Ontario Opioid Indicator Tool

Technical Appendix

Contents

What's New in the November 2022 Update

- To better meet the needs of the current crisis, this tool has been updated with new indicators, which focus on ***harm reduction***. A new dashboard for harm reduction has been added, with the following indicators:
    - Naloxone **doses** provided (community and pharmacy-provided doses) through the ONP and ONPP
    - Pharmacy-provided naloxone **doses,** by type
    - Needles provided
    - Straight stems provided
- **Needles** and **straight stems provided** are newly added indicators, which address the need for information on provision of supplies to support safer injection and smoking of substances, respectively. **Community-provided naloxone doses** is also a newly added indicator that complements our existing indicator on pharmacy-provided naloxone, and helps to provide a more complete picture of naloxone provision in Ontario.
- **Reporting of naloxone has been changed from kit to dose**. Note that each community and pharmacy-provided kit contains two doses of naloxone. To be consistent with how the Ontario Naloxone Program provides naloxone (i.e. kits and refill doses), we have changed the indicator to allow for consistent reporting across programs. Therefore, rates reported in this update will appear higher than in previous versions of this tool as they now reflect doses, not kits. This change has been applied to all years of data included in this tool.
- All indicators in this tool were developed with input from a variety of stakeholders, including Public Health Ontario, the Ontario Ministry of Health, the Ontario Ministry of Long-Term Care, Public Health Units, Local Health Integration Networks, community groups, and people with lived experience.
- As the overdose crisis continues to evolve, we hope these indicators will provide useful and timely information to policymakers and community members who are working to improve the lives of people who use drugs.

Background

Ontario has been experiencing an opioid overdose crisis for the past decade. To describe the magnitude of emergency department visits, hospitalizations, and deaths due to opioid-related toxicity in Ontario, Public Health Ontario developed and released a public interactive surveillance tool in 2017. As a complement to this tool, the ODPRN also launched an interactive tool to provide public access to indicators of opioid dispensing in Ontario. However, since the ODPRN's initial launch of this tool in 2018, the landscape of the overdose crisis in Ontario has shifted, with an increasing recognition that the majority of opioid-related harms have been associated with the unregulated opioid supply, which is predominantly made up of fentanyl. To better meet the needs of the current crisis, the tool was updated in August 2022 with new indicators that focus less on the dispensing of opioids for pain, and more on opioids used for the treatment of opioid use disorder, as well as complications arising from opioid-related harms. This current update **(November 2022)** includes a new harm reduction dashboard, which provides data on naloxone doses, needles and straight stems provided. All indicators in this tool were developed with input from a variety of stakeholders, including Public Health Ontario, the Ontario Ministry of Health, the Ontario Ministry of Long-Term Care, Public Health Units (PHUs), Local Health Integration Networks (LHINs), community groups, and people with lived experience.

This tool uses data from the Narcotics Monitoring System (NMS), which captures all opioid prescriptions dispensed from community pharmacies in Ontario. We used data from the NMS to present trends in the number and rate of people dispensed opioid prescriptions, the number and rate of people receiving high daily dose opioid prescriptions, the volume of opioid prescriptions dispensed, the number and rate of people with opioid agonist therapy (OAT) use, and the number and rate of prescribers for OAT. In addition, information from the Ontario Drug Benefit (ODB) program was leveraged to provide information on the number of publicly-funded naloxone doses provided by pharmacies. Data on the dissemination of community-provided naloxone doses (provided through the Ontario Naloxone Program), straight stems (provided by the Ontario Harm Reduction Distribution Program), and needles (provided by the Needle Exchange Program) were obtained from the Ontario Ministry of Health. The tool also utilizes data from the National Ambulatory Care Reporting System and the Discharge Abstract Database to report select indicators of opioid-related harm, including the number and rate of healthcare encounters for opioid-related infective endocarditis, serious infections, and other serious complications associated with opioid toxicity (including brain injuries, required intubation, and rhabdomyolysis). Where possible, we aimed to present patterns in the distribution of these indicators by age, sex, LHIN, and PHU. However, due to privacy requirements, in some circumstances we were restricted in the age, sex, and geographic stratifications we were able to report. As the overdose crisis continues to evolve, we hope these indicators will provide useful and timely information to policymakers and community members who are working to improve the lives of people who use drugs.

Indicators

Opioids for Pain

Individuals dispensed an opioid for pain

$$\frac{\text{\# of individuals dispensed an opioid for pain}}{\text{Population}} \times 1000$$

- **Numerator:** Total number of unique individuals who were dispensed a prescription opioid with an indication to treat pain. This includes opioids administered through oral and transdermal routes as well as injectables and suppositories. This excludes opioids indicated for OAT, and opioids indicated to treat cough, diarrhea, or for medical assistance in dying. This excludes over-the-counter medications for pain that contain opioids, which are not captured in the NMS database.
- **Denominator:** Population for the time period, geographic region, and age group or sex of interest.

Individuals newly dispensed an opioid for pain

$$\frac{\text{\# of individuals newly dispensed an opioid for pain}}{\text{Population}} \times 1000$$

- **Numerator:** Total number of unique individuals who were **newly** dispensed a prescription opioid with an indication to treat pain. Individuals newly dispensed an opioid for pain were defined as those who had not been dispensed a prescription opioid with an indication to treat pain, cough, or for OAT in the 1 year prior to their first prescription opioid claim for pain in a given year. This includes opioids administered through oral and transdermal routes as well as injectables and suppositories. This indicator does not capture new episodes of opioid therapy for pain among individuals who discontinued therapy and started a new course of opioid therapy for pain within a period of less than 1 year. This indicator excludes new starts on opioids indicated for OAT, and opioids indicated to treat cough, diarrhea, or for medical assistance in dying. This excludes over-the-counter medications for pain that contain opioids, which are not captured in the NMS database.
- **Denominator:** Population for the time period, geographic region, and age group or sex of interest.

Volume of opioids dispensed for pain

$$\frac{\text{Total volume of opioids dispensed (in milligrams of morphine equivalents)}}{\text{Population}}$$

- **Numerator:** Total volume of prescription opioids dispensed with an indication to treat pain, in milligrams of morphine equivalents (MMEs; see Methodological Notes section for definition and calculation). Total volume is calculated as the sum of the dose on each opioid prescription dispensed to treat pain. This indicator is restricted to prescription opioids that have a valid milligram morphine equivalent conversion factor. This excludes opioids indicated for OAT, and opioids indicated to treat cough, diarrhea, or for medical assistance in dying. This excludes over-the-counter medications for pain that contain opioids, which are not captured in the NMS database.
- **Denominator:** Population for the time period, geographic region, and age group or sex of interest.

Prevalence of people dispensed a long-acting opioid with a high daily dose

$$\frac{\text{\# of individuals dispensed a long-acting opioid with a high average daily dose}}{\text{Total number of individuals dispensed a long-acting opioid}} \times 100$$

- **Numerator:** Total number of unique individuals who were dispensed a long-acting prescription opioid with an average daily dose that exceeds 50 MME, 90 MME, or 200 MME. Average daily dose is calculated as the total dose of an opioid prescription divided by the days' supply (see Methodological Notes section for definition and calculation). This indicator does not consider overlapping opioid prescriptions in the calculation of average daily dose for an individual, and therefore may underestimate the actual dose a person is receiving if they are taking more than one opioid prescription at a time. This indicator is restricted to prescription opioids indicated to treat pain with a valid morphine equivalent conversion factor (as described above).
- **Denominator:** Total number of unique individuals dispensed a long-acting prescription opioid with an indication to treat pain and a valid morphine equivalent conversion factor.

Opioids for Opioid Agonist Therapy

Individuals dispensed an opioid for OAT

$$\frac{\text{\# of individuals dispensed an opioid for OAT (overall and by type)}}{\text{Population}} \times 1000$$

- **Numerator:** Total number of unique individuals who were dispensed a prescription opioid with an indication for OAT (overall and by type: methadone, buprenorphine/naloxone, subcutaneous buprenorphine extended-release [Sublocade; first marketed in Canada on February 3, 2020], implantable buprenorphine [Probuphine; first marketed in Canada on November 22, 2018], or slow-release oral morphine). This indicator excludes products that are indicated to treat pain. Where possible, we used product identification numbers specific to OAT to make this distinction. Because there are no product identification numbers specific to OAT for slow-release oral morphine, we required individuals to either have a prior outpatient health services visit related to OAT or a prior prescription for a different form of OAT in the year before their slow-release oral morphine prescription. Any other slow-release oral morphine claims were classified as being indicated for pain and were excluded from this indicator.
- **Denominator:** Population for the time period, geographic region, and age group or sex of interest.

Individuals newly dispensed an opioid for OAT

$$\frac{\text{\# of individuals newly dispensed an opioid for OAT (overall and by type)}}{\text{Population}} \times 1000$$

- **Numerator:** Total number of unique individuals who were **newly** dispensed a prescription opioid with an indication for OAT (overall and by type: methadone, buprenorphine/naloxone, subcutaneous buprenorphine extended-release [Sublocade; first marketed in Canada on February 3, 2020], implantable buprenorphine [Probuphine; first marketed in Canada on November 22, 2018], or slow-release oral morphine). Individuals newly dispensed an opioid for OAT were defined as those who had not been dispensed a prescription opioid with an indication for OAT in a predefined period prior to their first prescription in a given month or year. The period that we used to define new use for each specific type of OAT was chosen based on consultations with prescribers and was based on common prescribing patterns of each type of OAT. The periods were shorter for more regularly dispensed forms of OAT (i.e., 30 days for methadone, 30 days for buprenorphine/naloxone, and 30 days for slow-release oral morphine) and were longer for longer-acting (less frequently dispensed) forms of OAT (i.e., 90 days for subcutaneous buprenorphine extended-release and 270 days for implantable buprenorphine). The **overall new use of OAT** measure was defined by combining new use for each distinct type of OAT and selecting the first prescription for each month or year per person. This indicator excludes products that are indicated to treat pain. Where possible, we used product identification numbers specific to OAT to make this distinction. Because there are no product identification numbers specific to OAT for slow-release oral morphine, we required individuals to either have a prior outpatient health services visit related to OAT or a prior prescription for a different form of OAT in the year before their slow-release oral morphine prescription to be captured in this indicator.
- **Denominator:** Population for the time period, geographic region, and age group or sex of interest.

Prescribers for OAT

$$\frac{\text{\# of prescribers who wrote prescriptions for OAT}}{\text{\# of individuals dispensed OAT}} \times 100$$

- **Numerator:** Total number of unique prescribers (restricted to physicians and nurse practitioners) who wrote prescriptions for methadone, buprenorphine/naloxone, subcutaneous buprenorphine extended-release [Sublocade; first marketed in Canada on February 3, 2020], implantable buprenorphine [Probuphine; first marketed in Canada on November 22, 2018], or slow-release oral morphine. This indicator excludes products that are indicated to treat pain.
- **Denominator:** Total number of unique individuals who were dispensed an opioid with an indication for OAT (methadone, buprenorphine/naloxone, subcutaneous buprenorphine extended-release [Sublocade], implantable buprenorphine [Probuphine], or slow-release oral morphine).

Opioid-Related Harm

Incident healthcare encounters for opioid-related infective endocarditis

$$\frac{\text{\# of incident hospitalizations for infective endocarditis}}{\text{Population}} \times 100{,}000$$

- **Numerator:** Total number of incident hospitalizations for infective endocarditis (see Methodological Notes section for definition) among individuals with a history of opioid use disorder or prescription OAT use. An incident hospitalization was defined as having no prior hospitalization for infective endocarditis in the 1 year before the encounter. Hospitalizations were defined as inpatient visits only; emergency department visits were not included unless the individual was subsequently transferred to an inpatient facility. We restricted to hospitalizations among individuals with a history of opioid use disorder, which was defined as an emergency department visit or hospitalization for opioid use disorder or a prescription for OAT in the 1 year prior to or on the date of hospitalization.
- **Denominator:** Population for the time period, geographic region, and age group or sex of interest.

Incident healthcare encounters for opioid-related serious infections

$$\frac{\text{\# of incident hospitalizations for serious infections}}{\text{Population}} \times 100{,}000$$

- **Numerator:** Total number of incident hospitalizations for serious infections (see Methodological Notes section for definition) among individuals with a history of opioid use disorder or prescription OAT use. An incident hospitalization was defined as having no prior hospitalization for serious infections in the 1 year before the encounter. Hospitalizations were defined as inpatient visits only; emergency department visits were not included unless the individual was subsequently transferred to an inpatient facility. We restricted to hospitalizations among individuals with a history of opioid use disorder, which was defined as an emergency department visit or hospitalization for opioid use disorder or a prescription for OAT in the 1 year prior to or on the date of hospitalization.
- **Denominator:** Population for the time period, geographic region, and age group or sex of interest.

Opioid toxicity incidents resulting in serious complications

$$\frac{\text{\# of opioid toxicity hospitalizations with serious complications}}{\text{Population}} \times 100{,}000$$

- **Numerator:** Total number of opioid toxicity hospitalizations resulting in serious complications (see Methodological Notes section for definition). Hospitalizations were defined as inpatient visits only; emergency department visits were not included unless the individual was subsequently transferred to an inpatient facility. We restricted to hospitalizations for an opioid-related overdose that were also associated with a serious complication (including a brain injury, rhabdomyolysis, or required intubation).
- **Denominator:** Population for the time period, geographic region, and age group or sex of interest.

Harm Reduction

NEW Naloxone doses provided

$$\frac{\text{\# of naloxone doses provided}}{\text{Population}} \times 1000$$

- **Numerator:** Total number of naloxone doses provided through the **Ontario Naloxone Program (ONP)** and the **Ontario Naloxone Program for Pharmacies (ONPP)**. The Ontario Naloxone Program provides naloxone doses to Public Health Units for distribution through eligible community-based organizations, including Community Health Centres, Aboriginal Health Access Centres, shelters, withdrawal management programs, AIDS Service Organizations, outreach programs, Consumption Treatment Services, and hospitals with an emergency department and/or urgent care centre. The Ontario Naloxone Program for Pharmacies provides naloxone doses through participating community pharmacies. This indicator includes both injectable and intranasal naloxone. Naloxone doses provided to police, fire and St. John Ambulance are excluded. Naloxone kits provided by pharmacies and community include 2 naloxone doses. Kits are counted as 2 doses within the numerator of this indicator.
- **Denominator:** Population for the time period and geographic region of interest.

NEW Community-provided naloxone doses

$$\frac{\text{\# of community-provided naloxone doses}}{\text{Population}} \times 1000$$

- **Numerator:** Number of naloxone doses provided through the **Ontario Naloxone Program**, which provides naloxone kits to Public Health Units for distribution through eligible community-based organizations, including Community Health Centres, Aboriginal Health Access Centres, shelters, withdrawal management programs, AIDS Service Organizations, outreach programs, Consumption Treatment Services, and hospitals with an emergency department and/or urgent care centre. This indicator includes both injectable and intranasal naloxone. Naloxone doses provided to police, fire and St. John Ambulance are excluded.
- **Denominator:** Population for the time period and geographic region of interest.

Pharmacy-provided naloxone doses

$$\frac{\text{2 x (\# of pharmacy-provided naloxone kits) (overall and by type)}}{\text{Population}} \times 1000$$

- **Numerator:** Total number of pharmacy-provided naloxone doses (calculated as number of kits dispensed multiplied by 2), overall and by type (injectable and intranasal naloxone). This is restricted to naloxone doses dispensed by pharmacies participating in the **Ontario Naloxone Program for Pharmacies**. As of March 2018, there are some instances in which a pharmacist is permitted to provide more than one naloxone kit (each containing two doses) to a recipient in a given naloxone claim. In this case, each kit and respective dose would be counted.
- **Denominator:** Population for the time period and geographic region of interest.

NEW Straight stems provided

$$\text{\# of straight stems provided} \times 1000$$

Population

- **Numerator:** Total number of straight stems provided through the Ontario Harm Reduction Distribution Program to a Public Health Unit in a region of interest.
- **Denominator:** Population for the time period and geographic region of interest.

NEW Needles provided

$$\frac{\text{\# of needles provided}}{\text{Population}} \times 1000$$

- **Numerator:** Total number of needles provided through the Needle Exchange Program.
- **Denominator:** Population for the time period and geographic region of interest.

Data Sources

ICES Data

These datasets were linked using unique encoded identifiers and analyzed at ICES (www.ices.on.ca). The use of data in this project was authorized under section 45 of Ontario's Personal Health Information Protection Act, which does not require review by a Research Ethics Board.

Dispensed Opioid Prescriptions

The Narcotics Monitoring System (NMS), 2012-2022

The NMS captures data on all prescriptions for opioids and other controlled substances dispensed from community pharmacies in Ontario, regardless of payment type (i.e. cash, public drug program, private insurance).

Important note: Prescription reversals can occur when a prescription is initially filled by the pharmacist but not actually dispensed to the patient. Prescription reversals can be submitted to the NMS up to 365 days from the date of service. Generally, about 36% of prescriptions that are reversed are submitted within 7 days, and 95% of prescriptions that are reversed are submitted within 3 months of the service date. At ICES, submitted reversals are stored in a separate database from the filled prescriptions. However, the most recent 3 months of filled prescription data may include some reversed prescriptions if they are not processed within the period that ICES receives the data. Overall, about 0.7% of the NMS records will be identified as a reversal and removed from the database in each subsequent data update.

Pharmacy-provided Naloxone

The Ontario Drug Benefit (ODB) Database, 2016-2022

The ODB database contains claims for dispensed drugs that are reimbursed through the Ontario Drug Benefit program through the Ontario government. This includes drugs listed on the ODB formulary, drugs covered under the Exceptional Access Program, and products and services such as blood glucose test strips, certain vaccinations, and naloxone doses. The Ontario Naloxone Program for Pharmacies (ONPP) was introduced on June 3, 2016, and provides government funding for the provision of naloxone, a medication that can counter the effects of an opioid overdose, at community pharmacies in Ontario. Through this program, all individuals in Ontario can receive a free naloxone kit from participating pharmacies without a prescription. Prior to March 27, 2018, only injectable naloxone was funded through the ONPP. On March 27, 2018, funding of intranasal naloxone was added to the ONPP, and pharmacists were granted the ability to provide a naloxone kit to individuals who do not present an Ontario health card at the time of dispensing, as well as to provide two naloxone kits to an eligible recipient at one time, in limited circumstances.

Drug Information Database

The drug list file, 2012-2022

The drug master list file contains drug identification numbers for drugs used in Canada from 1990 forward. This file was used to determine characteristics of dispensed opioid prescriptions (e.g., opioid drug, formulation, and strength).

Opioid-related Harms

The National Ambulatory Care Reporting System (NACRS), Discharge Abstract Database (DAD), Ontario Mental Health Reporting System (OMHRS)

These datasets are maintained by the Canadian Institute for Health Information. NACRS contains data for all hospital- and community-based ambulatory care, such as day surgery and emergency department visits including chief complaint (reason for visit). DAD captures administrative, clinical and demographic information on hospital discharges. The OMHRS database contains admissions to adult-designated mental health hospital beds and includes the most responsible diagnosis for admission

Other Health Services

Ontario Health Insurance Plan Claims Database (OHIP)

These data capture all claims submitted for reimbursement by Ontario physicians for inpatient and ambulatory visits, consultations and procedures. The data also include claims from optometrists for publicly-funded reimbursement and from laboratories for all diagnostic tests performed.

Demographics

The Ontario Health Insurance Plan Registered Persons Database (RPDB), 2012-2022

The RPDB provides basic demographic information about individuals with an Ontario health card number, including age, sex, place of residence, and date of death. The location of residence of an individual is based on a dataset that contains the best known postal code for individuals eligible for health insurance in Ontario each year. The dataset is created by supplementing location of residence data received from the Ontario Ministry of Health and Ontario Ministry of Long-Term Care with information from other data sources, such as emergency department visits and hospitalizations, since postal codes are recorded each time a person enters an institution. The location of residence file is refreshed annually, and the other demographic information is updated bimonthly. The RPDB also provided population estimates for all Ontarians with a registered health card by age, sex, and LHIN or PHU.

Ontario Ministry of Health Data

Data on the provision of community-based naloxone, straight stems and needles were provided by the Ontario Ministry of Health through the Ontario Naloxone Program, Ontario Harm Reduction Distribution Program, and Needle Exchange Program, respectfully.

Methodological Notes

Time:

- Monthly data are reported from July 2012 onwards whenever possible.
- Yearly data are reported from 2013 onwards whenever possible.
- Timing of harm reduction supply distribution to the public may occur later than shown. See "Details on the Ontario Naloxone Program and community-based programs" below for more details.

Location:

- Data are reported at the provincial, LHIN, and PHU levels whenever possible. LHIN or PHU is based on the individual's location of residence for most indicators (note exception below). For the prescribers for OAT indicators, prescribers are assigned to a LHIN or PHU based on the OAT recipient's location of residence. Therefore, a single OAT prescriber could be counted in multiple LHINs or PHUs.
    - Exception: PHU location of community-provided naloxone dose reflects where the dose was distributed, not the residence of the individual being provided the dose. See "Details on the Ontario Naloxone Program and community-based programs" below for more details.
    - Exception: PHU location of straight stem provided reflects where the bulk straight stems were sent through the Ontario Harm Reduction Distribution Program, not the residence of the individual being provided the straight stem. See "Details on the Ontario Harm Reduction Program" below for more details.
- On March 27, 2018, a change was made to the Ontario Naloxone Program for Pharmacies allowing pharmacists to provide naloxone kits to individuals who do not present an Ontario health card. As a result, 38% of naloxone claims beyond this date could not be linked to the Registered Persons Database to determine the location of residence of the recipient. To try to preserve as much information as possible in reporting, the following method was used to report pharmacy-provided naloxone doses by LHIN or PHU:
    - For records that could be linked to the Registered Persons Database, geography was based on the recipient's LHIN or PHU of residence
    - For records that could not be linked to the Registered Persons Database, geography was based on the LHIN or PHU of the pharmacy from which the naloxone kit was dispensed
- For indicators derived from ICES data that are reported by LHIN or PHU, the following PCCF+ versions were used to determine geography:
    - When geography was based on an individual's location of residence, PCCF+ Version 6D was used for metrics reported between 2012 and 2013, and PCCF+ Version 7B was used for metrics reported from 2014 onwards
    - For the pharmacy-dispensed naloxone indicator, when geography was based on the location of the pharmacy from which the naloxone kit was dispensed, PCCF+ Version 6D was used for the entire surveillance period. This was due to a change in methodology for geocoding forward sortation area in PCCF+ Version 7B. As a result of this change, PCCF+ Version 7B could not be used to impute LHIN or PHU using the pharmacy forward sortation area
- Records where the census subdivision or residence code was shared between more than one LHIN were not included in results stratified by LHIN. However, this was extremely rare.
- Records without a recorded LHIN or PHU were not included in results stratified by each respective region, but were included in the provincial-level estimates. However, this was extremely rare (<0.01% of records).

Age:

- Data reported by age use the following age groups, whenever possible: 0-14, 15-24, 25-44, 45-64, 65+.
- Data reported by age group are not mutually exclusive. For each individual, age was measured on the date that each opioid prescription was dispensed. Therefore, if an individual received more than one opioid prescription in a given year, and had a birthday between prescriptions where they moved into a subsequent age group, they would contribute to the numerator for both age groups.

Exclusions related to data linkage:

- For each indicator measuring dispensing of prescriptions, approximately 2% to 7% of dispensed prescription records were excluded because they were unable to be linked to the Registered Persons Database to determine demographic characteristics and location of residence. The specific exclusion criteria applied to the dispensed prescription records were as follows:
    - Records in which the individual used identification other than an Ontario Health Card
    - Records in which the individual resided outside of Ontario

Details on harm reduction supplies:

- Provision of naloxone, straight stems and needles represents distribution of these supplies to PHUs who provide supplies to community-based organizations, including needle exchange/syringe programs, Hepatitis C programs, and consumption and treatment services. Therefore, the volumes reported in these indicators represent the timing of provision to public health units, and not the timing of distribution to community members.
- Number of naloxone doses provided through the Ontario Naloxone Program includes Public Health Units, Community Health Centres, Aboriginal Health Access Centres, shelters, withdrawal management programs, AIDS Service Organizations, outreach programs, Consumption Treatment Services, and hospitals with an emergency department and/or urgent care centre. It also includes both injectable and intranasal naloxone.
- Naloxone doses provided to police, fire and St. John Ambulance are excluded as these doses are intended for administration by police, fire or St. John Ambulance and are thus not provided directly to the public.

Drugs and formulations:

- See the following pages for a list of opioids by drug and formulation, definitions and formulas for calculating milligrams of morphine equivalents, and information regarding small cell suppression.

List of opioids by drug and formulation

Opioid Drug	Opioid Formulations	Notes
Opioids indicated to treat pain		
Codeine	Immediate release Long-acting	
Codeine combination	Immediate release	
Fentanyl	Immediate release* Long-acting	*Immediate release fentanyl is rarely prescribed in Ontario. Immediate release fentanyl prescriptions accounted for less than 1% of all fentanyl prescriptions between 2013 and 2017, and less than 3% of all individuals dispensed a fentanyl prescription in Ontario between 2013 and 2017 received the immediate release formulation.
Hydromorphone	Immediate release Long-acting	
Morphine	Immediate release Long-acting	This category includes all immediate release and long-acting morphine, except for long-acting morphine claims that are being used for OAT (see definition below).
Oxycodone	Immediate release Long-acting	
Oxycodone combination	Immediate release	
Tramadol	Immediate release Long-acting	
Other	Immediate release Long-acting	This category is comprised of opioids indicated to treat pain that are used less frequently in Ontario. This includes, for example, meperidine, levorphanol, and methadone and buprenorphine products that are indicated to treat pain.
Opioids indicated for opioid agonist therapy		
Methadone	Long-acting	
Buprenorphine/naloxone	Long-acting	Buprenorphine/naloxone is a combination product that includes buprenorphine and naloxone. This combination product is used for the management of opioid use disorder. This **does not** capture the use of single agent naloxone (Narcan®), which is used to reverse the effects of opioids and associated overdoses.
Subcutaneous buprenorphine (Sublocade)	Long-acting	Extended-release subcutaneous buprenorphine is a medication used for the treatment of opioid use disorder that is administered as an injection on an approximately monthly basis.
Buprenorphine subdermal implant (Probuphine)	Long-acting	Long-acting buprenorphine subdermal implant is used for the treatment of opioid use disorder. The medication is implanted underneath the skin and the implant is replaced approximately every 6 months.
Slow-release oral morphine (Kadian)	Long-acting	Slow-release oral morphine is widely used for pain management, but there is also a growing evidence base for its use as an OAT medication. For OAT, it is administered orally, once daily, and is released over a period of 24 hours. Because there are no product identification numbers specific to OAT for slow-release oral morphine, we classified slow-release oral morphine claims as OAT if the recipient had a prior outpatient health services visit related to OAT or had a prior prescription for a different form of OAT in the year before their slow-release oral morphine prescription. Otherwise, claims were classified as indicated for pain.
Harm reduction supplies		
Opioid antagonist used to temporarily reverse the effects of opioid overdose		

Naloxone		Naloxone is an opioid antagonist that is used to temporarily reverse the effects of opioids and associated overdoses. Specifically, naloxone can restore normal breathing to someone whose breathing has slowed or stopped due to an opioid overdose. Naloxone is available in injectable and nasal spray forms.
Single use smoking supplies		
Straight stems		Straight stems are used for the safer smoking of crack cocaine. They are made from low expansion borosilicate glass (Pyrex) which is resistant to high temperatures. When used with brass screens and a mouthpiece, straight stems can reduce burns, prevent cuts, and limit the transmission of infectious diseases such as HIV and hepatitis C (Ontario Harm Reduction Distribution Program).
Single use injection supplies		
Needles		Needle exchange programs involve the provision of sterile needles and injection equipment in exchange for used needles, which are then safely destroyed. The use of sterile needles provided by these programs prevents the spread of blood-borne illnesses associated with injection drug use, including HIV and hepatitis C (Canadian Centre on Substance Abuse).

Milligrams of morphine equivalents

Opioids are comprised of a number of different drugs with different formulations that vary on a chemical level. These differences affect how much of the drug an individual needs to take to reach a particular desired analgesic effect (i.e., how potent each drug is). To compare all opioid drugs, we calculate milligrams of morphine equivalents, which is a standardized measure of the total amount of opioid dispensed on a single prescription.

Milligrams of morphine equivalents are calculated by determining the total milligrams of each opioid an individual was dispensed, and then converting this into an equivalent morphine dose using a conversion factor. Opioid dose in milligrams of morphine equivalents is calculated using the following equation:

$$dose = quantity * strength * conversion\ factor$$

For transdermal fentanyl, the formula is slightly different. Generally, a single transdermal fentanyl patch is used over a 3 day period, however sometimes individuals may use a fentanyl patch for only 2 days. If an individual is using a patch for 3 days, they receive three times the dose on the patch (the same dose for 3 days). If they use the patch for 2 days, they receive two times the dose on the patch. Using the quantity and days' supply values of the transdermal fentanyl claim from the NMS database, we can determine whether an individual is using a patch for 2 or 3 days. We then use the following formula to calculate the fentanyl dose in milligrams of morphine equivalents:

$$dose = quantity * days\ of\ patch\ use * conversion\ factor$$

Once the total dose of the dispensed opioid prescription is calculated, the average daily dose (i.e., the amount of the drug that an individual is consuming each day) in milligrams of morphine equivalents can be calculated by dividing the total dose by the days' supply on the claim.

Some opioids, such as injectables, suppositories, and opioids used for OAT, do not have valid milligram morphine equivalent conversion factors. Therefore, these opioids are excluded from dose calculations. The table on the following page shows the dose equivalence and conversion factors for opioids that have valid conversions:

Opioid	Dose equivalence to morphine	To convert to oral morphine, multiply by
Morphine	30 mg	1
Codeine	200 mg	0.15
Oxycodone	15-20 mg	1.5
Hydrocodone	30 mg	1
Hydromorphone	6-7.5 mg	5
Meperidine	300 mg	0.1
Tramadol	300 mg	0.1
Transdermal fentanyl	12.5 mcg/h → 30-67 mg 25 mcg/h → 60-134 mg 37.5 mcg/h → 135-179 mg 50 mcg/h → 180-224 mg 75 mcg/h → 270-314 mg 100 mcg/h → 360-404 mg	If 12.5 mcg/h then conversion factor = 48 If 25 mcg/h then conversion factor = 97 If 37.5 mcg/h then conversion factor = 157 If 50 mcg/h then conversion factor = 202 If 75 mcg/h then conversion factor = 292 If 100 mcg/h then conversion factor = 382
Other Fentanyl Formulations	**Fentanyl buccal or SL tablets, or lozenge**	0.13
	Fentanyl film or oral spray	0.18
	Fentanyl nasal spray	0.16

List of healthcare encounters and associated diagnosis codes

Type of Healthcare Encounter	Data Source	Codes
Infective endocarditis	Discharge Abstract Database (DAD)	**ICD-10:** • I33.0, I33.9, I38, I39, B37.6
Serious infections	DAD	**ICD-10:** • M86, M00, G06.1, M46.2, M46.3, M46.4, M46.5, L02, M76.2

Opioid use disorder	DAD, NACRS, Ontario Health Insurance Plan Database (OHIP), Ontario Mental Health Reporting System (OMHRS)	• **DAD/NACRS databases (ICD-10):** F11
		• **OHIP database (Fee codes):** K682, K683, K684
		• **OMHRS:**
		  ○ **DSM-IV and DSM-5:** 304.00, 305.50
		  ○ **ICD-10:** F11

Opioid-related toxicity	DAD/NACRS	**ICD-10:** • T400, T401, T402, T403, T404, T406
Serious complication from opioid-related overdose	DAD	**<u>Brain Injury</u>**: **ICD-10:** **Anoxic brain injury:** G93.1 **Hypoxic brain injury:** Most responsible diagnosis of hypoxic ischemic brain injury (I46.0, R09.0, R09.2, T71, G92, with G93.1 in any secondary diagnostic field). **Traumatic brain injury:** S02.0, S02.1, S02.3, S02.7, S02.8, S02.9, S06, S07.1, T90.2, T90.5. **<u>Required Intubation</u>** **Include Mechanical ventilation:** **CCI:** 1.GZ.31.CA-ND, 1.GZ.31.CR-ND, 1.GZ.31.GP-ND **Exclude Noninvasive Ventilation:** **CCI:** 1.GZ.31.CA-MP, 1.GZ.31.CB-ND, 1.GZ.31.JA-MD,1.GZ.31.JA-NC, 1.GZ.31.JA-PK, 1.GZ.31.CA-PK, 1.GZ.31.CB-EP,

		1.GZ.31.CA-EP **<u>Rhabdomyolysis</u>** **ICD-10:** M62.8, T29.6, G21.0

Small cell censoring and suppression

In accordance with ICES' commitments in data sharing agreements and in order to minimize risk of re-identification, ICES prohibits the presence of small cells (counts less than 6) in any output or report. Small cells (and associated cells that were suppressed in order to avoid risk of residual disclosure) were suppressed for various indicators where necessary, and will appear as breaks or gaps in the graph.

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