days' supply to identify any prescriptions overlapping the 365 days before the index date. An individual could have multiple new treatment courses over the study period; we selected 1 incident course of treatment (earliest by date) per individual in the time period of interest (i.e., month or year).

  Overall users of opioids for pain were defined as individuals with any prescription claim for an opioid for pain dispensed in the time period of interest.

- **OAT:** New users of OAT were defined as individuals initiating either methadone or buprenorphine (i.e., buprenorphine/naloxone, subcutaneous buprenorphine extended-release [BUP-ER] [Sublocade] or implantable buprenorphine [BUP-IMP] [Probuphine]) with no claim for that specific OAT dispensed in, or overlapping with, a predefined lookback period before the index date. We selected the first new course of treatment per individual. Lookback periods defining new use varied by OAT type according to dosing frequency, and were as follows:
  - **Methadone:** No methadone claim dispensed in, or overlapping with, the 30 days before the index date. We identified methadone dispensations in the 90 (30 + 60) days before the index date and used the days' supply to identify any prescriptions overlapping the 30 days before the index date.
  - **Buprenorphine/naloxone:** No buprenorphine/naloxone claim dispensed in, or overlapping with, the 30 days before the index date. We identified buprenorphine dispensations in the 90 (30 + 60) days before the index date and used the days' supply to identify any prescriptions overlapping the 30 days before the index date.
  - **BUP-ER:** No BUP-ER claim in the 90 days before the index date.
  - **BUP-IMP:** No BUP-IMP claim in the 270 days before the index date.

    We used shorter lookback periods to define new users of OAT (relative to opioids for pain) so that it would reflect people being newly titrated into OAT. Because people with OUD sometimes disengage and re-engage in treatment over time, we developed a definition reflective of a clinical context when an individual would likely be retitrated onto a course of OAT.

    Overall users of OAT were defined as individuals with any claim for methadone or buprenorphine dispensed in the time period of interest.
  - **SROM:** We defined overall users of SROM (Kadian) as individuals with any claim for a SROM product DIN in each year over the study period.

Exclusion criteria: We excluded individuals with invalid patient identifiers, those with missing or invalid age or sex data, those older than 105 years of age, and people residing outside of the province on the index date. For cohorts of incident users, we also excluded individuals who did not meet the definitions of new use. In Quebec, we excluded individuals who had not been continuously covered by the drug insurance plan from 455 days before the first day of the time period of interest (i.e., month or year interval) until the end of the time period, or until the date of death within the month or year interval if applicable, to reflect the longest lookback window used in analyses.

Prescription Opioid Use Prior to Opioid-Related Toxicity Events

We identified episodes of opioid toxicity inpatient hospitalizations and ED visits separately in each province where data were available. Opioid-related toxicity was defined using ICD-10 diagnosis codes. The intention of the opioid toxicity ED visit and hospitalization was flagged using accompanying ICD-10 external cause of injury codes (Appendix 1, Table 8). ICD-10 external cause of injury codes were not available in Quebec for all analyses, and they were not available in British Columbia for the ED-specific analyses. We considered

inpatient hospitalization and ED cohorts separately; therefore, ED visits that led to an inpatient hospitalization were captured in both cohorts.

- **Inpatient hospitalizations:** We identified all episodes of acute opioid toxicity inpatient hospitalizations regardless of intention (i.e., accidental, intentional, undetermined, or unknown). We restricted the cohort to diagnoses present on admission and all admissions were included over the study period, meaning that we captured multiple events among the same individuals. Definitions used for admission diagnoses across provinces are summarized in Appendix 1, Table 9. We excluded repeated inpatient hospital visits within the same episode of care (e.g., transfers across multiple institutions were counted as 1 hospitalization) in all provinces except Quebec. The index date was defined as the admission date for the hospitalization.
- **ED visits:** We identified all episodes of opioid toxicity ED visits over the study period. Data on ED visits were only available in British Columbia, Alberta, Saskatchewan (from April 2021 onwards), Quebec, and Ontario. We included all episodes of ED visits during the study period, thus capturing multiple events among the same individuals. We excluded repeated ED visits within the same episode of care (e.g., transfers across multiple institutions were counted as 1 ED visit) in all provinces except Quebec and Alberta where each ED record was considered a separate claim. The index date was defined as the registration date for the ED visit.

Methodological note: Throughout the remainder of the report, we have simplified our language to refer to the events described in the previous text as “opioid-related toxicities,” “opioid toxicity ED visits,” and “opioid toxicity inpatient hospitalizations.”

Exclusion criteria: We excluded individuals with suspected but unconfirmed diagnoses, with missing or invalid patient identifiers, with missing or invalid age or sex data, those older than 105 years at the index date, and individuals residing outside of the province of interest on the index date. In Quebec, we excluded individuals who had not been continuously covered by the public drug insurance plan from 180 days before the first day of the year interval until the end of the year interval, or until the date of death within the year interval if applicable.

Exposure

Prescription Opioid Use for Pain and OAT

We identified dispensed prescription claims for opioids for pain or OAT using DINs for drugs described in the Identification of Opioids section.

Prescription Opioid Use Prior to Opioid-Related Toxicity Events

We identified prescription opioid exposure before all episodes of opioid toxicity inpatient hospitalizations and ED visits using DINs for drugs described in the Identification of Opioids section. Our primary exposure of interest was active prescription opioid use at the time of opioid-related toxicity. An “active” opioid exposure was defined as an opioid dispensed in the 100 days before hospital admission or ED visit with a duration (days’ supply) overlapping the index date. Due to the high frequency of daily dispensing for OAT products, we expanded our definition of active exposure for methadone or any oral buprenorphine to also include

dispensations on the day before the index date. This would include those individuals actively receiving OAT who experience a toxicity event before picking up their daily dispensed treatment. In secondary analyses, recent opioid exposure was defined as any opioid dispensed in the 30 days and 180 days before but not including the index date.

Key Study Measures

Prescription Opioid Use for Pain and OAT

The main study measures of interest were the number and population-adjusted rates of new and overall users of prescription opioids for pain and OAT. We reported patient characteristics of new and prevalent users including age, sex (male, female), neighbourhood income quintile, and rurality (urban, rural). We also identified opioid type dispensed among prevalent users of opioids for pain (oxycodone, morphine, codeine, hydromorphone, fentanyl, and other) and OAT (methadone and buprenorphine). Finally, among new users of opioids for pain, we determined the initial dose dispensed and categorized as 50 MME or less and more than 50 MME because this is the maximum recommended stable dose for people newly prescribed opioids for pain in national guidelines.[7-9] We categorized people who were dispensed any opioids for pain at initiation with an invalid MME conversion factor as “nonestimable.”

Prescription Opioid Use Prior to Opioid-Related Toxicity Events

The main measures of interest were the prevalence of active and recent prescription opioid use before opioid toxicity inpatient hospitalizations and ED visits. We assessed patient characteristics among episodes with active prescription opioid use at the time of toxicity including age (≤ 24, 25 to 44, 45 to 64, 65 to 74, ≥ 75 years) and sex (male, female). We also characterized the type of opioid actively dispensed (i.e., opioids for pain, OAT, SROM).

Analyses

Prescription Opioid Use for Pain and OAT

In the main analysis, we reported monthly numbers and population-adjusted rates per 1,000 population of new and overall users of prescription opioids for pain and OAT between January 2018 and December 2022, stratified by province. We also reported annual numbers and population-adjusted rates per 1,000 overall users of SROM over the study period in each province.

We constructed annual cohorts of new and overall opioid recipients in each year for 2018 and 2022 and reported population-adjusted rates stratified by age (≤ 24, 25 to 44, 45 to 64, 65 to 74, ≥ 75 years), sex (female, male), neighbourhood income quintile, and rurality (urban, rural). The distribution of opioid type was described in each annual cohort of overall users for both pain and OAT, as well as the distribution of initial opioid dose dispensed (≤ 50 MME versus > 50 MME) among annual cohorts of new users of prescription opioids for pain.

Prescription Opioid Use Prior to Opioid-Related Toxicity Events

First, we summarized the overall number and rate per 1,000 population of opioid toxicity ED visits and inpatient hospitalizations each year over the study period (2018 to 2022). We also reported the proportion of

opioid-related toxicity episodes that were accidental in 2018 and 2022 as well as the distribution of opioid-related toxicities by age group in 2022.

In the primary analysis, we reported the proportion of opioid toxicity inpatient hospitalizations and ED visits with active and recent prescription opioid exposure each year over the study period across provinces. We also reported the proportion of opioid-related toxicity episodes with active opioid exposure stratified by age, sex, and opioid type for the years 2018 and 2022 only.

Findings

Trends in Prescription Opioid Use for Pain

Main Take-Aways

The rate of people newly starting prescription opioids for pain has decreased over time in all provinces studied. Similarly, rates of overall users of opioids for pain have also reduced over time.

The monthly rates of new opioid initiations for pain were similar across provinces, but Manitoba had the highest rate of people using opioids for pain, while British Columbia had the lowest.

New initiation rates of prescription opioids for pain were higher among females, older individuals (75 years and older), residents of lower income quintile neighbourhoods, and people living in rural locations across all provinces.

The majority of people starting opioids for pain (more than 80%) received initial doses of 50 MME or less across all provinces. High-dose opioid initiation (> 50 MME) has declined over time or remained stable across provinces.

The types of opioids dispensed varied across provinces. Codeine was the most commonly dispensed in most provinces, while hydromorphone was the most commonly dispensed in Quebec and Saskatchewan. Over the study period, hydromorphone dispensing increased while oxycodone dispensing decreased.

In 2022, a total of 1,818,680 individuals newly initiated opioids for pain, and 2,770,268 individuals were overall users of opioids for pain across all provinces studied. Annual new user rates of prescription opioids for pain in 2022 ranged from a high of 63.0 per 1,000 in Alberta to a low of 55.2 per 1,000 population in Ontario. Rates of overall users of opioids for pain in 2022 were also highest in Alberta (96.3 per 1,000) but lowest in Saskatchewan (85.1 per 1,000) (Table 1).

Table 1: Annual Numbers and Rates of New and Overall Users of Prescription Opioids for Pain by Province in 2022

Province	Individuals newly dispensed opioids for pain, rate per 1,000 (N)	Individuals dispensed opioids for pain, rate per 1,000 (N)
British Columbia	61.8 (331,067)	90.1 (482,334)
Alberta	63.0 (284,206)	96.3 (434,595)
Saskatchewan	57.2 (67,398)	85.1 (100,226)
Manitoba	59.2 (83,628)	95.9 (135,494)
Ontario	55.2 (836,380)	85.5 (1,294,115)
Quebec	60.0 (216,001)	89.8 (323,504)

Overall, monthly rates of new users of prescription opioids for pain declined in British Columbia, Alberta, Saskatchewan, Manitoba, Ontario, and Quebec between January 2018 and December 2022; however, rates were relatively similar across provinces over this time. There was a short-term decrease in the rates of initiation of prescription opioids for pain between March 2020 and June 2020 across all provinces, reflecting the start of the COVID-19 state of emergency and related disruptions in prescription medication dispensing across Canada. In December 2022, the monthly rate of people newly initiating opioids for pain ranged from a low of 4.7 per 1,000 in Ontario and Saskatchewan to a high of 5.3 per 1,000 in Alberta (Figure 1). Overall, monthly rates of overall users of prescription opioids for pain declined between January 2018 and December 2022 across all provinces. Monthly rates were consistently highest in Manitoba and lowest in British Columbia over the study period. In December 2022, these rates ranged from a low of 18.3 per 1,000 in British Columbia to a high of 26.2 per 1,000 in Manitoba (Figure 2).

Rates of new use of prescription opioids for pain in 2022 were generally slightly higher among females compared to males and increased with age across all provinces studied (Figure 3). Specifically, the new user rates of opioids for pain ranged from 60.3 (Ontario) to 67.9 (Alberta) per 1,000 among females compared to a range of 50.1 (Ontario) to 58.5 (British Columbia) per 1,000 among males. The highest rates of opioid initiation for pain in 2022 were among individuals aged 75 years or older, ranging from 92.7 to 112.1 per 1,000 population. Patterns across age and sex were generally consistent over time (2018 versus 2022) and when considering overall users of opioids for pain in 2022 (Appendix 2, Figures 18 and 19).

We stratified rates of new use of prescription opioids for pain in 2022 by income quintile and rurality in all provinces except Quebec (where these data were not available). In 2022, rates of new initiation of opioids for pain were slightly higher among people living in the lowest income quintile neighbourhoods in most provinces, with the exception of Manitoba and Ontario where rates were similar across neighbourhood income quintiles. Specifically, the rates ranged from 54.3 (Ontario) to 90.2 (Alberta) per 1,000 in the lowest income quintile neighbourhoods, compared to a range of 41.9 (Alberta) to 61.0 (Manitoba) per 1,000 in those of the highest income quintile. Rates of newly initiating opioids indicated for pain were higher in rural areas across all provinces. While differences across urban and rural regions were generally small, there was a notably higher rate of initiation of opioids for pain in rural areas of Alberta compared to urban areas (73.8 versus 60.5 per 1,000 population, respectively) (Figure 4). Overall, patterns were generally consistent over

time. In 2018, rates of new opioid use for pain were slightly more skewed toward the lowest income quintile, with this diminishing slightly over time (Appendix 2, Figure 20).

The distribution of new users of opioids for pain in 2018 and 2022 by dose at initiation across all provinces is summarized in Table 2. People newly initiating opioids indicated for pain generally received daily doses of 50 MME or less (> 80% across all provinces). Over time, the percentage of people initiating opioids at doses greater than 50 MME declined across most provinces studied but remained stable in British Columbia (86.9% versus 86.9%). We observed the largest decrease in the proportion of high-dose opioid initiation (> 50 MME) between 2018 and 2022 in Ontario (17.1% versus 11.9%) and Alberta (11.3% versus 8.2%). In 2022, the proportion of high-dose opioid initiation ranged from a low of 7.9% in Manitoba to a high of 16.1% in Saskatchewan.

Table 2: Numbers and Percentages of New Users of Opioids for Pain in 2018 and 2022 by Dose at Initiation

	2018			2022		
Province	Opioid dose at initiation ≤ 50 MME N (%)	Opioid dose at initiation > 50 MME N (%)	Nonestimable N (%)	Opioid dose at initiation ≤ 50 MME N (%)	Opioid dose at initiation > 50 MME N (%)	Nonestimable N (%)
British Columbia	301,391 (86.9%)	40,826 (11.8%)	4,739 (1.4%)	287,585 (86.9%)	38,031 (11.5%)	5,451 (1.7%)
Alberta	254,674 (88.2%)	32,656 (11.3%)	1,524 (0.53%)	258,970 (91.1%)	23,225 (8.2%)	2,011 (0.71%)
Saskatchewan	60,264 (81.1%)	13,115 (17.7%)	946 (1.27%)	55,455 (82.3%)	10,837 (16.1%)	1,106 (1.6%)
Manitoba	83,931 (89.6%)	9,571 (10.2%)	194 (0.21%)	76,841 (91.9%)	6,597 (7.9%)	190 (0.23%)
Ontario	770, 218 (81.2%)	162,461 (17.1%)	15,785 (1.7%)	719,180 (86.0%)	99,811 (11.9%)	17,389 (2.1%)
Quebec	195,633 (87.7%)	25,691 (11.5%)	1,708 (0.77%)	194,848 (90.2%)	19,090 (8.8%)	2,063 (0.96%)

MME = morphine milligram equivalents.

Note: The “nonestimable” category reflects individuals who were dispensed any opioids for pain at initiation with an invalid MME conversion factor.

In 2022, the type of opioids most commonly dispensed among overall users of opioids for pain varied considerably across provinces, with codeine being the most commonly dispensed medication in Manitoba (77.78%), British Columbia (58.9%), Alberta (58.6%), and Ontario (44.7%), and hydromorphone being the most commonly dispensed opioid in Quebec (55.3%) and Saskatchewan (45.0%) (Figure 5). Notably, nearly 30% of people dispensed opioids received morphine in Quebec (< 10% in all other provinces) and 20.2% of people dispensed opioids in Ontario received oxycodone (< 11% in all other provinces). In British Columbia and Alberta, there was a high percentage of people dispensed opioids categorized in the “other” grouping (29.1% and 34.9%, respectively). This was driven by a higher proportion of tramadol dispensing in these provinces. When examining trends over time, the proportion of overall oxycodone use consistently decreased across all provinces between 2018 and 2022. In response, the distribution shifted toward hydromorphone dispensing across all provinces over this same period (Appendix 2, Figure 21).

Figure 1: Monthly Rates of New Users of Prescription Opioids for Pain by Province, 2018 to 2022

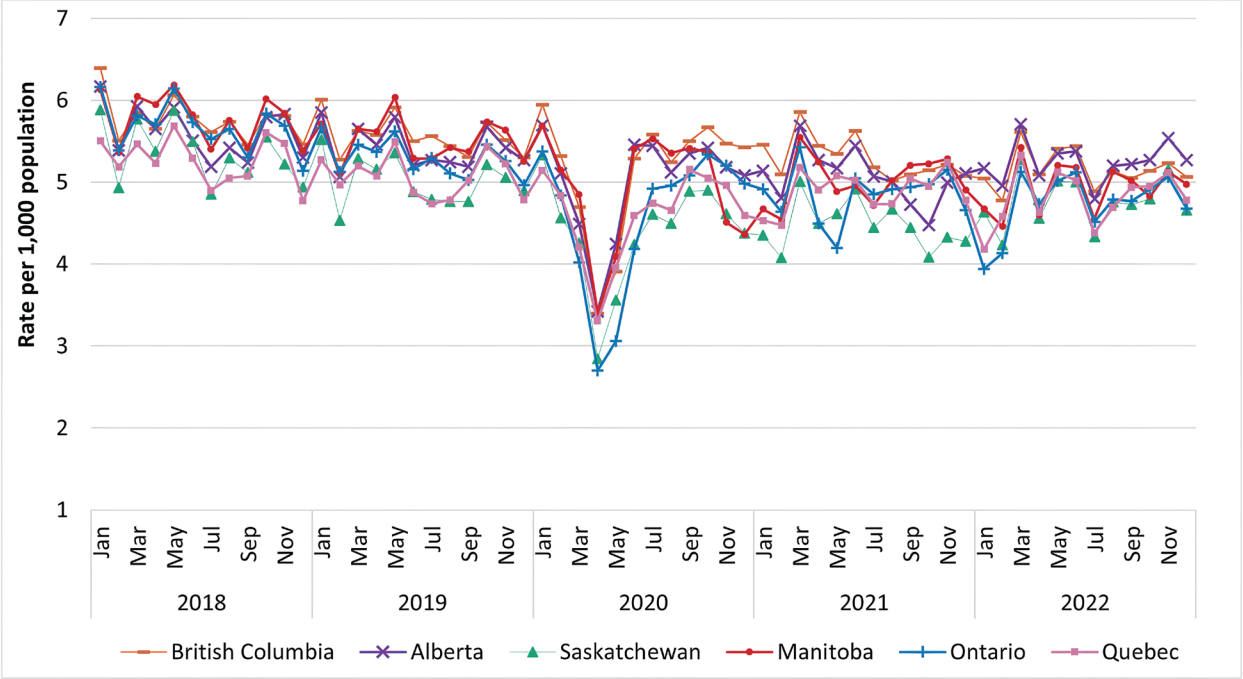


Figure 2: Monthly Rates of Overall Users of Prescription Opioids for Pain, 2018 to 2022

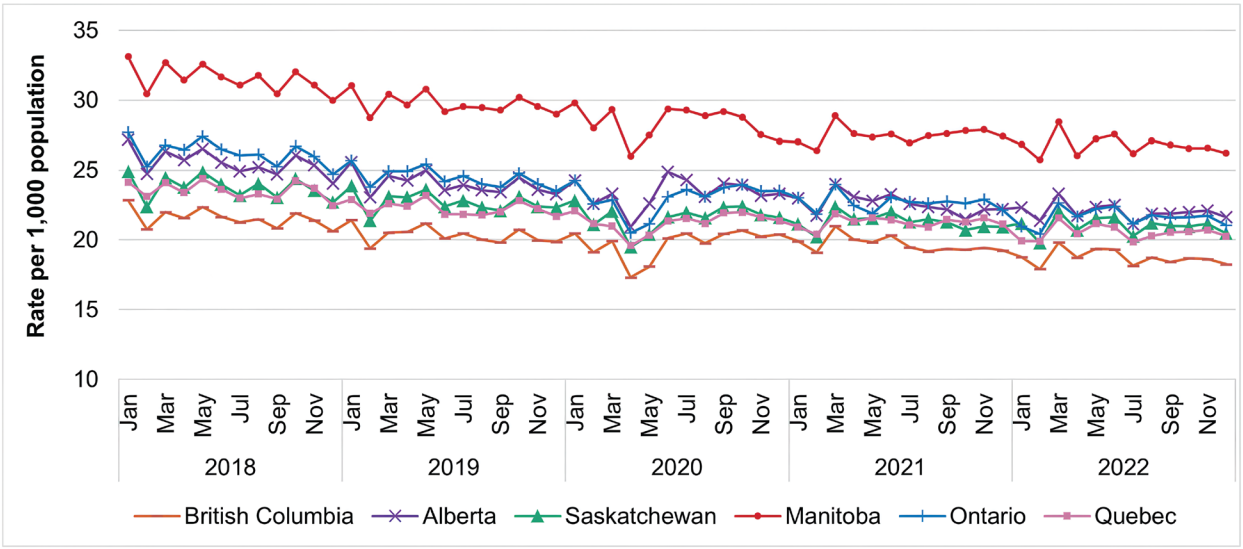


Figure 3: Rates of New Users of Opioids for Pain in 2022, by Age and Sex

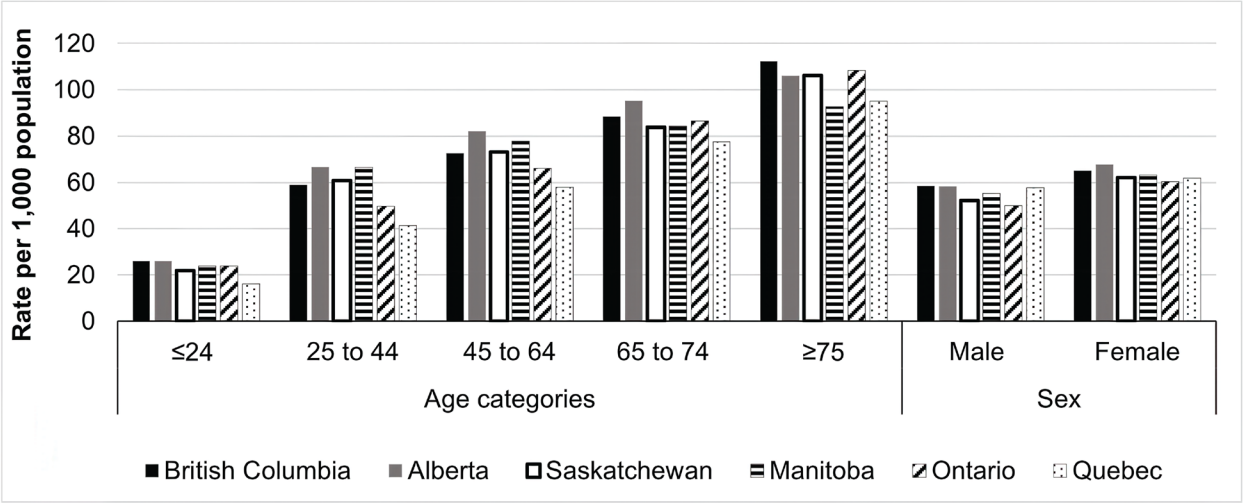
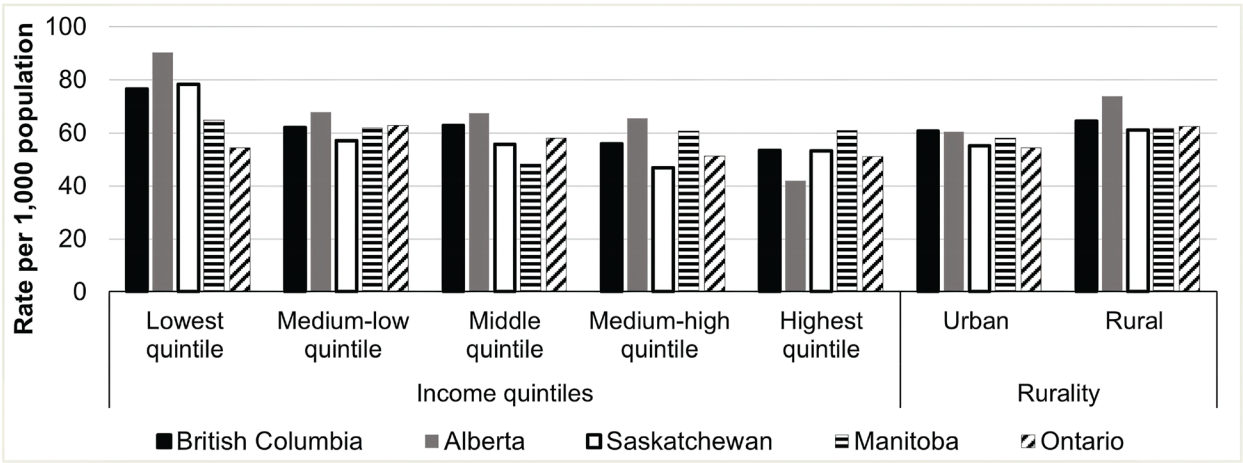
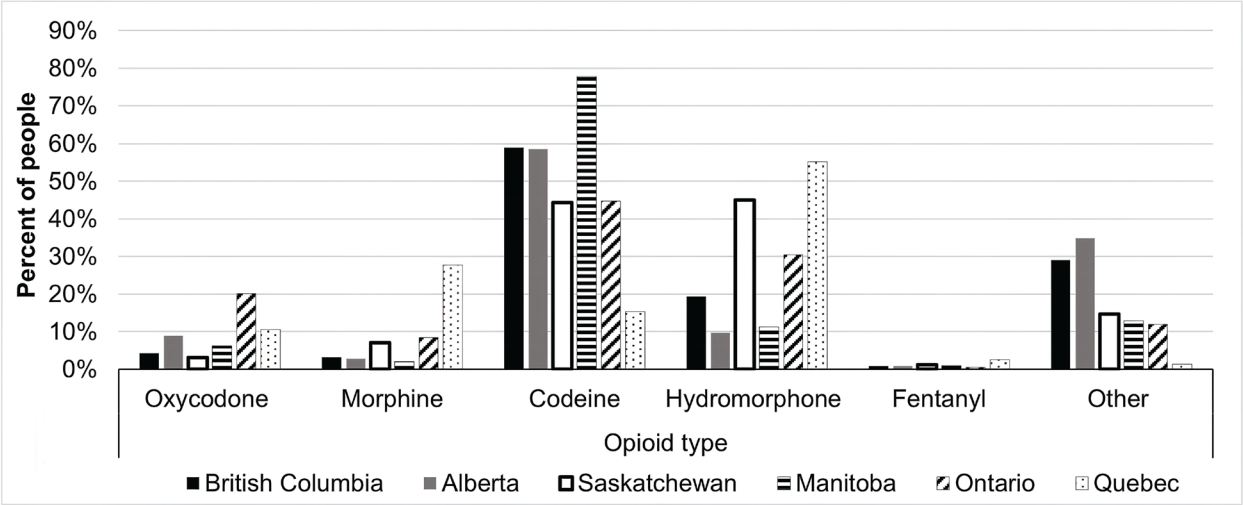


Figure 4: Rates of New Users of Opioids for Pain in 2022, by Income Quintile and Rurality



Note: Data on income quintile and rurality are not available in Quebec.

Figure 5: Proportion of Overall Users of Opioids for Pain in 2022, by Type of Opioid Dispensed



Note: Individuals can be captured in several opioid type categories if they were dispensed multiple opioids over the time period. Opioid types categorized in the "other" grouping include buprenorphine (pain), butorphanol, dextropropoxyphene, meperidine, methadone (pain), nalbuphine, oxymorphone, pentazocine, tapentadol, and tramadol.

Trends in Prescription Opioid Use for OAT

Main Take-Aways

The rate of people receiving OAT and of those newly starting OAT each month varied widely across provinces, with increases noted in Alberta, Saskatchewan, and Manitoba, whereas trends remained stable in other provinces.

The rate of new use of OAT was generally higher among males (except in Saskatchewan and Manitoba), younger adults (25 to 44 years of age), and people residing in a lower income quintile neighbourhood. Rates of new use of OAT varied between rural and urban areas depending on the province.

The types of OAT dispensed differed across provinces and changed over time. There was an overall increase in buprenorphine use across all provinces.

In 2022, a total of 50,793 individuals newly initiated OAT, and 126,265 individuals were dispensed OAT across all provinces studied. Annual rates of new users of OAT in 2022 ranged from 0.58 per 1,000 in Quebec to 2.4 per 1,000 in Alberta. In contrast, the annual rates of overall users of OAT in 2022 were highest in British Columbia (5.3 per 1,000) and lowest in Quebec (1.4 per 1,000) (Table 3).

Table 3: Annual Numbers and Rates of New and Overall Users of OAT by Province in 2022

Province	Individuals newly dispensed OAT, rate per 1,000 (N)	Individuals dispensed OAT, rate per 1,000 (N)
British Columbia	1.8 (9,760)	5.3 (28,348)
Alberta	2.4 (10,826)	3.8 (16,918)
Saskatchewan	1.5 (1,818)	4.7 (5,484)
Manitoba	0.82 (1,153)	2.4 (3,378)
Ontario	1.7 (25,145)	4.4 (67,159)
Quebec	0.58 (2,091)	1.4 (4,978)

OAT = opioid agonist therapy.

Between January 2018 and December 2022, there was a large variation in monthly rates of OAT initiation across provinces, with lower new user rates noted in Quebec and Manitoba and higher new user rates in British Columbia and Alberta (Figure 6). The largest growth in monthly rates of OAT initiation over the study period was seen in Alberta (80% relative increase; from 0.15 to 0.27 per 1,000) and Saskatchewan (62% relative increase; from 0.13 to 0.21 per 1,000). Notably, the COVID-19 pandemic–related state of emergency beginning in March 2020 led to a temporary decrease in monthly rates of new OAT use in most provinces, with the exception of Quebec. By December 2022, monthly OAT initiation rates ranged from a low of 0.05 per 1,000 (N = 204) in Quebec to a high of 0.27 per 1,000 (N = 1,261) in Alberta. Note that variations in OAT prescribing across provinces may be reflective of differences in the underlying prevalence of OUD. We are unable to adjust for rates of OUD in this analysis because there are no validated definitions that could be derived from the data available.

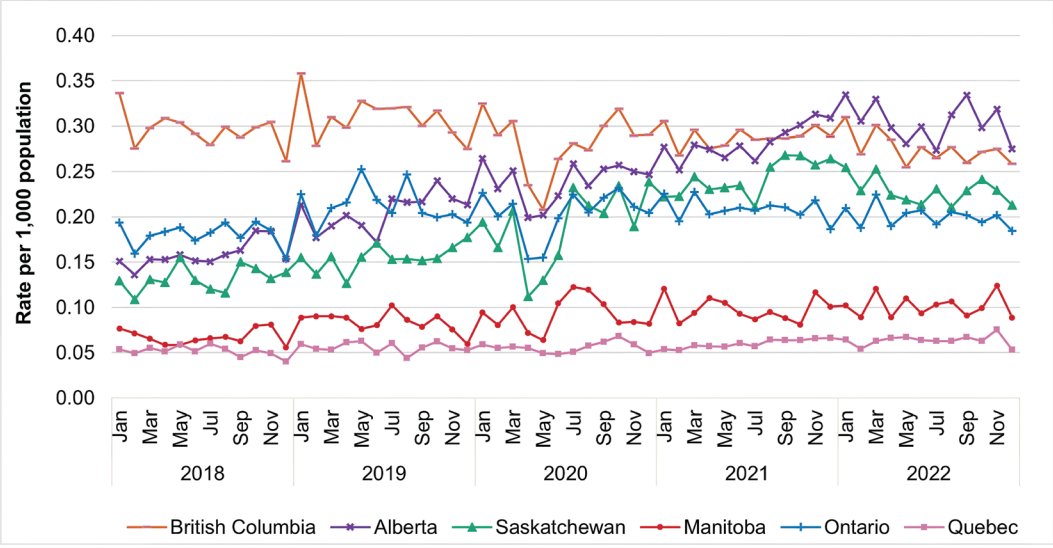
Over the study period, the monthly overall rates of people dispensed OAT were consistently highest in British Columbia, Ontario, and Saskatchewan, and lowest in Quebec. However, trends varied by province. Monthly rates of overall users of OAT slightly declined in British Columbia (from 3.85 to 3.59 per 1,000) and were relatively stable in Ontario (3.46 and 3.37 per 1,000) and Saskatchewan (3.14 to 3.16 per 1,000) over the study period. In Manitoba, Quebec, and Alberta, monthly rates of overall users of OAT were generally lowest in January 2018; however, rates increased considerably in Alberta (65%, from 1.29 to 2.13 per 1,000) and Manitoba (39%, from 1.16 to 1.61 per 1,000) by the end of the study period. In Quebec, a smaller increase in monthly rates of overall users was noted over the same period, rising 17% from 0.89 to 1.04 per 1,000 (Figure 7).

In 2022, the highest annual rates of OAT initiation were observed among younger adults aged 25 to 44 years in all provinces, ranging from 1.37 per 1,000 in Quebec to 4.85 per 1,000 in Alberta. A notable rise in OAT initiation rate was observed in this age group in Alberta (69% relative increase from 2.87 to 4.85 per 1,000) and Saskatchewan (61% relative increase from 2.44 to 3.92 per 1,000) between 2018 and 2022 (Figure 8 and Appendix 2, Figure 22). Males had higher annual rates of OAT initiation compared to females in most provinces. However, similar rates were observed across both males and females in Manitoba (0.77 and 0.86 per 1,000, respectively) and Saskatchewan (1.60 and 1.48 per 1,000, respectively) (Figure 8). Patterns across age and sex were generally consistent for prevalent users of OAT in 2022 (Appendix 2, Figure 23).

We summarized rates of new use of OAT in 2022 stratified according to rurality and neighbourhood income quintiles across provinces (except in Quebec where these data are not available) in Figure 9. In British Columbia and Saskatchewan, rates of new users of OAT were higher in urban areas (1.76 and 1.59 per 1,000, respectively) compared to rural areas (1.34 and 1.32 per 1,000, respectively). In contrast, rates of new users were higher in rural areas in Alberta, Ontario, and Manitoba (2.80, 2.65, and 0.92 per 1,000, respectively) compared to urban areas (2.21, 1.52, and 0.77 per 1,000, respectively). In general, the highest annual OAT initiation rates were observed among individuals in the lowest neighbourhood income quintiles. In 2022, rates of new use among people living in the lowest income quintile neighbourhoods ranged widely from 2.01 per 1,000 in Manitoba to 7.04 per 1,000 in Alberta. In the highest income quintile neighbourhoods, the rates of new users of OAT were lower and had a smaller range, from a low of 0.41 per 1,000 in Manitoba to a high of 0.76 per 1,000 in Alberta.

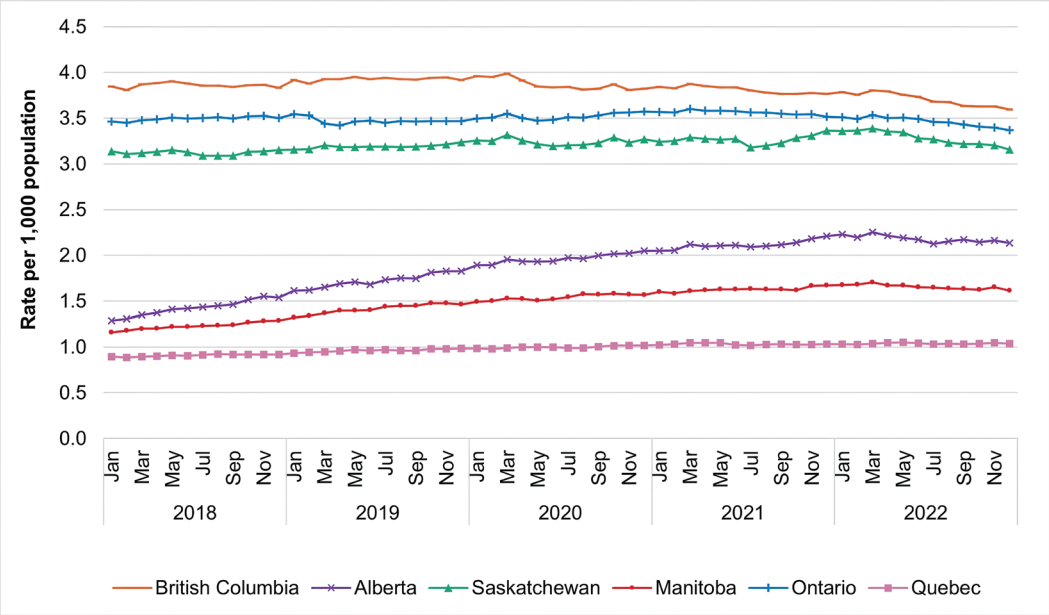
The distribution of overall users of OAT in 2018 and 2022, stratified according to OAT type (methadone and buprenorphine) across all provinces is presented in Figure 10. In 2018, 70% or more of individuals receiving OAT were treated with methadone in all provinces, with the exception of Alberta (45.9% methadone and 62.5% buprenorphine). The distribution of the types of OAT dispensed changed considerably between 2018 and 2022, with a rise in the proportion of individuals dispensed buprenorphine. By 2022, methadone was still the most common form of OAT dispensed in British Columbia (65.5%), Ontario (61.1%), Saskatchewan (58.7%), and Quebec (55.9%). However, in Alberta, buprenorphine products remained the most commonly dispensed form of OAT throughout the study period (74.2% in 2022); and in Manitoba, there was a large shift away from methadone dispensing over the study period (77.3% in 2018 versus 40.3% in 2022), with 63.5% of OAT recipients dispensed buprenorphine-based formulations in Manitoba in 2022.

Figure 6: Monthly Rates of New Users of OAT by Province, January 2018 to December 2022



OAT = opioid agonist therapy.

Figure 7: Monthly Rates of Overall Users of OAT by Province, January 2018 to December 2022



OAT = opioid agonist therapy.

Figure 8: Rates of New Users of OAT in 2022, by Age and Sex

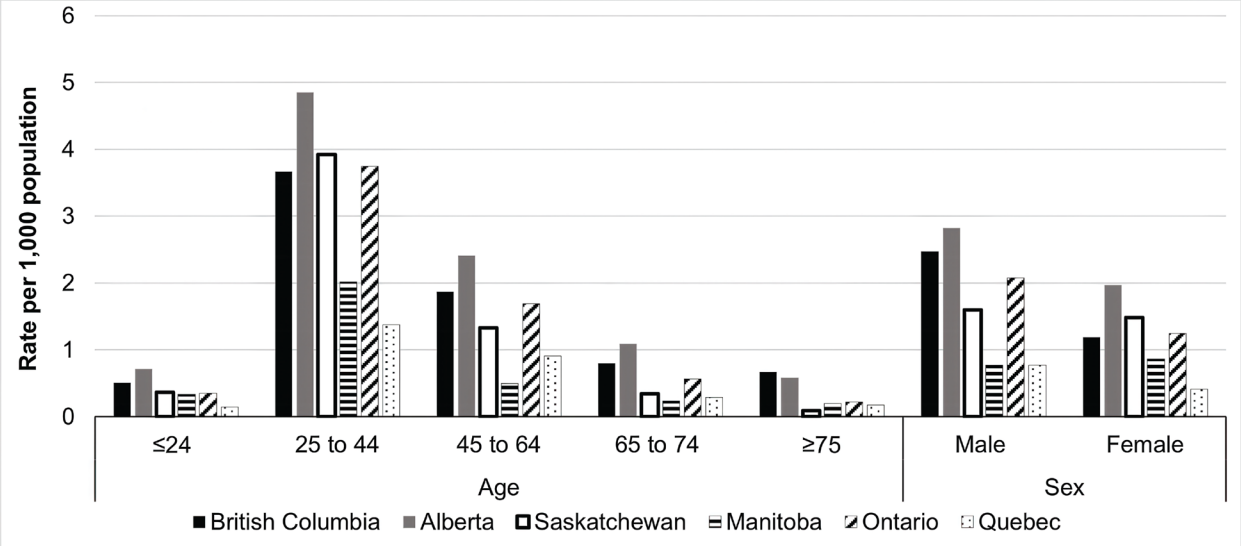
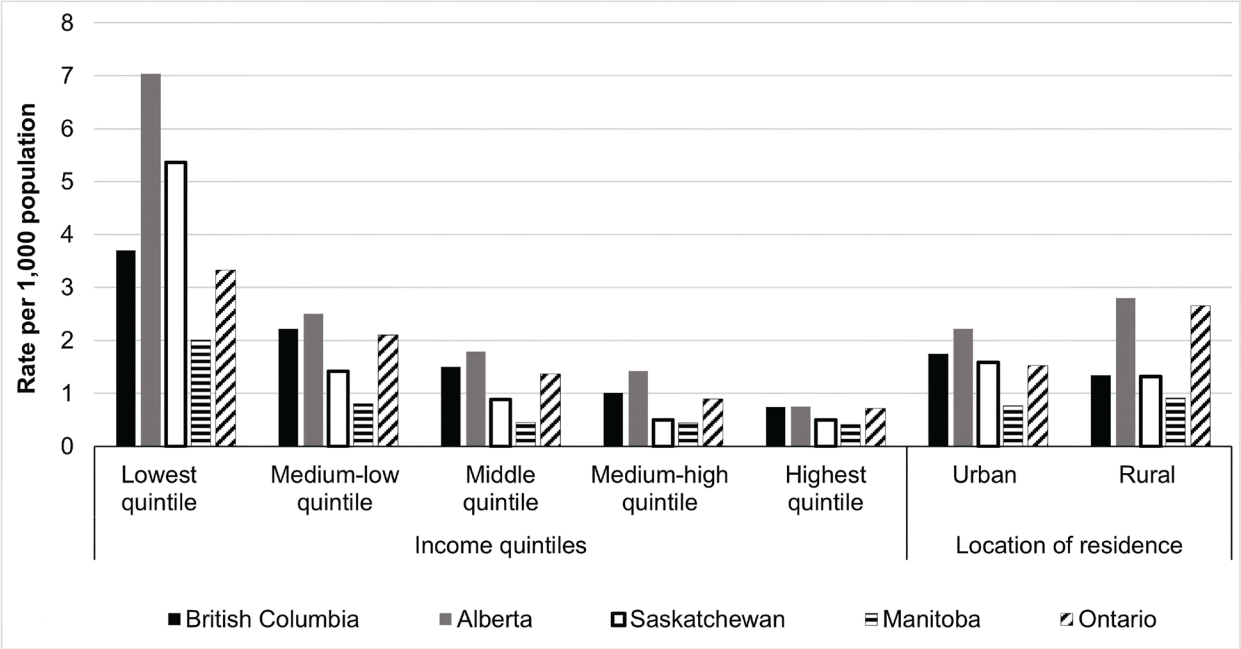


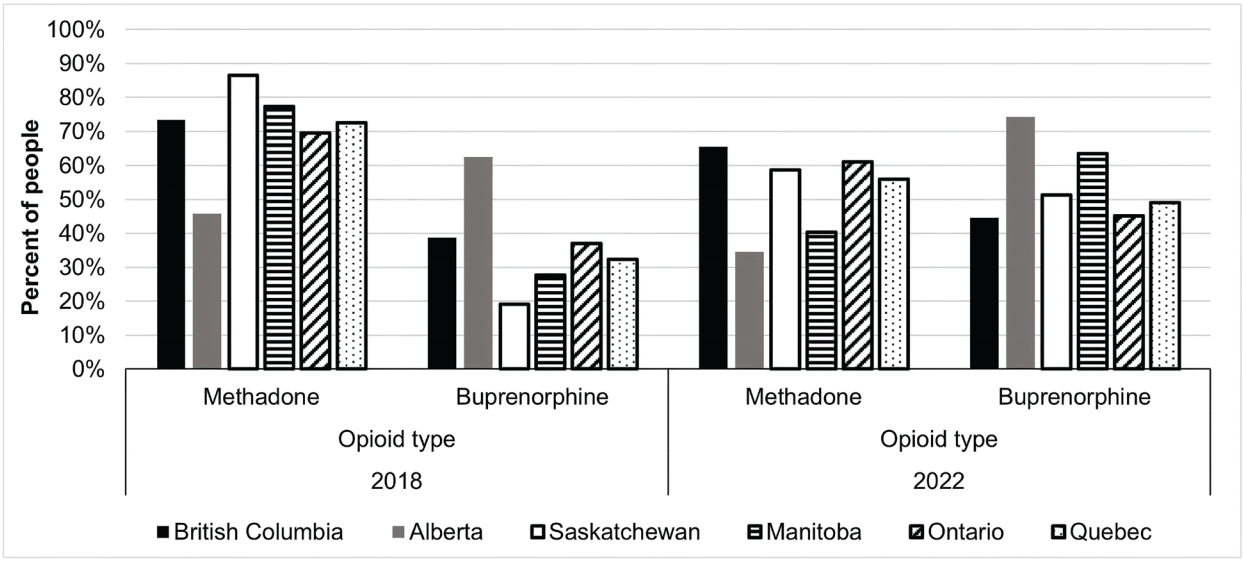
Figure 9: Rates of New Users of OAT in 2022, by Income Quintiles and Rurality



OAT = opioid agonist therapy.

Note: Data on income quintile and rurality are not available in Quebec.

Figure 10: Proportion of Overall Users of OAT by Type of OAT Dispensed, in 2018 and 2022



OAT = opioid agonist therapy.

Note: Individuals can be captured in several opioid type categories if they were dispensed multiple opioids over the time period.

Trends in SROM Dispensing

Main Take-Aways

Overall, the rates of people receiving SROM has increased over time in most provinces except Manitoba and Quebec. British Columbia, Alberta, and Ontario saw the largest growth. In 2022, British Columbia and Quebec had the highest rate of people dispensed SROM, while Manitoba had the lowest.

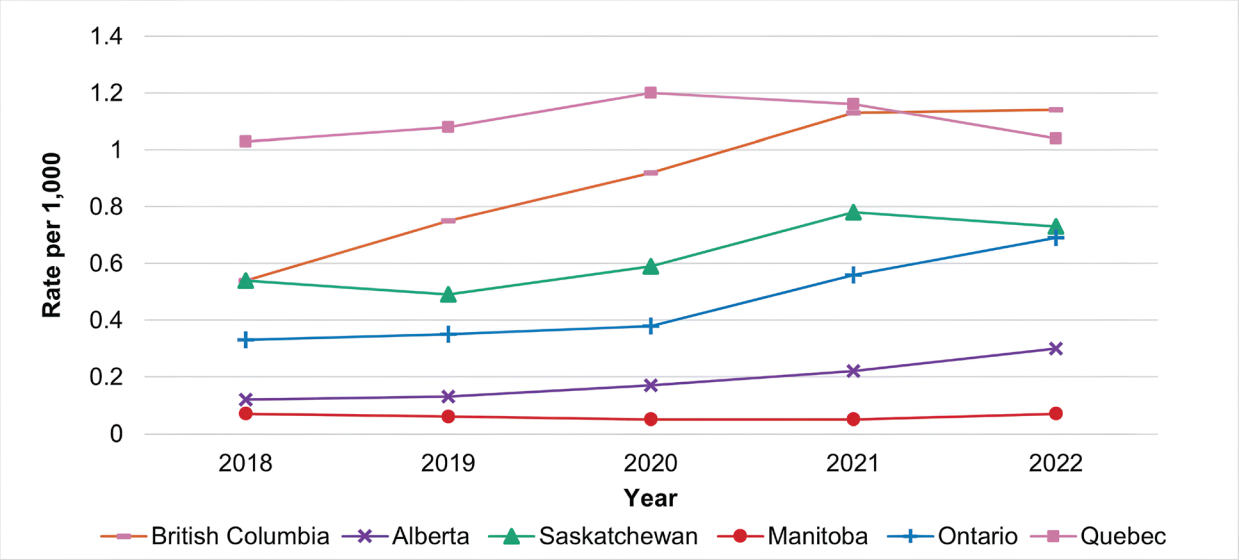
In general, annual rates of overall users of SROM increased across included provinces between 2018 and 2022 (Figure 11), with the exception of Manitoba and Quebec where rates fluctuated slightly over time but were similar in 2018 and 2022 (0.07 and 0.07 per 1,000 in Manitoba and 1.03 and 1.04 per 1,000 in Quebec) (Table 4). We observed the largest increases in annual rates between 2018 and 2022 in British Columbia (0.54 versus 1.14 per 1,000), Alberta (0.12 versus 0.30 per 1,000) and Ontario (0.33 versus 0.69 per 1,000), where they more than doubled. In 2022, the highest annual rates of overall users were in British Columbia (1.14 per 1,000) and Quebec (1.04 per 1,000) and were lowest in Manitoba (0.07 per 1,000) (Table 4).

Table 4: Numbers and Rates of Overall Users of SROM by Province, 2018 to 2022

Province	Rate per 1,000 (N) by year				
	2018	2019	2020	2021	2022
British Columbia	0.54 (2,705)	0.75 (3,831)	0.92 (4,760)	1.13 (5,902)	1.14 (6,097)
Alberta	0.12 (508)	0.13 (585)	0.17 (732)	0.22 (969)	0.30 (1,367)
Saskatchewan	0.54 (624)	0.49 (576)	0.59 (689)	0.78 (909)	0.73 (864)
Manitoba	0.07 (95)	0.06 (84)	0.05 (74)	0.05 (74)	0.07 (101)
Ontario	0.33 (4,753)	0.35 (5,054)	0.38 (5,571)	0.56 (8,381)	0.69 (10,485)
Quebec	1.03 (3,472)	1.08 (3,708)	1.20 (4,203)	1.16 (4,130)	1.04 (3,746)

SROM = slow-release oral morphine.

Figure 11: Rate of Overall Users of SROM, 2018 to 2022



SROM = slow-release oral morphine.

Prescription Opioid Use Prior to Opioid Toxicity Inpatient Hospitalizations

Main Take-Aways

Annual rates of opioid toxicity hospitalizations varied by province, with growth in British Columbia and roughly stable trends over time in the other provinces. In 2022, rates were highest in British Columbia and lowest in Manitoba and Quebec. Most toxicities were accidental and involved individuals aged 25 to 64 years.

The percentage of opioid toxicity hospitalizations with active prescription opioid exposure decreased in most provinces over time but remained relatively stable in British Columbia. In 2022, it ranged from a low of 20% in British Columbia to a high of 37% in Quebec.

In 2022, active opioid exposure was higher among older adults (aged 65 years and older) and females (except in Saskatchewan where active exposure was similar between sexes).

Generally, active use of opioids for pain was more common than OAT at the time of opioid toxicity hospitalization across most provinces (except British Columbia where percentages were similar in 2022). Active use of opioids for pain has declined over time in most provinces, whereas active OAT use has seen a slight increase.

The absolute number of opioid toxicity inpatient hospitalizations increased across all provinces between 2018 and 2022 except in Alberta, Ontario, and Quebec where numbers slightly decreased (from 847 to 803, 1,930 to 1,846, and 259 to 249, respectively). In 2022, annual rates of opioid toxicity hospitalizations varied across provinces, with the highest rates in British Columbia (0.30 per 1,000) and lowest rates in

Manitoba and Quebec (0.07 per 1,000 in both provinces). We observed the largest growth in annual rates between 2018 and 2022 in British Columbia (25% relative increase from 0.24 per 1,000 to 0.30 per 1,000), whereas rates remained roughly similar across other provinces over time. The majority of opioid-related toxicities treated in inpatient hospital settings were accidental in nature, and the proportion of toxicities that were accidental increased over time across all studied provinces. In 2022, the proportion of opioid-related toxicities that were accidental ranged from 64.2% in Manitoba to 75.3% in Alberta (Table 5). Most opioid toxicity inpatient hospitalizations (more than 50%) occurred among people aged 25 to 64 years across all provinces; but in Quebec, we observed a slightly higher proportion among those aged 65 to 74 years and those aged 75 years and older (35%) compared to the other provinces (< 22%) (Appendix 2, Figure 24).

Table 5: Annual Number and Rate (per 1,000) of Opioid Toxicity Inpatient Hospitalizations by Province, 2018 and 2022

Province	2018		2022	
	Total toxicities N (Rate per 1,000)	Accidental toxicities N (%)	Total toxicities N (Rate per 1,000)	Accidental toxicities N (%)
British Columbia	1,229 (0.24)	845 (68.8%)	1,632 (0.30)	1,209 (74.1%)
Alberta	847 (0.20)	575 (67.9%)	803 (0.18)	605 (75.3%)
Saskatchewan	203 (0.18)	120 (59.1%)	205 (0.17)	154 (75.1%)
Manitoba	89 (0.07)	48 (53.9%)	106 (0.07)	68 (64.2%)
Ontario	1,930 (0.13)	1,151 (59.6%)	1,846 (0.12)	1,192 (64.6%)
Quebec	259 (0.08)	NA	249 (0.07)	NA

NA = not available.

Note: Data on intention of toxicity are not available in Quebec.

The annual proportion of opioid toxicity inpatient hospitalizations when the individual had an active dispensation of a prescription opioid at the time of admission was consistently highest in Quebec and lowest in British Columbia in both 2018 and 2022. Specifically, by 2022, the proportion of hospitalizations with active opioid exposure ranged from a high of 36.6% (Quebec) to a low of 19.7% (British Columbia) (Figure 12). Overall, proportions declined over time across all provinces with the exception of British Columbia where it remained relatively stable. The largest decline in proportion of hospitalizations with active opioid exposure between 2018 and 2022 was observed in Manitoba (39% relative decrease from 44.9% to 27.4%), Quebec (23% relative decrease from 47.5% to 36.6%), and Alberta (21% relative decrease from 34.9% to 27.5%). When considering prescription opioids dispensed in the prior 30 and 180 days, proportions were higher across all provinces, with more notable declines over time in Quebec and Manitoba. In 2022, opioid exposure in the prior 30 days ranged from 33.3% (British Columbia) to 50.6% (Quebec) and exposure in the prior 180 days ranged from 45.7% (British Columbia) to 60.2% (Quebec) (Appendix 2, Figures 24 and 25).

In our stratified analyses, we found people aged 65 years and older had a higher prevalence of opioid toxicity hospitalizations with active prescription opioid exposure (Figure 13 and Appendix 2, Figure 27). For example, in 2022, among individuals aged 65 to 74 years, more than 55% were being actively dispensed a prescription opioid at the time of opioid-related toxicity admission across all provinces except British Columbia (39.3%);

and among those aged 75 and older, more than 50% had an active opioid exposure across all provinces (note: data in this age group were not reportable in Alberta and Manitoba). In contrast, less than 25% of people aged 25 to 44 years had an active opioid exposure at the time of opioid toxicity hospitalization across all studied provinces (note: data in this age group were not reportable in Manitoba and Quebec). When stratified by sex, active opioid exposure in 2022 was higher among females than males across most provinces, except in Saskatchewan where proportions were similar between sexes (34.3% among males versus 34.0% among females). Specifically, the percentage of opioid toxicity hospitalizations with active opioid exposure in 2022 across all provinces ranged from 23.5% (British Columbia) to 41.8% (Quebec) among females, compared to a range of 16.7% (Manitoba) to 34.3% (Saskatchewan) among males.

The proportion of opioid toxicity inpatient hospitalizations with an active prescription opioid exposure in 2022, stratified by opioid type, is presented in Figure 14. Active opioid dispensations at the time of hospital admission were more common for opioids indicated for pain than OAT across all provinces, although the degree of difference varied considerably. Specifically in 2022, more than 20% of opioid toxicity hospitalizations had an active dispensation of an opioid indicated for pain across all provinces (range of 21.7% in Alberta to 32.9% in Quebec), with the exception of British Columbia, where this proportion was 10.2%. Active exposure to OAT among opioid toxicity hospitalizations ranged from a low of 0.0% in Manitoba to a high of 12.7% in Saskatchewan. Notably, in British Columbia, the proportion of hospitalizations with active exposure to opioids for pain was similar to that for OAT (10.2% versus 9.6%, respectively). Hydromorphone was the most commonly dispensed opioid for pain at the time of toxicity in all provinces except Manitoba, where oxycodone was the most commonly dispensed opioid analgesic. However, patterns of active exposure to different types of opioids for pain generally varied across provinces. When examining trends over time (2018 versus 2022), active dispensations of opioids for pain at the time of opioid toxicity hospitalization decreased across all studied provinces. Specifically, proportions of hospitalizations with active dispensations of opioids for pain fell from a range of 14.9% to 45.2% in 2018 to 10.2% to 32.9% in 2022. In contrast, active dispensations of OAT slightly increased over time in most provinces where data were reportable (range of 2.13% to 10.3% in 2018 versus 4.03% to 12.7% in 2022). The exception was Manitoba where active exposure to OAT remained low in both 2018 and 2022 (Appendix 2, Figure 28 and Figure 14). Active exposure to SROM was very low in both 2018 and 2022 (when reportable).

Figure 12: Proportion of Opioid Toxicity Inpatient Hospitalizations With Active Opioid Dispensations, 2018 to 2022

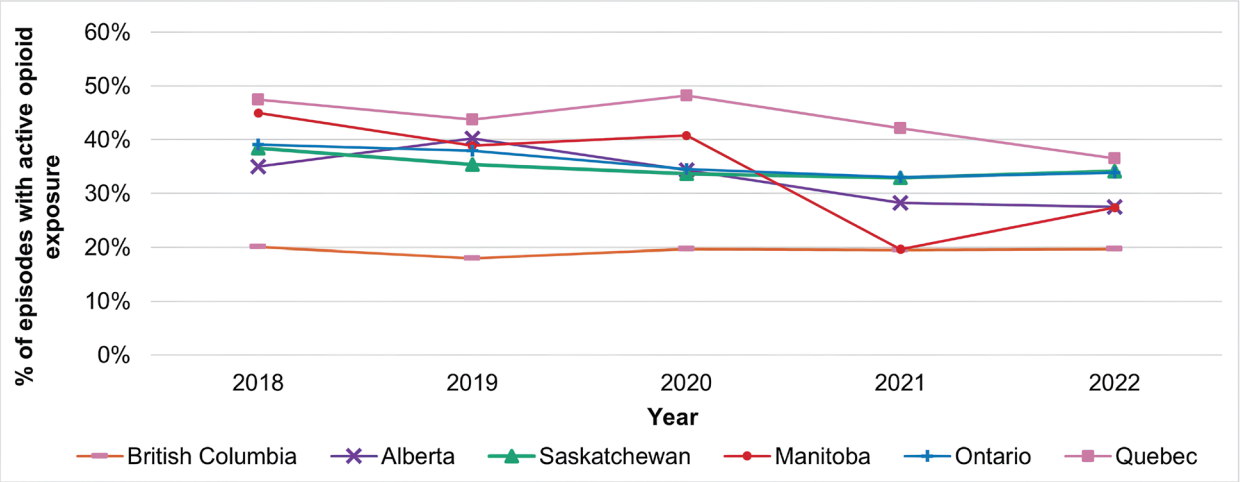
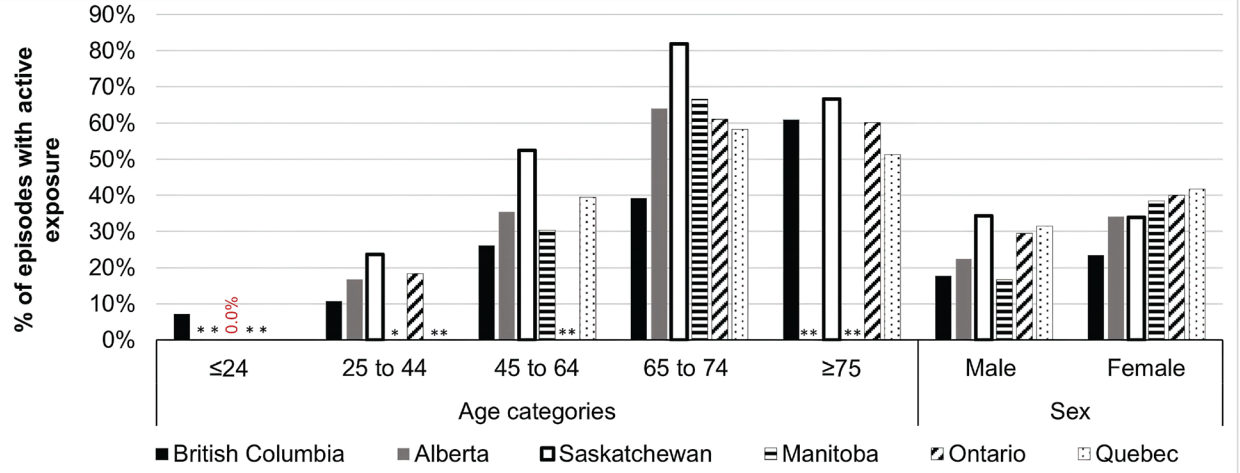
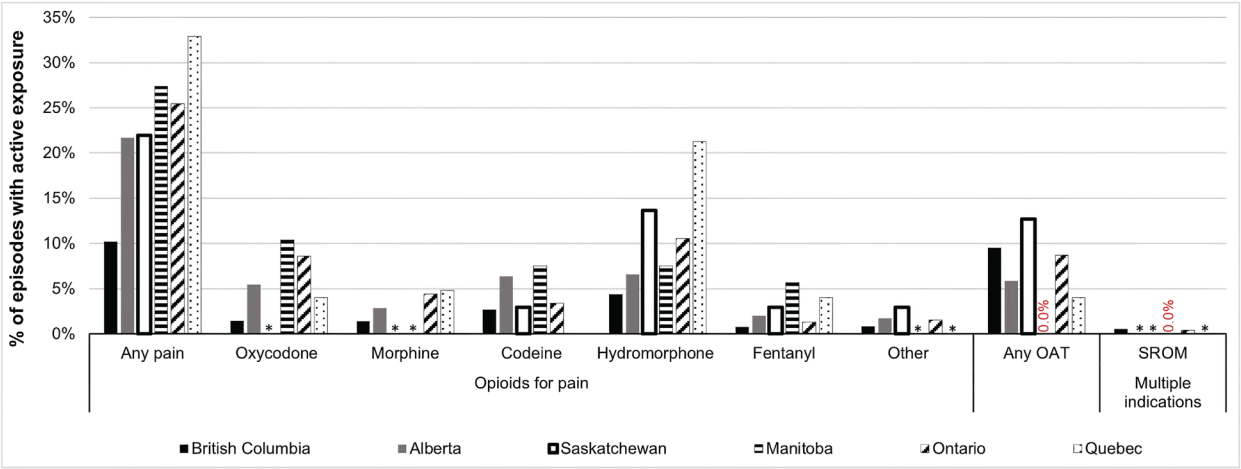


Figure 13: Proportion of Opioid Toxicity Inpatient Hospitalizations With Active Opioid Dispensations in 2022, Stratified by Age and Sex



Note: The proportion was 0% among those 24 years or younger in Manitoba. Asterisks (*) represent censoring of small cell counts (i.e., N < 5 in British Columbia, Saskatchewan, Manitoba, and Quebec; N < 6 in Ontario; and N < 10 in Alberta). In cases of a small cell count, the next smallest cell has been suppressed (**) to prevent residual disclosure.

Figure 14: Proportion of Opioid Toxicity Inpatient Hospitalizations With Active Opioid Dispensations in 2022, Stratified by Opioid Type



OAT = oral agonist therapy; SROM = slow-release oral morphine.

Note: The proportion was 0% for "Any OAT" and "SROM" in Manitoba. Asterisks (*) represent censoring of small cell counts (i.e., N < 5 in British Columbia, Saskatchewan, Manitoba, and Quebec; N < 6 in Ontario; and N < 10 in Alberta). Episodes can be captured in several opioid type categories if multiple opioids were dispensed over the time period. Opioid types categorized in the "other" grouping include buprenorphine (pain), butorphanol, dextropropoxyphene, meperidine, methadone (pain), nalbuphine, oxymorphone, pentazocine, tapentadol, and tramadol.

Prescription Opioid Use Prior to Opioid Toxicity ED Visits

Main Take-Aways

The total number of opioid toxicity ED visits increased over time across all studied provinces. In Ontario, annual rates have grown, while in Alberta and Quebec, the rates have remained roughly stable. Most ED visits were among younger adults (aged 25 to 44 years).

The percentage of opioid toxicity ED visits with active prescription opioid exposure has generally decreased over time, except in British Columbia, where it has increased yet remained among the lowest rates from 2018 to 2022. In 2022, the highest percentage of opioid toxicity ED visits with active opioid exposure was in Quebec (26%) and the lowest was in Alberta (15%).

In 2022, older adults and females were most likely to be actively exposed to prescription opioids at the time of the opioid toxicity ED visit.

Among opioid toxicity ED visits in 2022, active use of opioids was more common for OAT than for pain management in British Columbia, Ontario, and Saskatchewan. Between 2018 and 2022, active use of OAT before the opioid toxicity ED visit increased, while the use of opioids for pain fell.

The absolute number of opioid toxicity ED visits increased between 2018 and 2022 across all provinces where data were available. Where reportable, annual rates of opioid toxicity ED visits increased in Ontario (from 0.60 to 0.71 per 1,000) over the study period and remained relatively stable in Alberta (1.2 per 1,000 in both years) and Quebec (0.20 versus 0.19 per 1,000). Overall, the majority of opioid-related toxicities

treated in the ED were accidental in provinces where intention of toxicity was reportable, and the proportion of accidental opioid-related toxicities increased over time. By 2022, the proportion of opioid toxicity ED visits that were accidental ranged from 76.6% (Saskatchewan) to 85.6% (Alberta) (Table 6). In 2022, opioid toxicity ED visits were concentrated among younger adults aged 25 to 44 years across all provinces. For example, more than 45% of opioid-related toxicities occurred among people aged 25 to 44 years, compared with less than 14% in the 65 years and older age groups across all provinces. Similar to the inpatient hospitalization analyses, there was a slightly higher proportion of opioid toxicity ED visits occurring in the 65 years and older age groups in Quebec compared to other provinces. Specifically, in 2022, 7.8% of opioid toxicity ED visits in Quebec were among people aged 65 to 74 (< 4% in all other provinces), and 4.9% were among those aged 75 years and older (≤ 2% in all other provinces) (Appendix 2, Figure 29).

Table 6: Annual Number and Rate (per 1,000) of Opioid Toxicity ED Visits by Province, 2018 and 2022

Province	2018		2022	
	Total toxicities (N, Rate per 1,000)	Accidental toxicities (N, %)	Total toxicities (N, Rate per 1,000)	Accidental toxicities (N, %)
British Columbia	3,255	NA	4,519	NA
Alberta	5,167 (1.20)	4,304 (83.3%)	5,493 (1.22)	4,703 (85.6%)
Saskatchewan	NA	NA	1,386	1,061 (76.6%)
Ontario	8,630 (0.60)	5,702 (66.1%)	10,772 (0.71)	8,421 (78.2%)
Quebec	663 (0.20)	NA	681 (0.19)	NA

ED = emergency department; NA = not available.

Note: Data are only available from April 2021 onwards for Saskatchewan. Rates could not be reported in British Columbia and Saskatchewan due to partial data coverage because ED visits consist of a subset of the population. Data on intention of toxicity are not available in British Columbia and Quebec.

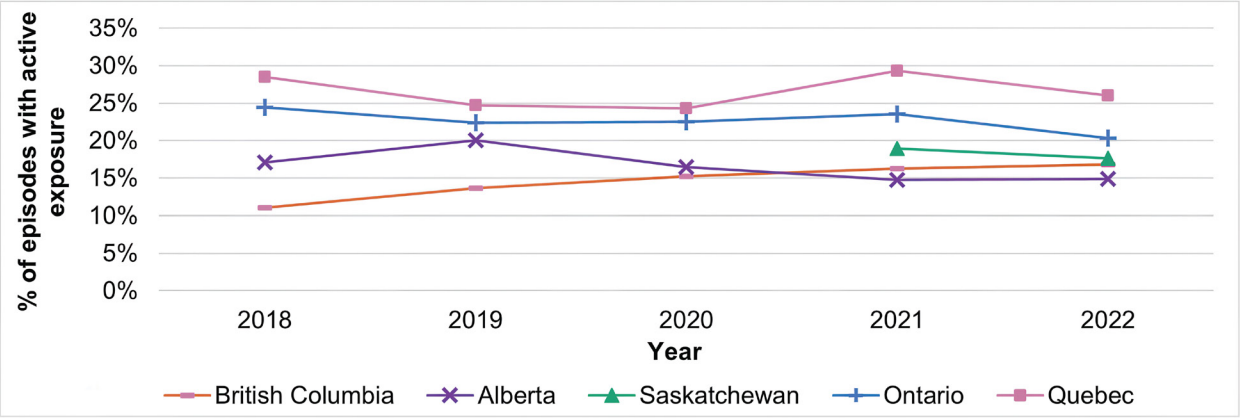
Overall, the annual proportion of opioid toxicity ED visits with active prescription opioid exposure slightly declined over the study period in Alberta (from 17.1% to 14.9%), Ontario (from 24.5% to 20.3%), and Quebec (from 28.5% to 26.0%). Conversely, in British Columbia, annual proportions increased over time from 11.0% in 2018 to 16.8% in 2022. Trends could not be well established in Saskatchewan where data were only available between 2021 (19.0%) and 2022 (17.6%). By 2022, the proportion of opioid toxicity ED visits with an active opioid exposure ranged from a low of 14.9% in Alberta to a high of 26.0% in Quebec (Figure 15). In our secondary analyses, prescription opioid exposure in the 30 and 180 days before an opioid toxicity ED visit was more common. Trends were relatively stable over time except in British Columbia where proportions increased (from 23.3% to 35.8% in the prior 30 days and 38.7% to 48.9% in the prior 180 days). In 2022, proportions of opioid toxicity ED visits with a prescription opioid dispensed in the prior 30 days ranged from 26.6% (Saskatchewan) to 42.7% (Quebec) (Appendix 2, Figure 30). When considering opioids dispensed in the prior 180 days, proportions ranged from 39.5% (Saskatchewan) to 53.0% (Quebec) in 2022 (Appendix 2, Figure 31).

Patterns of active prescription opioid dispensation at the time of an opioid toxicity ED visit across age groups and sex were generally consistent with the inpatient hospitalization analyses, with higher proportions

observed in the older age groups (65 and older) across all provinces (Figure 16 and Appendix 2, Figure 32). Notably, in British Columbia, proportions of ED visits with active prescription opioid exposures in 2022 were lower among people aged 65 to 74 years and 75 years and older (29.6% and 34.2%, respectively), compared to other provinces (range 50.0% to 71.0% and 48.5% to 75.0%, respectively). When stratified by sex, being actively dispensed prescription opioids at the time of opioid toxicity ED visit was slightly higher among females in Alberta, Saskatchewan, Ontario, and Quebec; whereas in British Columbia, patterns were reversed (Figure 16).

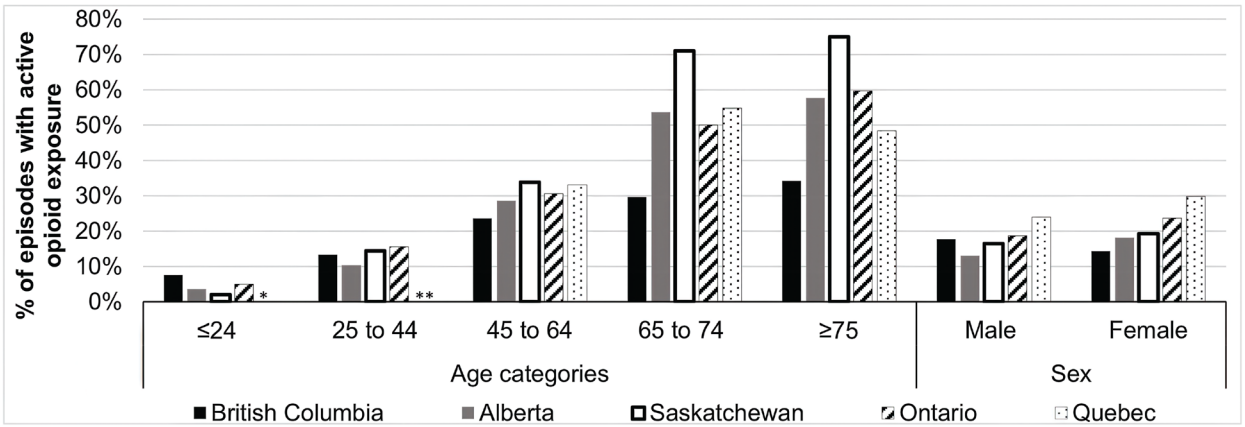
The active exposure to specific opioid types at the time of an opioid toxicity ED visit in 2022 is presented in Figure 17. Overall, active dispensations of opioids used to treat pain were much lower among opioid toxicity ED visits compared with those treated in inpatient settings, ranging from a low of 2.7% in British Columbia to a high of 15.3% Quebec in 2022. In contrast, active exposure to OAT was much higher among opioid toxicity ED visits, ranging from 5.8% (Alberta) to 14.4% (British Columbia). In British Columbia, Ontario, and Saskatchewan, active exposure to OAT was more common (14.4%, 12.0%, and 9.7%, respectively) compared to opioids for pain (2.7%, 8.5%, and 7.9%, respectively). In contrast, there were higher proportions of opioid toxicity ED visits with active exposure to opioids for pain in Alberta and Quebec (9.2% and 15.3%, respectively), compared to OAT (5.8% and 10.9% respectively). Exposure to specific types of opioid analgesics generally varied by province, with hydromorphone being dispensed most frequently in Saskatchewan and Quebec, and codeine being most common in Alberta. When examining trends over time (2018 versus 2022), active exposure to opioids for pain decreased across all provinces where data were available. Specifically, proportions of opioid toxicity ED visits with active exposure to any opioids for pain fell from a range of 3.2% to 22.9% in 2018 to 2.7% to 15.3% in 2022. Conversely, active dispensations of any OAT increased over time in all provinces where data were available (from 2.6% to 10.4% in 2018 to 5.8% to 14.4% in 2022) (Appendix 2, Figure 33 and Figure 17). Active exposure to SROM was very low in both 2018 and 2022.

Figure 15: Proportion of Opioid Toxicity ED Visits With Active Opioid Dispensations, 2018 to 2022



ED = emergency department.
Note: Data are only available from April 2021 onwards for Saskatchewan.

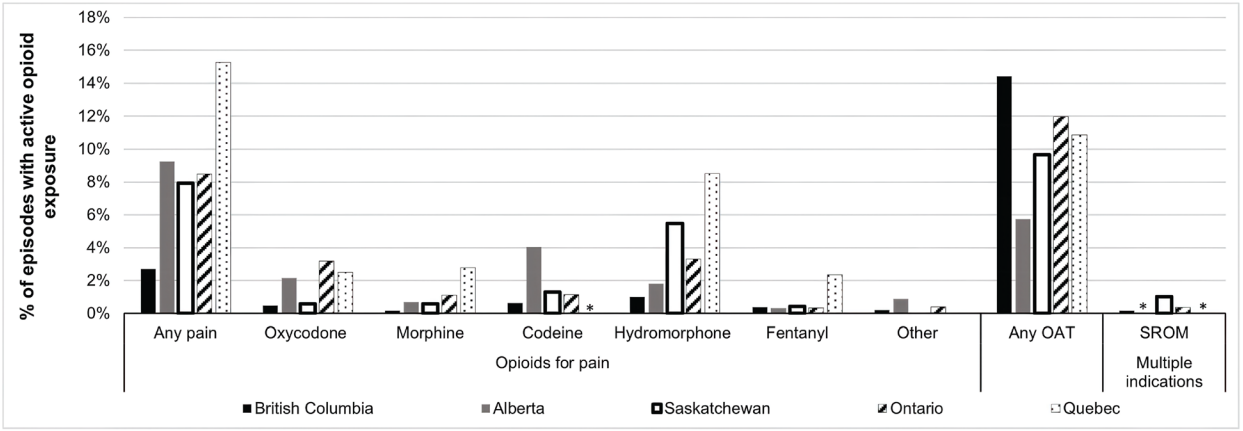
Figure 16: Proportion of Opioid Toxicity ED Visits With Active Opioid Dispensations in 2022, Stratified by Age and Sex



ED = emergency department.

Note: Asterisks (*) represent censoring of small cell counts (i.e., N < 5 in British Columbia, Saskatchewan, and Quebec; N < 6 in Ontario; and N < 10 in Alberta). In cases where there is a small cell count, the next smallest cell has been suppressed (**) to prevent residual disclosure.

Figure 17: Proportion of Opioid Toxicity ED Visits With Active Opioid Dispensations in 2022, Stratified by Opioid Type



ED = emergency department; OAT = opioid agonist therapy; SROM = slow-release oral morphine.

Note: Asterisks (*) represent censoring of small cell counts (i.e., N < 5 in British Columbia, Saskatchewan and Quebec; N < 6 in Ontario; and N < 10 in Alberta). Episodes can be captured in several opioid type categories if multiple opioids were dispensed over the time period. Opioid types categorized in the "other" grouping include buprenorphine (pain), butorphanol, dextropropoxyphene, meperidine, methadone (pain), nalbuphine, oxymorphone, pentazocine, tapentadol, and tramadol.

Strengths and Limitations

The primary strength of this study is the use of linked population-based databases across several provinces representing more than 90% of the total Canadian population to characterize trends in prescription opioid use in Canada. However, there are several notable limitations to this study:

- Population-level opioid dispensing data were not readily accessible across all provinces and territories; therefore, we were unable to capture the full extent of opioid dispensing in the entirety of

Canada, with particular gaps in data in the Atlantic provinces and across all territories. Importantly, distinct dynamics of opioid prescribing that may exist within these jurisdictions are not captured in this analysis. Unfortunately, there are limitations in the availability of complete pharmacy dispensing data via CIHI in the Atlantic provinces, meaning that analyses would be limited to people eligible for public drug benefits. This population is often limited to seniors and low-income households and is therefore not comparable with broader population covered in included provinces. Furthermore, other available data through prescription monitoring programs could not be accessed in a streamlined manner for this analysis, and IQVIA data have substantial limitations for OAT capture. Therefore, we decided to primarily focus on provinces where we had access to individual-level data that could be analyzed consistently. One exception to this was Quebec, where prescription drug data are limited to people insured by the public drug insurance plan (RAMQ). The study population was further restricted to those receiving continuous coverage by the public drug insurance plan over a 455-day period (for RQ1) or 180-day period (for RQ2). We chose to include Quebec in this analysis because it is a large province, representing more than 20% of the population of Canada.

- We did not include Manitoba in analyses relying on ED data due to nonmandatory submission of diagnoses codes needed to identify opioid-related toxicities over the study period. British Columbia and Saskatchewan also had partial ED data over the study period. Therefore, the ED-specific analyses in these jurisdictions may not be representative of the entirety of the province, and absolute numbers of opioid toxicity ED visits are an underestimate.
- We were unable to account for repeat visits within the same episode of care in Alberta's ED analyses and Quebec's ED and inpatient analyses, which may have resulted in some overestimation of opioid toxicity hospitalizations in these provinces.
- Similar to other studies of prescription dispensing data from community pharmacies, we are unable to determine if individuals took or adhered to the medications as prescribed. Therefore, trends presented in this study may not accurately reflect actual prescription opioid use but are reflective of the amount of opioids dispensed in the community.
- DINs for low-dose codeine products used to treat pain were excluded from analyses to help harmonize data across provinces. While these products are widely available over the counter and can be purchased without a prescription in most provinces in Canada, rescheduling of low-dose codeine purchasing in Manitoba in 2016 shifted the availability of these products to prescription only in the province. Therefore, we excluded low-dose codeine for consistency of the included products across provinces, although it is possible that cross-provincial regulatory differences in the purchasing of low-codeine products may have impacted dispensing patterns of other opioids.
- Our inclusion criteria for OAT were limited to methadone and buprenorphine (alone or in combination with naloxone), excluding SROM, which is increasingly used as a second-line treatment for OAT. Due to the increasing role of SROM as a form of OAT in many provinces, we reported trends in this product over time separately and did not group this into our pain and OAT indication categories. Therefore, it is possible that some of the declining trends in OAT observed in some provinces are reflective of increasing use of SROM as a form of OAT. Due to our inability to determine the indication

of SROM, we were unable to determine the degree to which this is occurring. Additionally, we are not able to separate immediate release (IR) hydromorphone used for safer opioid supply (SOS) programs from that used for pain, and we therefore categorized all IR hydromorphone product dispensing as indicated for pain in our analyses. However, we expect that SOS expansion in recent years would have very minimal impact on dispensing trends of IR hydromorphone due to the very small number of people accessing SOS across Canada.

- We were unable to adjust for rates of OUD across provinces in our analysis due to the lack of a validation definition in administrative health data. Therefore, OAT analyses should be interpreted carefully because differences in OAT prescribing across provinces may reflect underlying variations in rates of OUD.
- We did not examine the duration of opioid dispensing, were unable to capture clinical indications of opioid use for pain in our analyses and cannot distinguish between use for acute versus chronic pain. Therefore, the patterns of opioid dispensing for pain (e.g., patient characteristics, dose at initiation, and types of opioid dispensed) observed in this study cannot be interpreted within the context of specific indications for pain management.
- Although in most provinces, we were able to restrict our analysis to ED visits and hospitalizations where an opioid-related toxicity was expected to be present at the time of arrival at the hospital, in Quebec we were restricted to reporting hospital visits where the opioid-related toxicity was defined as the “most responsible diagnosis” (i.e., responsible for the longest length of stay). Therefore, it is possible that Quebec data do not capture all the toxicity events present at admission, and we were unable to remove toxicities that occurred while admitted (although we anticipate this number to be small).
- We cannot determine whether opioid-related toxicity events were directly related to pharmaceutical opioid dispensing. For example, in the case of OAT, it is possible that toxicities occurred when the unregulated drug supply was accessed after OAT was abruptly discontinued. Similarly, it is possible that some of those receiving prescribed opioid analgesics had concurrently accessed unregulated opioids and other substances that could have contributed to the opioid toxicity. We also did not capture concurrent use of other substances with prescribed opioids, which could increase the likelihood of a toxicity event (e.g., benzodiazepines, alcohol).
- We cannot determine the extent to which trends may be impacted by health care disruptions related to the COVID-19 pandemic, which began in 2020.
- Finally, opioid-related toxicities that do not present in inpatient hospital and ED settings are not captured in this analysis. Therefore, our findings on pharmaceutical opioid exposure before opioid-related harms are only generalizable to toxicity events treated in a hospital.

Discussion

Main Take-Aways

The use of prescription opioids for pain is declining across Canada, with the majority of individuals initiating a dose of 50 MME or less.

OAT initiation varied across provinces — either increasing or remaining stable. Differences across provinces might indicate different underlying rates of OUD and/or variable access to treatment for each province. There was a notable rise in buprenorphine use across all provinces, which aligns with the 2018 clinical guidelines applicable to the study period, which recommended this product as the first-line treatment for OUD.[10]

There was a decrease in opioid toxicity hospitalizations and ED visits with active exposure to prescribed opioids, primarily focused on less exposure to opioids indicated for pain. This highlights the increasing dangers of the unregulated drug supply across the country.

In general, rates of new and overall prescription opioid use for pain have declined across all included provinces over time, which may reflect efforts made to promote opioid stewardship and appropriate opioid prescribing for chronic noncancer pain and acute pain across Canada over the past decade.[7-9,11] We found that females and older adults were more likely to initiate a prescription opioid to treat pain, which is consistent with findings broadly across Canada.[12,13] Notably, we did not observe differences in opioid initiation for pain across income in Ontario and Manitoba, and we observed only small differences in British Columbia, Alberta, and Saskatchewan, where those in the lowest income quintile had higher rates of opioid initiation for pain. This lack of a gradient in opioid analgesic prescribing in light of evidence suggesting differences in pain prevalence across income[14,15] may suggest undertreatment of pain in those with lower incomes. More than 80% of people starting opioids for pain received initial doses less than or equal to 50 MME, although we did not assess how these doses changed over the course of someone's treatment and whether they remained within this threshold.[7] Moreover, the prevalence of lower-dose opioid initiation has risen or remained stable in all provinces, which further indicates shifts in clinical practice over time toward more safe initiation practices. Finally, there were substantial interprovincial differences in the types of opioids prescribed for pain. For example, Manitoba had the highest prescribing of codeine, despite our exclusion of low-dose codeine products from all analyses. This trend may have been influenced by the rescheduling of over-the-counter low-dose codeine products to prescription only in Manitoba in 2016, which may have changed prescribing practices for codeine products more generally. Elsewhere, Ontario had the highest rate of oxycodone dispensing, while Quebec had the highest rate of hydromorphone and morphine dispensing.

Overall, prescription OAT new user rates varied widely across provinces — ranging from a low of 0.6 per 1,000 in Quebec to a high of 2.4 per 1,000 in Alberta in 2022. These findings may indicate differences in the underlying prevalence of OUD; variability in the accessibility, tolerance, or preference for OAT; or differences in the willingness to prescribe OAT in these provinces — all of which we were unable to account for in our analyses. For example, the growth in the rates of new users of OAT in Alberta, Manitoba, and

Saskatchewan over the study period aligns with reports of recent rapid accelerations in opioid-related deaths in these provinces since 2019–2020,[16] suggestive of a growing population who may require treatment for an OUD. Our findings are also consistent with previous research that has reported growth in prescription OAT dispensed in these provinces since 2019.[12] In contrast, the lower rates of overall OAT users in Quebec observed in this study have been documented elsewhere[12] and may reflect a generally lower prevalence of unregulated opioid use, opioid-related harms, and OUD in this province.[1,16] Alternatively, with Quebec reporting higher rates of SROM prescribing compared to other provinces studied, it is possible that a different OAT practice is leading to a higher reliance on SROM for OAT in this province. Future work is needed to further understand the patterns of OAT and SROM prescribing across Quebec in contrast with elsewhere in Canada. High rates of OAT initiation among males and younger age groups in all provinces are consistent with previous research in other provinces[13,17] and also parallels high rates of opioid-related harms in these demographic groups.[1] Finally, we observed increased rates of initiation of OAT in rural areas in provinces such as Alberta and Ontario. This may reflect efforts made in some provinces to improve access to OAT in rural areas, where access has historically been challenging.[18,19] Finally, we observed changes in the type of OAT prescribed across all provinces over time, with a large shift toward buprenorphine over methadone — a change that aligns closely with the evolving role of buprenorphine as the preferred OAT formulation in 2018 clinical guidelines that were in effect during the study period.[10]

The majority of people experiencing an opioid toxicity treated in an ED or as an inpatient had no evidence of active treatment with opioids indicated for either pain or OAT across all provinces studied, reflecting the dominance of the unregulated drug supply in opioid-related harms across the country.[1] While we are unable to determine whether prescribed opioids contributed to the opioid-related toxicity event, there were considerable differences in the proportion of opioid toxicity inpatient hospitalizations with active opioid exposure across provinces — ranging from a low of 20% in British Columbia to a high of 37% in Quebec in 2022. These patterns likely reflect jurisdictional differences in the history of substance use, pharmaceutical opioid prescribing practices, and the potency and unpredictability of the unregulated drug supply across Canada. For example, British Columbia has a long history of unregulated opioid-related harms, with fentanyl entering their unregulated drug supply more than a decade ago,[20] contributing to a large proportion of opioid-related harms occurring among those not actively prescribed opioids. In contrast, in Quebec, the arrival of fentanyl in the unregulated drug supply occurred much later and remains lower than in Ontario and Western Canada.[20] This combined with the restriction of Quebec data to individuals eligible for the public drug program (RAMQ) — which constitutes an older population more likely to experience toxicities involving prescription opioids[1] — is likely what drives the higher relative proportion of active opioid exposure among opioid toxicity hospitalizations in Quebec. Importantly, the finding of a higher proportion of active prescription opioid exposure among opioid toxicity hospitalizations in Quebec should also be interpreted in consideration of the fact that the overall rates of opioid toxicity hospitalizations were much lower in Quebec relative to most other provinces. Despite variations in active prescription opioid exposure across the provinces, notable declines in proportions over time were observed in Alberta, Manitoba, and Quebec. These patterns coincide with rising opioid-related harms in these provinces in recent years that have been attributed to the

unregulated drug supply, further reinforcing the changing role of pharmaceutical opioids in opioid-related toxicity harms.[1,16]

Generally, we observed a lower proportion of active prescription opioid exposure among opioid toxicities treated in the ED relative to those treated in inpatient settings. Importantly, the majority of opioid toxicity ED visits occurred among those aged 25 to 44 years — a demographic for which active opioid prescribing was particularly low (≤ 15% in 2022) — and more commonly involved OAT. This finding likely reflects the management of many accidental toxicities from the unregulated drug supply in ED settings, with those admitted to hospital often having severe toxicities and/or complex health needs (e.g., multiple comorbidities, older age), thus requiring inpatient stabilization or extended monitoring. Further, among provinces reporting complete ED and inpatient opioid-related toxicity data, the absolute number of events treated in EDs was much higher than those in inpatient settings. This underscores the substantial impact of nonprescribed opioids in toxicities nationwide and highlights the critical need to resource EDs adequately to support people experiencing harm from the unregulated drug supply.

We observed that females and older adults were more likely to have an active opioid exposure at the time of opioid-related toxicity across most provinces, a finding that aligns with the broader opioid analgesic prescribing patterns previously discussed as well as higher rates of pain among females and older adults.[21] Specifically, opioid analgesics are generally dispensed at higher rates to women and those aged 65 years and older across Canada, while opioid-related toxicities from the unregulated drug supply are generally more concentrated among men and younger adults.[1,17,22] With rates of toxicities generally much higher among younger demographics, this suggests a need for multipronged approaches to opioid-related toxicity prevention — with efforts made in older populations to support safe prescribing and use of pharmaceutical opioids — whereas in younger populations, there is a need for focused responses that address the harmful unregulated drug supply. Importantly, we did observe a rise in active exposure to OAT before opioid toxicity hospitalizations across most provinces, which is likely indicative of expanded access to OAT over time because of efforts that have been made to remove barriers to treatment for people with an OUD. However, our analysis is unable to determine whether these toxicity events were related to the OAT dispensed or occurred as a result of harms from the unregulated drug supply. Because OAT retention rates have been shown to be low across Canada,[23,24] efforts are needed to support access to — and retention in — evidence-based treatment for people with OUD across the country.

Conclusions and Implications for Decision- or Policy-Making

Main Take-Aways

Rates of opioid analgesic use and initiation of high-dose opioids for pain have declined across Canada during a time in which efforts were made to promote appropriate prescription opioid use. Over the same period, buprenorphine dispensing, a treatment for OUD, has increased across Canada. While this aligns with guidelines in place during the study period recommending buprenorphine-naloxone as first-line treatment of OUD, recent guidance indicates that methadone may be more effective for those exposed to fentanyl from the unregulated supply, and 2024 guidelines recommend both methadone and buprenorphine-naloxone as first-line treatment for OUD.[25]

Policy responses designed to address the ongoing substance-related toxicity crisis must focus on the harm caused by the unpredictable, potent unregulated drug supply.

Generally, declining rates of prescription opioid use for pain and reductions in the initiation of opioids at high doses across provinces denotes efforts toward opioid stewardship in Canada. While lower doses at initiation (50 MME or less) may reflect the safer prescribing of opioids, evidence suggesting that rapid dose tapering, abrupt opioid discontinuation, as well as reluctance to initiate patients on opioids when clinically indicated can negatively impact patients, sometimes leading people to access opioids from the unregulated drug supply.[26-28] While this study was unable to determine the degree to which this happened in the provinces studied, future guidelines and policies should consider the potential unintended consequences of changing access to prescription opioids to prevent inadvertent harm. Additionally, future studies should assess the potential for income inequities regarding opioid treatment for pain, given the minimal differences in opioid initiation for pain across income quintiles in the provinces. This is important to investigate given the higher burden of pain among lower income populations.[14,15] The development of robust pain measures would also support future studies assessing inequities in the treatment of pain.

Clinical practice guidelines for OAT prescribing have changed over time, with buprenorphine-naloxone recommended as the first-line treatment for OUD in Canada in the 2018 guideline.[10] This recommendation may have contributed to the observed shift toward buprenorphine dispensing across provinces. However, with the increasing potency of the unregulated drug supply, recent recommendations suggest that methadone may be a more effective treatment option for individuals exposed to fentanyl.[29] Therefore, an understanding of the shifting dynamic of OAT prescribing across Canada and the effectiveness of available OAT formulations among fentanyl-exposed individuals is needed to ensure appropriate access to effective OAT among people with OUD across the country. Notably, in line with evolving evidence, new 2024 guidelines for the management of OUD recommends both buprenorphine and methadone as first-line OAT.[25]

Generally, we found declining rates of pharmaceutical opioid exposure at the time of opioid-related toxicity when measured in relation to overall opioid-related toxicity events, which reinforces the growing role of unregulated opioids in opioid-related harms. Moreover, our findings also point to important differences in pharmaceutical opioid exposure before opioid-related harms across jurisdictions in Canada as well as

between demographic groups. As the substance-related toxicity crisis persists across the country, our findings suggest a need for policy responses that target harms resulting from the unregulated supply.

References

1. Federal provincial and territorial Special Advisory Committee on the Epidemic of Opioid Overdoses *Opioid- and Stimulant-related Harms in Canada*. September, 2024. https://health-infobase.canada.ca/substance-related-harms/opioids-stimulants/
2. Gomes T, Campbell TJ, Kitchen SA, et al. Association Between Increased Dispensing of Opioid Agonist Therapy Take-Home Doses and Opioid Overdose and Treatment Interruption and Discontinuation. *JAMA*. 2022;327(9):846-855. doi:10.1001/jama.2022.1271 PubMed
3. Garg R, Kitchen SA, Men S, et al. Impact of the COVID-19 pandemic on the prevalence of opioid agonist therapy discontinuation in Ontario, Canada: A population-based time series analysis. *Drug and Alcohol Dependence*. 2022/07/01/ 2022;236:109459. doi:https://doi.org/10.1016/j.drugalcdep.2022.109459
4. Kitchen SA, Campbell TJ, Men S, et al. Impact of the COVID-19 pandemic on the provision of take-home doses of opioid agonist therapy in Ontario, Canada: A population-based time-series analysis. (1873-4758 (Electronic))
5. Russell C, Ali F, Nafeh F, Rehm J, LeBlanc S, Elton-Marshall T. Identifying the impacts of the COVID-19 pandemic on service access for people who use drugs (PWUD): A national qualitative study. *Journal of Substance Abuse Treatment*. 2021/10/01/ 2021;129:108374. doi:https://doi.org/10.1016/j.jsat.2021.108374
6. Statistics Canada. Data from: Postal Code Conversion File Plus (PCCF+) Version 8A1, December 2022 Postal Codes. 2023;V2. Deposited 2023-07-28 12:43:15.912. doi:hdl:11272.1/AB2/FPEURY.
7. Busse JW, Craigie S, Juurlink DN, et al. Guideline for opioid therapy and chronic noncancer pain. *Canadian Medical Association Journal*. 2017;189(18):E659-E666. doi:10.1503/cmaj.170363 PubMed
8. Health Quality Ontario Opioid Prescribing for Acute Pain-Care for People 15 Years of Age and Older. July 17, 2024, https://www.hqontario.ca/portals/0/documents/evidence/quality-standards/qs-opioid-acute-pain-clinician-guide-en.pdf
9. Health Quality Ontario Opioid Prescribing for Chronic Pain Care for People 15 Years of Age and Older. July 17, 2024, https://www.hqontario.ca/portals/0/documents/evidence/quality-standards/qs-opioid-chronic-pain-clinician-guide-en.pdf
10. Bruneau J, Ahamad K, Goyer M-È, et al. Management of opioid use disorders: a national clinical practice guideline. *Canadian Medical Association Journal*. 2018;190(9):E247-E257. doi:10.1503/cmaj.170958 PubMed
11. Furlan AD, Reardon R, Weppler C. Opioids for chronic noncancer pain: a new Canadian practice guideline. *Canadian Medical Association Journal*. 2010;182(9):923-930. doi:10.1503/cmaj.100187 PubMed
12. IQVIA. *Prescription Opioid Trends in Canada*. 2022. Accessed July 18, 2024. https://www.iqvia.com/-/media/iqvia/pdfs/canada/white-paper/prescriptionopioidtrendsincanada_report_en.pdf
13. Ontario Drug Policy Research Network. Ontario Opioid Indicator Tool. Updated April 2024. doi:10.31027/ODPRN.2022.01. https://odprn.ca/ontario-opioid-indicator-tool/pain/
14. Hogan ME, Taddio A, Katz J, Shah V, Krahn M. Health utilities in people with chronic pain using a population-level survey and linked health care administrative data. *Pain*. Mar 2017;158(3):408-416. doi:10.1097/j.pain.0000000000000776 PubMed
15. Uppal S. Rising prices and the impact on the most financially vulnerable: A profile of those in the bottom family income quintile. Statistics Canada. https://www150.statcan.gc.ca/n1/pub/75-006-x/2023001/article/00002-eng.htm
16. Ledlie S, Juurlink DN, Tadrous M, Mamdani M, Paterson JM, Gomes T. Opioid-related deaths between 2019 and 2021 across 9 Canadian provinces and territories. *Canadian Medical Association Journal*. 2024;196(14):E469-E476. doi:10.1503/cmaj.231339 PubMed
17. British Columbia Centre for Disease Control. Unregulated Drug Poisoning Emergency Dashboard. June, 2024. Accessed July 17, 2024. https://public.tableau.com/shared/89SJNZ4HP?:display_count=n&:origin=viz_share_link
18. Day N, Wass M, Smith K. Virtual opioid agonist treatment: Alberta's virtual opioid dependency program and outcomes. *Addiction Science & Clinical Practice*. 2022/07/28 2022;17(1):40. doi:10.1186/s13722-022-00323-4
19. Dorman K, Biedermann B, Linklater C, Jaffer Z. Community strengths in addressing opioid use in Northeastern Ontario. *Canadian Journal of Public Health*. 2018/04/01 2018;109(2):219-222. doi:10.17269/s41997-018-0055-4

20. Kleinman RA. Fentanyl, carfentanil and other fentanyl analogues in Canada's illicit opioid supply: A cross-sectional study. *Drug and Alcohol Dependence Reports*. 2024/09/01/ 2024;12:100240. doi:https://doi.org/10.1016/j.dadr.2024.100240
21. Shupler MS, Kramer JK, Cragg JJ, Jutzeler CR, Whitehurst DGT. Pan-Canadian Estimates of Chronic Pain Prevalence From 2000 to 2014: A Repeated Cross-Sectional Survey Analysis. *J Pain*. May 2019;20(5):557-565. doi:10.1016/j.jpain.2018.10.010 PubMed
22. Gomes T, Murray R, Kolla G, et al. *Patterns of medication and healthcare use among people who died of an opioid-related toxicity during the COVID-19 pandemic in Ontario*.
23. Gomes T, McCormack D, Bozinoff N, et al. Duration of use and outcomes among people with opioid use disorder initiating methadone and buprenorphine in Ontario: a population-based propensity-score matched cohort study. *Addiction*. 2022;117(7):1972-1981. doi:https://doi.org/10.1111/add.15862 PubMed
24. Nosyk B, Min JE, Homayra F, et al. Buprenorphine/Naloxone vs. Methadone for the Treatment of Opioid Use Disorder. *JAMA*. 2024;doi:10.1001/jama.2024.16954 PubMed
25. Yakovenko I, Mukaneza Y, Germe K, et al. Management of opioid use disorder: 2024 update to the national clinical practice guideline. *CMAJ*. Nov 11 2024;196(38):E1280-E1290. doi:10.1503/cmaj.241173 PubMed
26. Darnall BD, Juurlink D, Kerns RD, et al. International Stakeholder Community of Pain Experts and Leaders Call for an Urgent Action on Forced Opioid Tapering. *Pain Medicine*. 2018;20(3):429-433. doi:10.1093/pm/pny228 PubMed
27. Dubin R, Clarke H, Kahan M. The risks of opioid tapering or rapid discontinuation. *Canadian Family Physician*. 2024;
28. Martins D, Khuu W, Tadrous M, et al. Impact of changes in opioid funding and clinical policies on rapid tapering of opioids in Ontario, Canada. *PAIN*. 2022;163(1):e129-e136. doi:10.1097/j.pain.0000000000002420 PubMed
29. Bromley L, Kahan M, Regenstreif L, Srivastava A, Wyman J, Dabam F. Methadone treatment for people who use fentanyl: Recommendations. Toronto, ON: META: PHI, 2021. https://www.metaphi.ca/wp-content/uploads/Guide_MethadoneForFentanyl.pdf

Authors and Contributors

Authors

Tara Gomes developed and advised on the protocol, drafted and critically revised the report, coordinated data requests from all jurisdictions and consolidated the final data, and led the interpretation of findings.

Bisola Hamzat drafted the full protocol and the Ontario-specific dataset creation plan, consolidated and reviewed result outputs across the provinces, contributed to data visualization and interpretation, drafted and reviewed the final report, and incorporated feedback from internal and external reviewers.

Alice Holton contributed to developing the list of drug codes for the analysis, liaised with data providers, collated data output, contributed to data interpretation, and reviewed the draft reports.

Dana Shearer reviewed multiple drafts and the final report, provided project management and methodological support, and coordinated the Ontario analysts.

Daniel McCormack contributed to the drafting of the analysis plan, forming study cohorts, and conducting the analysis.

Joanna Yang analyzed objective 2 Ontario data, reviewed the report, and provided feedback.

Dean Eurich contributed to the conception and design, acquisition of data, and analysis and interpretation of the study results; and contributed to drafting and revising the report.

Jason R. Randall contributed to the conception and design of the study; was involved in the acquisition of data and coordination of the analysis; and reviewed and provided feedback on the report drafts.

Zhaoyu Liu contributed to the conception and design, acquisition of data, and analysis and interpretation of the study results; and contributed to drafting and revising the report.

Houssem Missaoui provided suggestions and feedback on the final version of the protocol and the report, conducted data extraction and analysis related to the province of Quebec, and delivered comprehensive and detailed results specific to the province of Quebec.

Jean-Luc Kaboré contributed to the protocol revision, review of analyses, and review of the report.

Grace Cheung contributed to the final drug list, supported the analysis by extracting the relevant claims data for 3 provinces, and reviewed the drafts to ensure findings were accurately reported.

Contributors

Anita Iocono reviewed the final draft, addressed comments, and made final revisions.

Dalen Koncz reviewed the data.

Felix Xu contributed to the conception and study design and the acquisition and analysis of data, reviewed the final draft report, assisted in the implementation of the knowledge mobilization plan, and provided project support.

Clinical Experts

Comments on this report were kindly provided by:

Abhimanyu Sud, MD

Assistant Professor and Clinical Investigator

Department of Family and Community Medicine, University of Toronto

and

Research Chair, Primary Care and Population Health Systems

Humber River Health

Acknowledgements

This study was supported by ICES, which is funded by an annual grant from the Ontario Ministry of Health and the Ministry of Long-Term Care. Parts of this material are based on data and information compiled and provided by the Ontario Ministry of Health and CIHI. The analyses, conclusions, opinions, and statements expressed herein are solely those of the authors and do not reflect those of the funding or data sources; no endorsement is intended or should be inferred. This document used data adapted from the Statistics Canada Postal Code^{OM} Conversion File, which is based on data licensed from Canada Post Corporation, and/or data adapted from the Ontario Ministry of Health Postal Code Conversion File, which contains data copied under license from Canada Post Corporation and Statistics Canada. We thank IQVIA Solutions Canada Inc. for the use of their Drug Information File.

This study is based in part on anonymized raw data from Alberta Health and Alberta Health Services (AHS), which were provided by the Alberta Strategy for Patient Oriented Research Unit housed within AHS. The interpretation and conclusions contained herein are those of the researchers and do not necessarily represent the views or opinions of the Government of Alberta or AHS.

Conflicts of Interest

Tara Gomes disclosed the following:

Payment as Advisor or Consultant

- Indigenous Services Canada — honorarium for participation in the Indigenous Services Canada Drugs and Therapeutics Advisory Committee

Travel or other expense payments

- Indigenous Services Canada

Research funding or grants paid to the institution

- Ontario Ministry of Health

Board of Governors Member

- Inner City Family Health Team

Involvement in Canada's Drug Agency (CDA-AMC) projects or Scientific Advice

- HC0053 Omalizumab for Chronic Idiopathic Urticaria — Utilization Review (2024)
- HC0096 Hydromorphone Prescriptions Trends (2024)
- HC0098 Long-Acting Injectable Antipsychotics (2024)

Bisola Hamzat disclosed the following:

Involvement in CDA-AMC projects or Scientific Advice

- HC0096 Hydromorphone Prescriptions Trends (2024 to 2025)
- HC0098 Long-Acting Injectable Antipsychotics (2024 to 2025)

Dana Shearer disclosed the following:

Involvement with CDA-AMC projects or Scientific Advice

- HC0096 Hydromorphone Prescriptions Trends
- HC0098 Long-Acting Injectable Antipsychotics

Dean Eurich disclosed the following:

Involvement with CDA-AMC projects or Scientific Advice

- HC0096 Hydromorphone Prescriptions Trends

Jason R. Randall disclosed the following:

Current employee

- Real World Evidence Unit, University of Alberta (2022 to 2024) — various drugs/technologies

Involvement in CDA-AMC projects or Scientific Advice

- RE0047 Biologic Drugs for Severe Asthma
- HC0081 Calcitonin Gene-Related Peptide Inhibitors for Migraine Prophylaxis
- HC0096 Hydromorphone Prescriptions Trends
- HC0098 Long-Acting Injectable Antipsychotics
- OS0011 PCSK9 Inhibitors in Familial Hypercholesterolemia

Felix Xu disclosed the following:

Employment

- Ontario Drug Policy Research Network — Opioids

Zhaoyu Liu disclosed the following:

Involvement with CDA-AMC projects or Scientific Advice

- HC0098 Long-Acting Injectable Antipsychotics
- OS0011 PCSK9 Inhibitors in Familial Hypercholesterolemia

Houssem Missaoui disclosed the following:

Involvement with CDA-AMC projects or Scientific Advice

- HC0069 Outpatient Paxlovid and Remdesivir Utilization in Canada
- HC0081 Calcitonin Gene-Related Peptide Inhibitors for Migraine Prophylaxis
- HC0096 Hydromorphone Prescriptions Trends

Jean-Luc Kaboré disclosed the following:

Involvement with CDA-AMC projects or Scientific Advice

- HC0069 Outpatient Paxlovid and Remdesivir Utilization in Canada
- HC0081 Calcitonin Gene-Related Peptide Inhibitors for Migraine Prophylaxis

Abhimanyu Sud disclosed the following:

Research funding or grants

- CIHR — Long-Acting Injectable Buprenorphine

- CIHR — Opioid Agonist Therapies
- CDA-AMC — Opioid Agonist Therapies

Involvement with CDA-AMC projects or Scientific Advice

- RE0045 Pain Control for Opioid Agonist Therapy (2023 to 2024)
- HC0096 Hydromorphone Prescriptions Trends

No other conflicts of interest were declared.

Appendix 1: Supplementary Information on Methods

Please note that this appendix has not been copy-edited.

Table 7: List of Opioid Drug Classes Included in the Analyses

Opioid type	Drug class
Opioids for pain	• Oxycodone • Morphine • Codeine • Hydromorphone • Fentanyl • Other (buprenorphine [pain]), butorphanol, dextropropoxyphene, meperidine, methadone [pain], nalbuphine, oxymorphone, pentazocine, tapentadol, or tramadol)
Opioid agonist therapy	• Methadone • Buprenorphine (buprenorphine/naloxone, subcutaneous buprenorphine extended-release [Sublocade] or implantable buprenorphine [Probuphine])
Slow-release oral morphine	• Slow-release oral morphine [Kadian 24-hour formulation]

Table 8: Diagnoses Codes for Opioid-Related Toxicity

Condition	Data Source	Codes	Diagnosis Types
Opioid-related toxicity	National Ambulatory Care Reporting System (all diagnosis types), Discharge Abstract Database (admission diagnosis)	**ICD-10 codes:** • T400: Poisoning by opium • T401: Poisoning by heroin • T402: Poisoning by other opioids • T403: Poisoning by methadone • T404: Poisoning by other synthetic narcotics • T406: Poisoning by unspecified and other narcotics **Intention of toxicity (using E codes on the same record):** • Accidental (X42) • Intentional (X62) • Unknown (all others)	**Inpatient hospitalizations:** • Admission diagnoses (where available) **ED visits:** • All diagnoses types

ICD-10 = International Classification of Diseases, 10th revision.

Table 9: Definitions of Admission Diagnoses for Inpatient Hospitalization Analyses

Provinces	Admission diagnoses definition
British Columbia	Records with at least 1 diagnosis for opioid-related toxicity (Appendix 1) with 1 of: • Diagnosis Type M (most responsible diagnosis) • Diagnosis Type 1 (preadmission comorbidity) • Diagnosis Type W, X, Y (service transfer diagnosis)

Provinces	Admission diagnoses definition
	Exclusions: • Records that have a diagnosis for opioid-related toxicity as diagnosis Type 2 (postadmission comorbidity)
Alberta	Records with at least 1 diagnosis for opioid-related toxicity (Appendix 1) with 1 of: • Diagnosis Type 1 (preadmission comorbidity) • Diagnosis Type W, X, Y (service transfer diagnosis) • Diagnosis Type M (most responsible diagnosis) as long as diagnosis for opioid-related toxicity does not show up with Diagnosis Type 2 (postadmission comorbidity) on the same record • Diagnosis Type 5 (admitting diagnosis) (optional)
Saskatchewan	Records with at least 1 diagnosis for opioid-related toxicity (Appendix 1) with 1 of: • Diagnosis Type M (most responsible diagnosis) • Diagnosis Type 1 (preadmission comorbidity) • Diagnosis Type W, X, Y (service transfer diagnosis) **Exclusions:** • Records that have a diagnosis for opioid-related toxicity as Diagnosis Type 2 (postadmission comorbidity)
Manitoba	Records with at least 1 diagnosis for opioid-related toxicity (Appendix 1) with 1 of: • Diagnosis Type M (most responsible diagnosis) • Diagnosis Type 1 (preadmission comorbidity) • Diagnosis Type W, X, Y (service transfer diagnosis) **Exclusions:** • Records that have a diagnosis for opioid-related toxicity as Diagnosis Type 2 (postadmission comorbidity)
Ontario	Records with at least 1 Diagnosis for opioid-related toxicity (Appendix 1) with 1 of: • Diagnosis Type 1 (preadmission comorbidity) • Diagnosis Type W, X, Y (service transfer diagnosis) • Diagnosis Type M (most responsible diagnosis) as long as diagnosis for opioid-related toxicity does not show up with Diagnosis Type 2 (postadmission comorbidity) on the same record
Quebec	Records with at least 1 diagnosis for opioid-related toxicity (Appendix 1) with 1 of: • Diagnosis Type M (with Diagnosis Type 2 [postadmission comorbidity] included) • Diagnosis Type 5 (admitting diagnosis) (optional)

Appendix 2: Additional Figures

Please note that this appendix has not been copy-edited.

Figure 18: Rates of New Users of Opioids for Pain in 2018, by Age and Sex

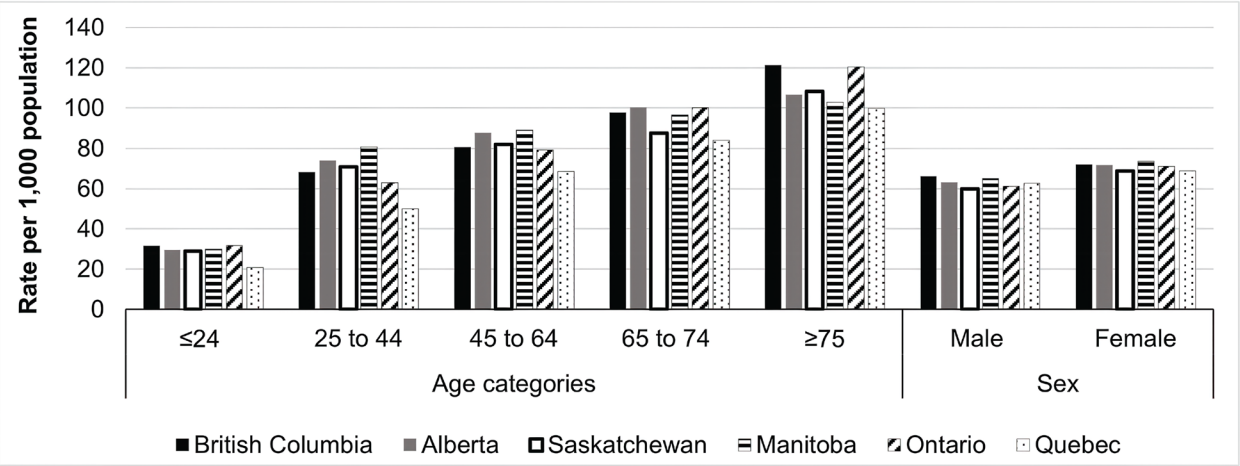


Figure 19: Rates of Overall Users of Opioids for Pain in 2022, by Age and Sex

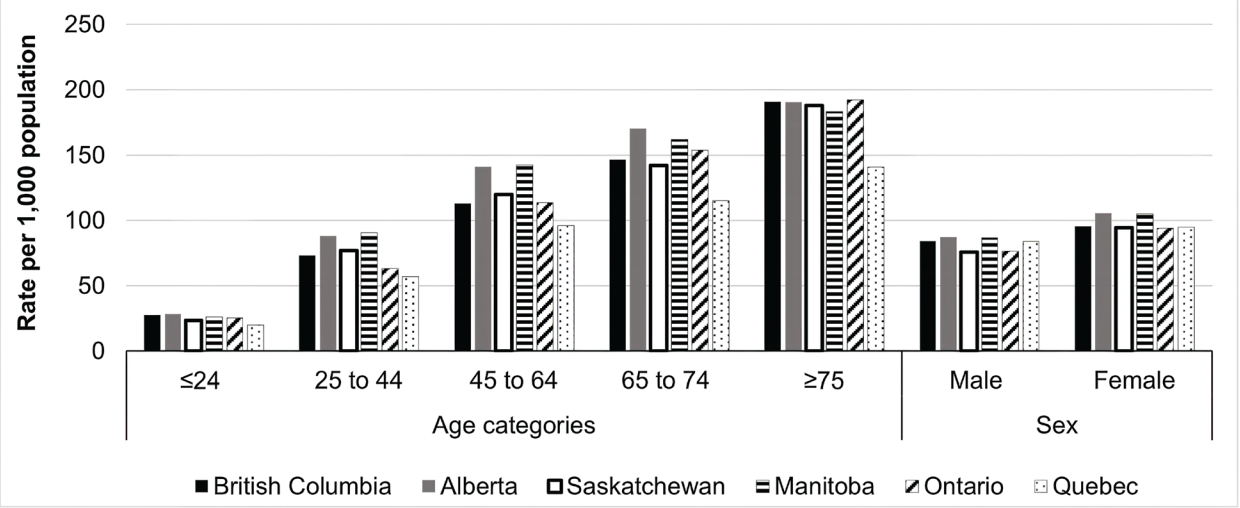


Figure 20: Rates of New Users of Pain in 2018, by Income Quintile and Rurality

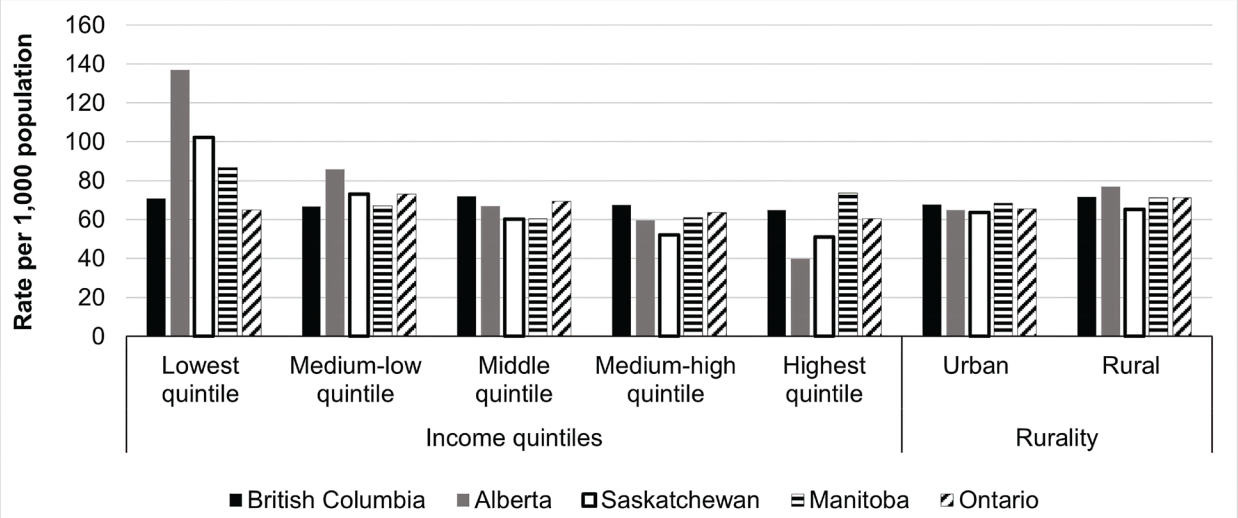
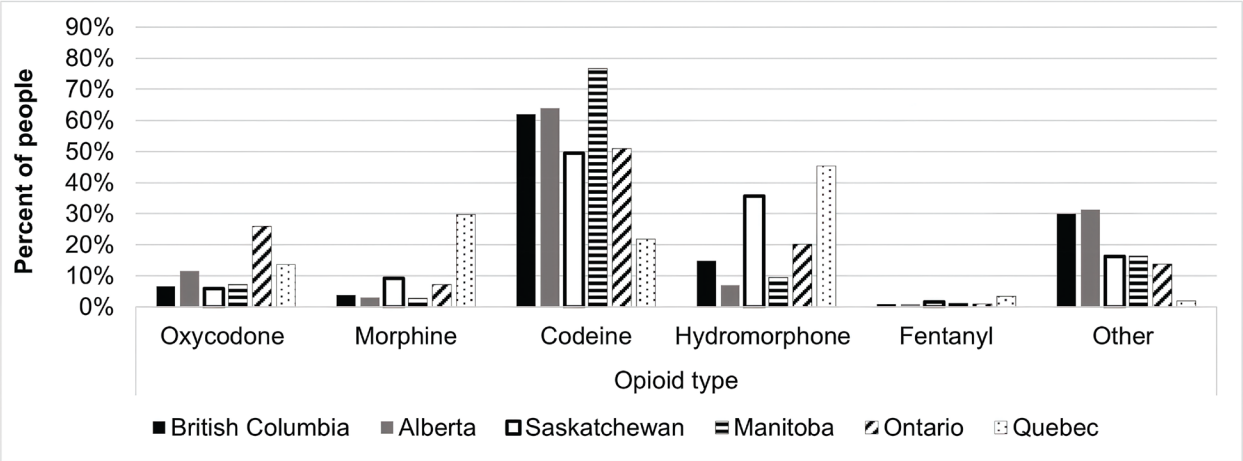
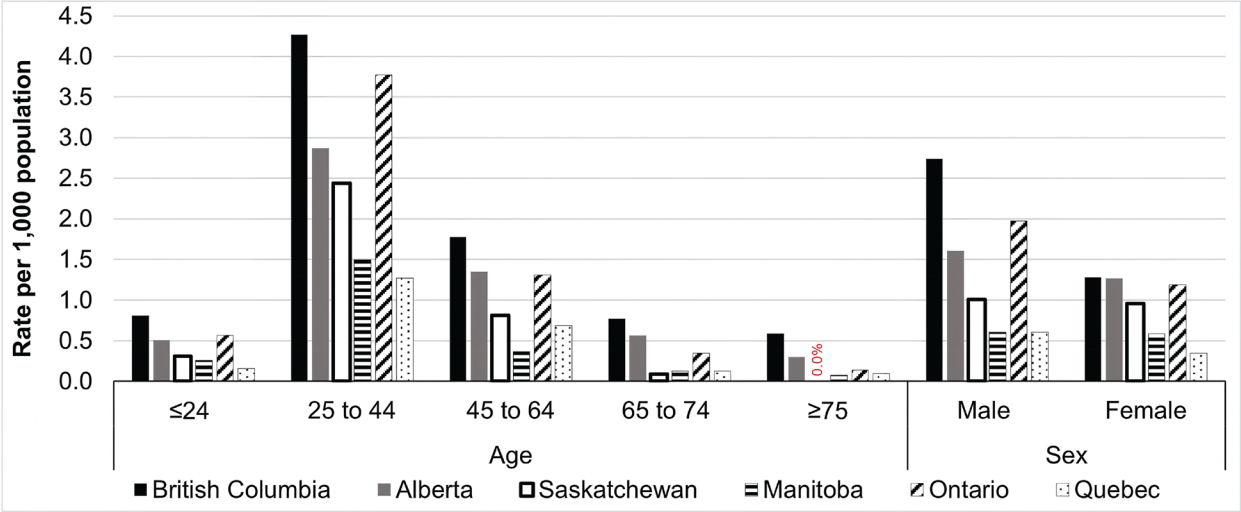


Figure 21: Proportion of Overall Users of Opioids for Pain in 2018, by Type of Opioid Dispensed



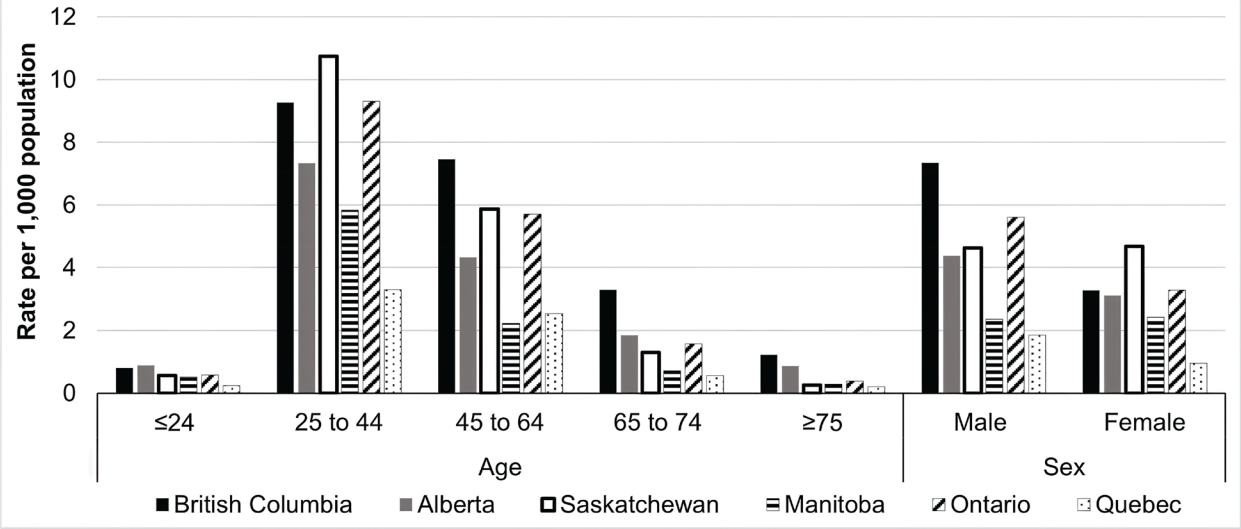
Note: Individuals can be captured in several opioid type categories if dispensed multiple opioids over the time period. Opioid types categorized in the “other” grouping include buprenorphine (pain), butorphanol, dextropropoxyphene, meperidine, methadone (pain), nalbuphine, oxymorphone, pentazocine, tapentadol, and tramadol.

Figure 22: Rates of New Users of OAT in 2018, by Age and Sex



OAT = opioid agonist therapy.
Note: The proportion was 0% for those aged 75 years and older in Saskatchewan.

Figure 23: Rates of Overall Users of OAT in 2022, by Age and Sex



OAT = opioid agonist therapy.

Figure 24: Proportion of Opioid Toxicity Inpatient Hospitalizations in 2022, by Age

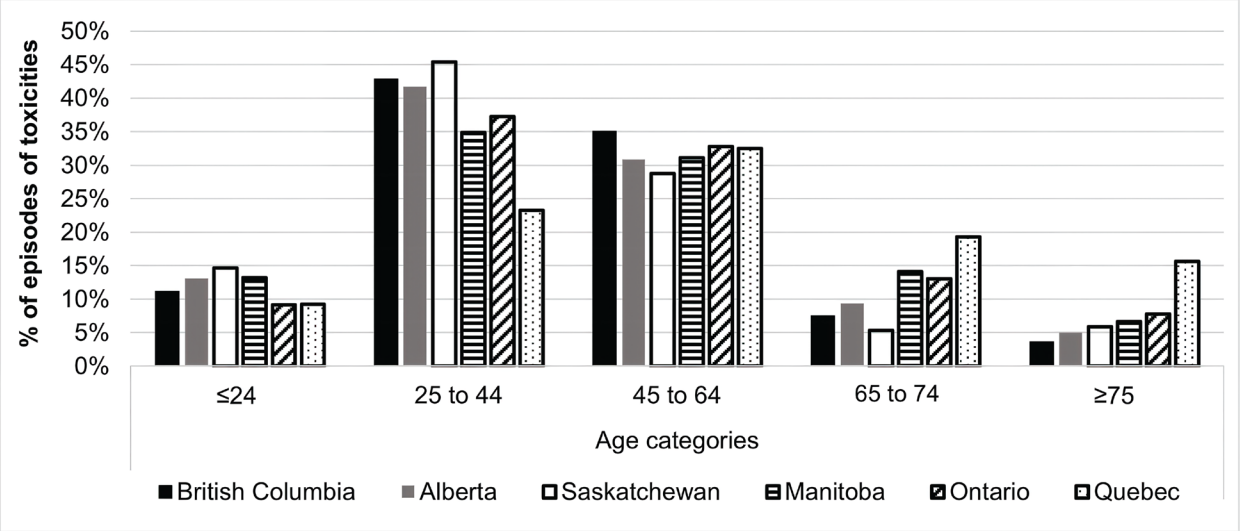


Figure 25: Proportion of Opioid Toxicity Inpatient Hospitalizations With Opioid Dispensations in the Prior 30 days, 2018 to 2022

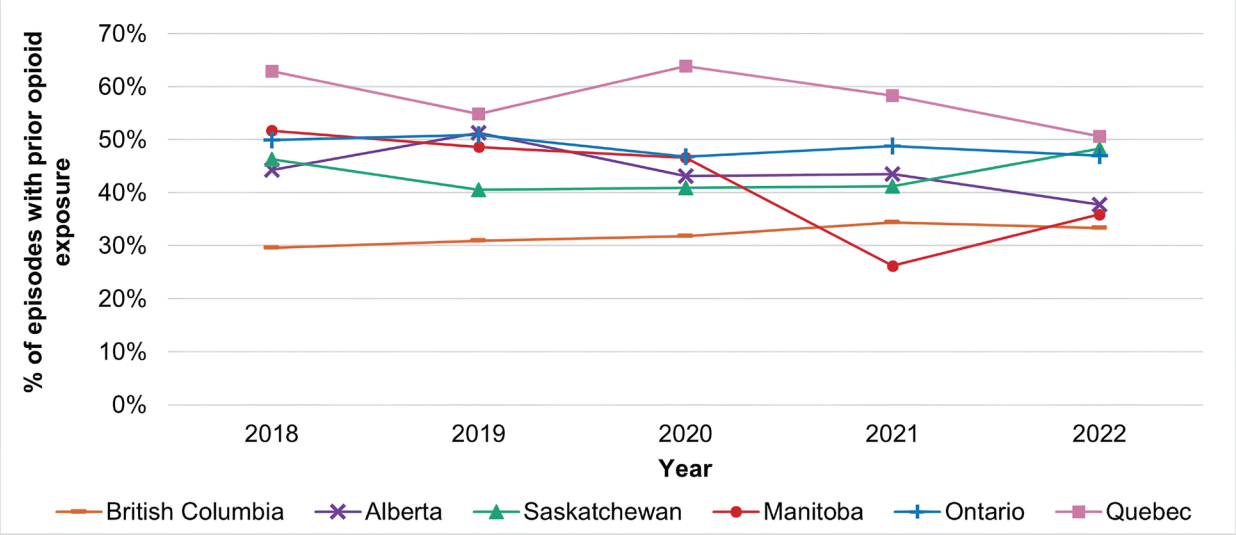


Figure 26: Proportion of Opioid Toxicity Inpatient Hospitalizations With Opioid Dispensations in the Prior 180 Days, 2018 to 2022

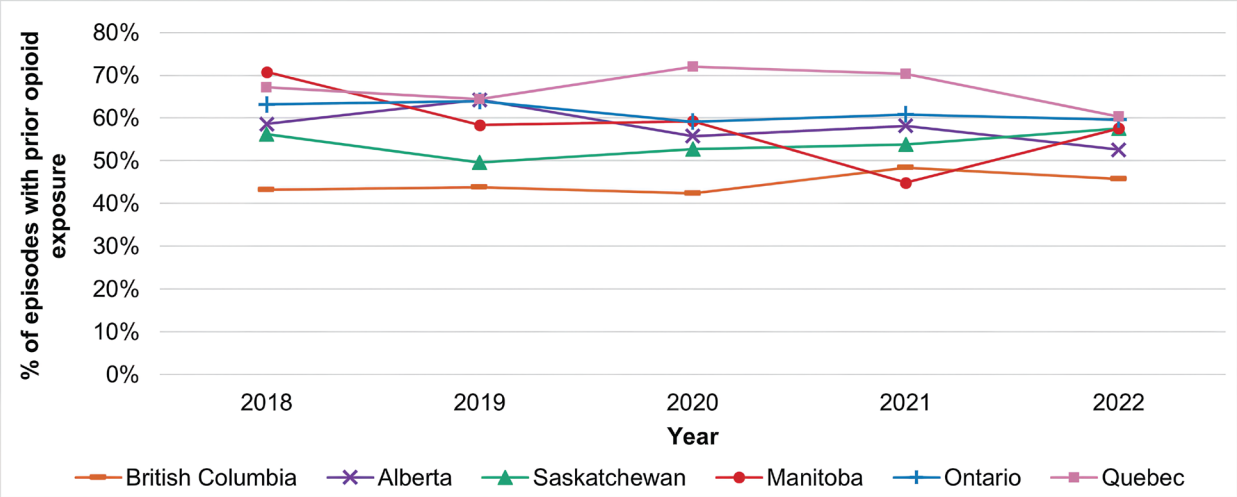
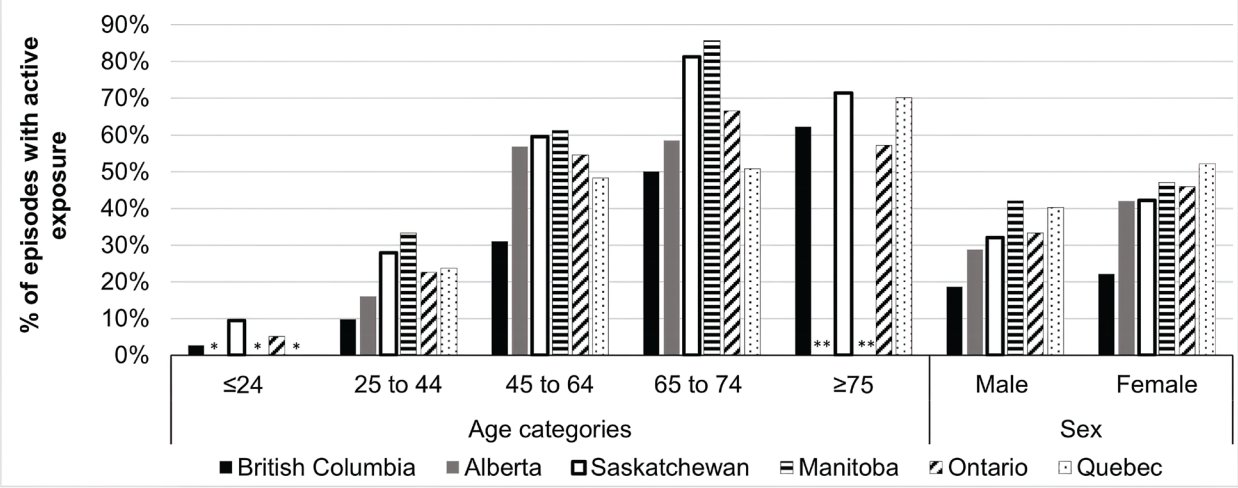
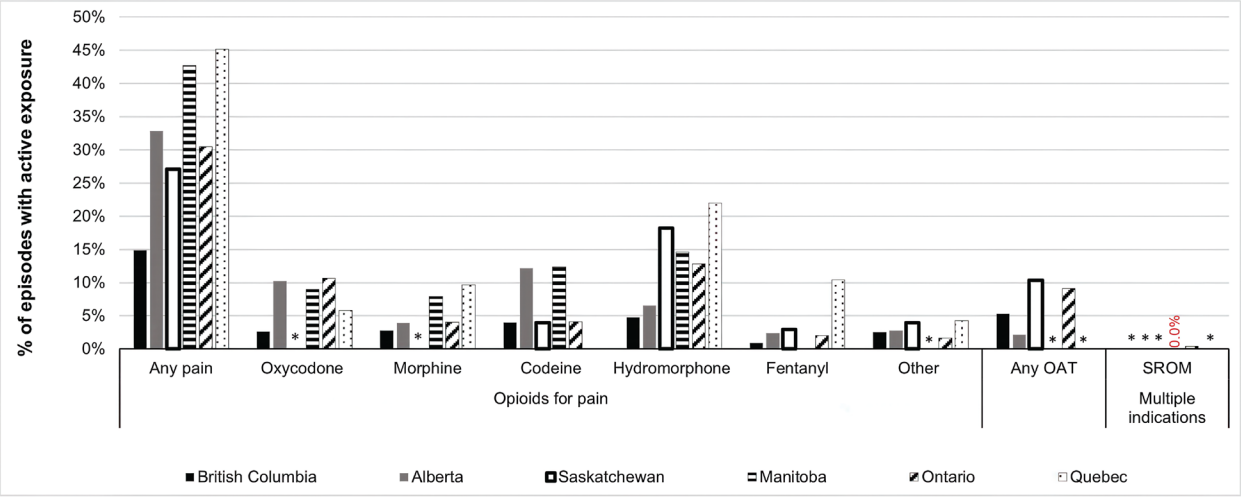


Figure 27: Proportion of Opioid Toxicity Inpatient Hospitalizations With Active Opioid Dispensations in 2018, Stratified by Age and Sex



Asterisks (*) represent censoring of small cell counts (i.e., N < 5 in British Columbia, Saskatchewan, Manitoba, and Quebec; N < 6 in Ontario; and N < 10 in Alberta). In cases where there is a small cell count, the next smallest cell has been suppressed (**) to prevent residual disclosure.

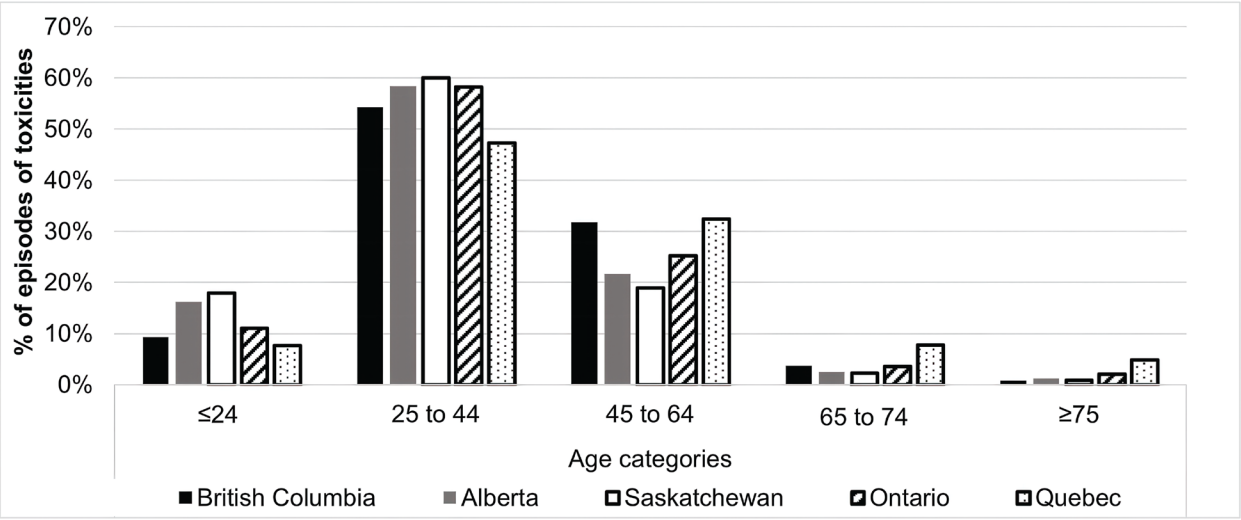
Figure 28: Proportion of Opioid Toxicity Inpatient Hospitalizations With Active Opioid Dispensations in 2018, Stratified by Opioid Type



OAT = opioid agonist therapy; SROM = slow-release oral morphine.

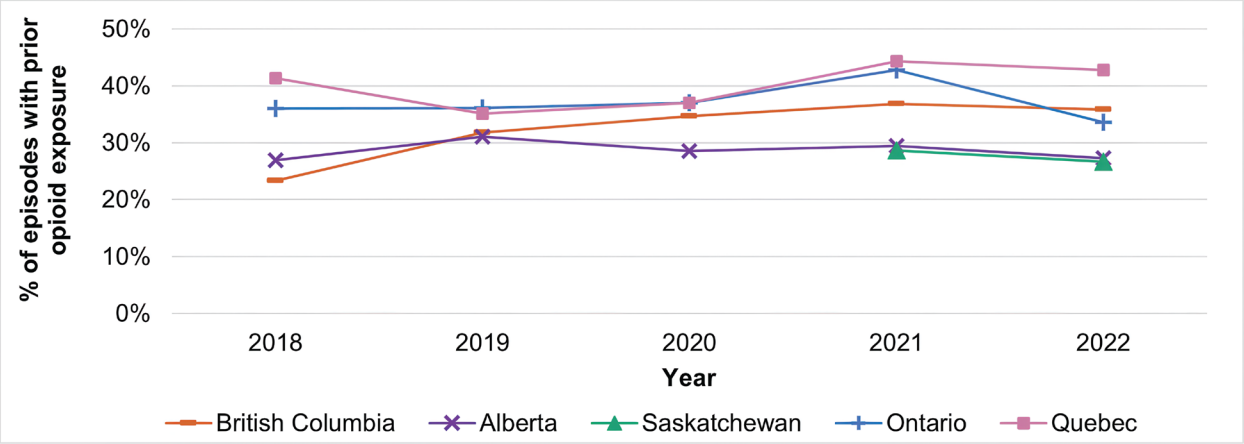
Note: The proportion was 0% for SROM in Manitoba. Asterisks (*) represent censoring of small cell counts (i.e., N < 5 in British Columbia, Saskatchewan, Manitoba, and Quebec; N < 6 in Ontario; and N < 10 in Alberta). Episodes can be captured in several opioid type categories if multiple opioids were dispensed over the time period. Opioid types categorized in the "other" grouping includes buprenorphine (pain), butorphanol, dextropropoxyphene, meperidine, methadone (pain), nalbuphine, oxymorphone, pentazocine, tapentadol, and tramadol.

Figure 29: Proportion of Opioid Toxicity ED Visits in 2022, by Age



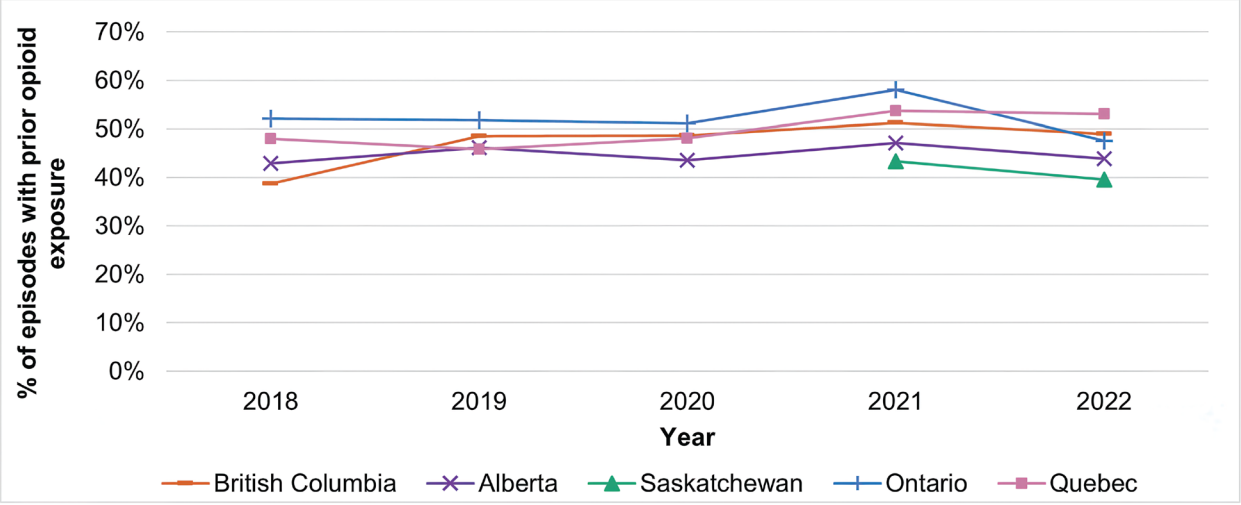
ED = emergency department.

Figure 30: Proportion of Opioid Toxicity ED Visits With Opioid Dispensations in the Prior 30 Days, 2018 to 2022



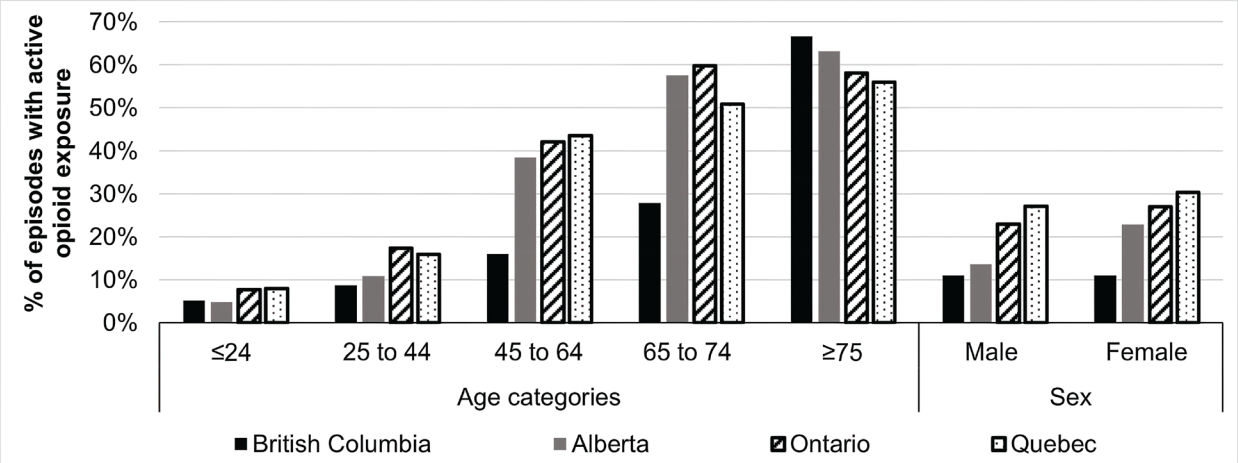
ED = emergency department.
Note: Data are only available from April 2021 onwards for Saskatchewan.

Figure 31: Proportion of Opioid Toxicity ED Visits With Opioid Dispensations in the Prior 180 Days, 2018 to 2022



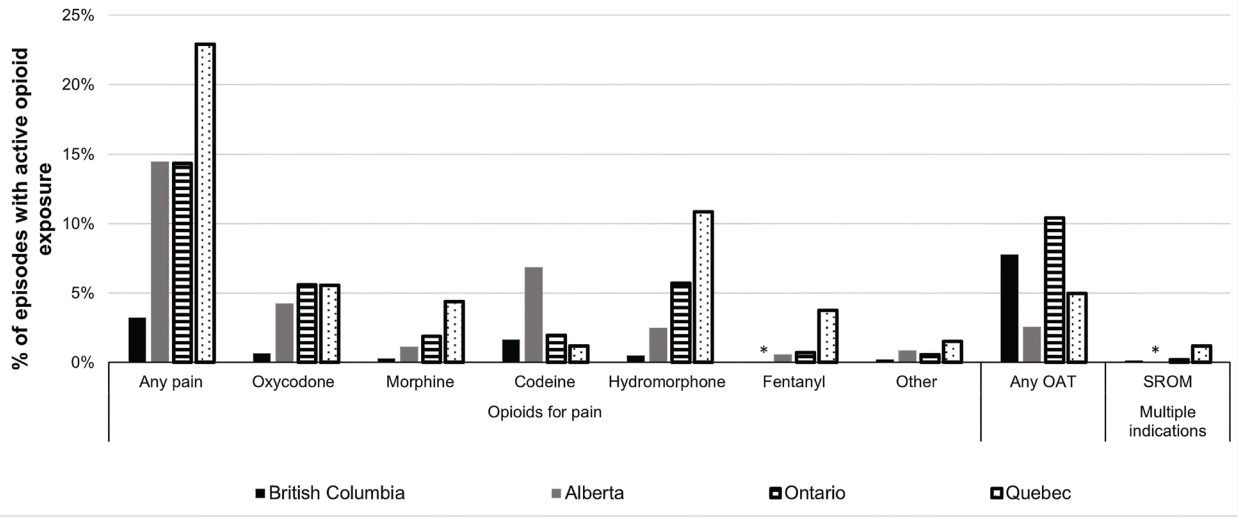
ED = emergency department.
Note: Data are only available from April 2021 onwards for Saskatchewan.

Figure 32: Proportion of Opioid Toxicity ED Visits With Active Opioid Dispensations in 2018, Stratified by Age and Sex



ED = emergency department.

Figure 33: Proportion of Opioid Toxicity ED Visits With Active Opioid Dispensations in 2018, Stratified by Opioid Type



ED = emergency department; OAT = opioid agonist therapy; SROM = slow-release oral morphine.

Note: Asterisks (*) represent censoring of small cell counts (i.e., N < 5 in British Columbia and Quebec; N < 6 in Ontario; and N < 10 in Alberta). Episodes can be captured in several opioid type categories if multiple opioids were dispensed over the time period. Opioid types categorized in the "other" grouping include buprenorphine (pain), butorphanol, dextropropoxyphene, meperidine, methadone (pain), nalbuphine, oxymorphone, pentazocine, tapentadol, and tramadol.

For more information on CoLab and its work, visit colab.cda-amc.ca.

This work was conducted by the Ontario Drug Policy Research Network (ODPRN) through the Post-Market Drug Evaluation CoLab Network. It was supported by Canada's Drug Agency (CDA-AMC) and its Post-Market Drug Evaluation Program through funding provided by Health Canada.

CDA-AMC is a pan-Canadian health organization. Created and funded by Canada's federal, provincial, and territorial governments, we're responsible for driving better coordination, alignment, and public value within Canada's drug and health technology landscape. We provide Canada's health system leaders with independent evidence and advice so they can make informed drug, health technology, and health system decisions, and we collaborate with national and international partners to enhance our collective impact.

CoLab is a pan-Canadian network of experts in applied research, scientific methods, and data analysis. CoLab members work with the Post-Market Drug Evaluation Program to produce credible and timely evidence on postmarket drug safety and effectiveness.