

Topic	New opioid use disorder diagnosis rates in British Columbia (2010-2023)
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Data source	BCC19C Proof of Concept
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Key messages

- There has been no observable provincial increase in new diagnosed OUD in BC since 2020.
- The average rate of new OUD diagnoses (incidence rate) has been decreasing since 2017, though the decline was lower in the June 2021-June 2023 period compared to the January 2019-June 2021 period.
- There are some divergences from provincial trends by region and age group that may be explained by context specific factors. These trends require ongoing monitoring and surveillance.

Introduction

- Population rates of diagnosed Opioid Use Disorder (OUD) are an important provincial indicator for monitoring of population rates of substance use service engagement and substance use-related harms (1)
- In this project, an updated algorithm (i.e. case definition) was developed to identify records that indicate OUD. The updated algorithm includes community pharmacy dispensations and fees related to opioid agonist treatment (OAT) in addition to physician records, hospitalizations, and emergency department visits for OUD.

- This Knowledge Update presents OUD diagnosis incidence rates by age and geographic location in BC between January 2010 and June 2023.

Methods

Data Source

- Data were derived from the BCC19C Proof of Concept surveillance platform based at the Provincial Health Services Authority (PHSA) which integrates datasets related to COVID-19 cases and testing, as well as administrative data on hospitalizations (Discharge Abstract Database, DAD), emergency room visits (National Ambulatory Care Reporting System, NACRS), prescription drug dispensations (PharmaNet, PNET), billings related to medical visits (Medical Services Plan, MSP), mortality (Vital Statistics), and other demographic and health databases.

OUD Diagnosis Algorithm

- A person was identified as having OUD if they had two medical visits within a year in MSP with ICD 9 codes related to OUD or fee items for OAT, one hospitalization or ED visit with ICD-10 or CEDIS codes for OUD, or one dispensation for OAT in PNET. The first record found across the four databases was used as the diagnosis date. The diagnostic codes were adapted from algorithms developed by the OUD Cascade of Care Team led by Dr. Bohdan Nosyk (2) (See Table A2). The total number of people identified by each data source is reported in Table A1.
- Persons not linkable across databases or with multiple birthdates were excluded as this could indicate duplicative personal health numbers (PHNs). We also excluded people who did not have any record in the BC Client Roster and persons who were younger than 12 at the date of diagnosis. The number of people excluded at each stage is shown in Figure A1.
- We carefully considered the inclusion and exclusion of ICD codes that have been used previously in research on OUD in BC (2) with guidance from people with lived/living experience (PWLLE), and public health practitioners and clinicians. We excluded two codes related to drug poisoning and the dispensation of hydromorphone tablets. The rationale for their exclusion is described below:
 - **Drug poisoning codes:** ICD codes indicating drug poisoning have been used previously to identify OUD. However, due to the current context of the drug poisoning crisis in which the unregulated drug supply is of unknown content and varying doses, people with lived and living experience have recommended that these codes not be used in the definition of OUD. This is because the likelihood of drug poisoning is high even in people who use opioids or other opioid-contaminated drugs but do not meet criteria for opioid use disorder. An additional rationale is that the indicator in this analysis measures diagnosed OUD rather than estimating undiagnosed OUD; toxicity-related

healthcare visits may or may not include a diagnostic interview for OUD. Patients receiving follow-up care for OUD after a toxicity-related visit (e.g. dispensed OAT or a subsequent physician visit for OUD) would be captured as OUD cases from the point of follow-up care.

- **Hydromorphone tablets:** Since hydromorphone tablets can be prescribed for both pain and OUD, they were not included in the case definitions. In sensitivity analyses, we found that the trends of OUD diagnosis incidence rates did not differ when hydromorphone tablets were excluded compared to when they were included. We did include injectable hydromorphone prescribed as OAT. Research suggests that the majority of people who received tablet hydromorphone under the Risk Mitigation Guidance (RMG) were also co-prescribed OAT. These people would be identified by our algorithm, as would anyone receiving hydromorphone tablets who met the definition in some other way (e.g. MSP visit for OUD).

Data Analysis

- New OUD diagnoses were summarized by quarter and reported as rates per 100,000 population. Population denominators were derived from BC STATS (3). Rates were further stratified by age group and health authority.
- A change point analysis identifies points during which abrupt changes to the distribution (e.g. mean, variance) of individual datapoints within any ordered data have occurred. In this case, change point analyses were run on monthly provincial time series data to identify any time points during which significant changes to the mean rates in new (i.e. incident) OUD diagnoses may have occurred, with an assumption that the average rates were constant between change points. The analyses were conducted using the 'strucchange' package in R v4.2.0.; R Core Team 2022. (4, 5, 6)
- We conducted a sensitivity analysis which included the 3-digit ICD-9 code for drug dependence (i.e. 304) in addition to all other codes (304.0, 304.7, 305.5), in response to reports from clinicians that this 3-digit code is often used to document OUD cases in clinical settings (See Appendix).

Findings

- We identified 98,663 people aged 12 and older who had an indication of new OUD diagnosis from January 1, 2010 – June 30, 2023.
- Provincial new OUD diagnoses have been decreasing since a peak in 2017, which coincided with changes in OUD treatment guidance and the expansion of OAT in BC (7, 8, 9). In the first quarter of 2020, OUD rates decreased and then returned to pre-pandemic trends. (See Figure 1).

- The trends of new OUD diagnoses stratified by health authorities suggest there has been a decline across the province since 2017, except for in Northern Health Authority, where rates of new OUD have remained at 2017 levels (Figure 2). Rates were similar across all health authorities prior to 2016, however after the 2016-2018 period, rates of new OUD in Vancouver Coastal Health were lower compared to Island Health, Interior Health, and Fraser Health.
- Provincially, between January 2010 and April 2017 the age groups with the highest rates of new OUD diagnoses were persons aged 25-34 and 19-24. Since 2017, new OUD diagnoses rates have been highest among persons aged 25-34 and 35-44 (Figure 3). New diagnoses of OUD among younger youth (12-18) have been historically lower than all other age groups, and this has continued into the post-COVID-19 pandemic period. Provincial rates of new OUD diagnoses among youth (12-18) have remained stable in the post-pandemic period.
- Figure 4 displays new OUD rates by region and age for those aged 12-18 and 19-24.
 - Youth (12-18) OUD diagnoses rates were consistently lower than all other age groups and relatively similar across all regions. While youth rates are difficult to interpret due to small numbers, rates appear to be stable or declining in most regions, except for in Vancouver Island, where youth new OUD diagnosis rates have been increasing since 2016.
 - Annual youth (12-18) new OUD diagnoses rates in Vancouver Coastal and Interior were higher in 2022 compared to 2021, however these rates were similar to years prior to 2021 (2010-2020).
 - New OUD diagnosis rates among people aged 19-24 years were the second highest in the province and increasing until 2017, after which they have been declining. In 2023 people aged 19-24 years had the second lowest rates of new OUD diagnoses.

The change point analysis identified changes in the provincial trend of new OUD diagnoses in early 2016, early 2019 and mid 2021¹ (See Figure 5).

¹ The year and month provided by the change point analysis is based on a model estimate and has some uncertainty around it. 95% Confidence Intervals (CIs) around the change point date shown in Figure 5.

Changepoint 1: The monthly mean level of the incidence rate of OUD diagnoses increased from 12.96 per 100 000 from January 2010 to February 2016, to an average of 17.30 between February 2016 and January 2019 (33.49% increase).

Changepoint 2: After this period, the mean rate decreased to 14.19 per 100, 000 between January 2019 and June 2021 (17.98% decrease).

Changepoint 3: Between June 2021 to June 2023 the mean level of new OUD diagnoses decreased again to 12.5 per 100, 000 (11.91% decrease).

Interpretation

- There has been no observable provincial increase in diagnosed OUD in BC since the onset of the COVID-19 pandemic, the Risk Mitigation Guidance, nor the PSS Policy Directive through which prescribed alternatives to the unregulated supply were made available.
- Rates of new cases of OUD provincially did not increase among youth aged 12-18 in 2017, unlike in other age groups (Figure 3). There are many potential explanations for the low and stable rates of OUD among youth compared to other age groups, such as increased barriers to accessing OAT and health care among youth compared to adults. Recent studies similarly reported that among teenagers with OUD in the U.S., less than 5% had access to OAT medications (10).
- Youth (12-18) OUD rates remained stable or declining in every region except for Vancouver Island. Youth OUD rates in Vancouver Island have been increasing since 2016. Although drug poisoning is a different measure compared to new OUD diagnosis, the BC Coroners Service recently reported an increasing number of unregulated drug poisoning deaths among youth in the Vancouver Island region in 2021 and 2022 compared to prior years, and the number of deaths in these years on Vancouver Island was higher than those observed in youth in the other regions. This finding might also reflect greater access to OAT in urban regions of Vancouver Island (e.g. Victoria), as OAT dispensations were included in the case definitions used to identify OUD cases in the present analysis. These trends differ from other regions in BC, where increases in new OUD diagnoses in youth have not been observed.
- Rates of new OUD among people aged 19-24 years were similar to older age groups (25-34- and 35-44-year-olds). This may reflect similar access to OAT and other services amongst these age groups.
- The sustained rate of new cases of OUD in Northern Health since 2017 differs from the provincial trend and requires further research.

- The change point analyses identified a break point provincially in February 2016, two months before the declaration of the unregulated drug poisoning emergency in April 2016. This may reflect expansion of OAT around this time as a response to increased drug poisonings. For example, as of October 2015, Suboxone was covered a regular benefit under Pharmacare.
- Since 2017, the average rate of new OUD diagnoses has been decreasing. The change point analysis suggested that the 17.98% reduction between periods 2 and 3 (January 2019- June 2021) was larger than the 11.91% reduction between periods 3 and 4 (June 2021- June 2023).

Limitations

- These estimates are based on administrative health care data and only capture OUD records where the person received medical care and had a diagnosis of OUD recorded. A person who has OUD but has not interacted with healthcare will not be included. Thus, OUD rates and counts are likely underestimates. Additional methods, including population-based surveys, are needed to better understand the total number of people using opioids and the proportion with OUD.
- In some instances, rates are highly variable from one quarter to the next. In the case of sub-sample analyses, (e.g. regional analyses of rates among youth) this may be explained by small sample sizes.
- Data quality issues related to the ICD codes in MSP and NACRS may result in misclassification, and potential underreporting of OUD. Not all emergency departments (EDs) report to NACRS, thus data from EDs in rural and remote communities (mostly in Northern and Interior Health) are not captured.
- PNET records only report medications that were dispensed but do not provide details or context for the dispensation. People with lived and living experience of substance use have reported being dispensed OAT following a misdiagnosis or not identifying with the diagnosis of OUD, suggesting that not all people who access OAT should be categorized as having an OUD. While we are unable to quantify the nuances in OAT prescriptions and the misclassifications that can occur, it is important to recognize the issues related to this definition and that administrative data may not always reflect the lived experiences of people who use substances or have a dependence related to opioids.
- The codes used in this analysis are “dependence” codes, while current diagnostic terminology in BC is based on the DSM-V construct of “use disorder”. Physical dependence on a substance does not necessarily indicate substance use disorder (11). For example, people using opioids may develop a physical dependence to the opioids (e.g. tolerance) without fitting criteria for a diagnosed opioid use disorder. There may be some misclassification associated with the difference between ICD-10 and DSM-V diagnostic constructs.

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Supporting Information

Document citation

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Data steward(s) disclaimer

All inferences, opinions, and conclusions drawn in this Knowledge Update are those of the authors, and do not reflect the opinions or policies of the Data Steward(s).

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Data Source Citations

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Figures and Tables

Figure 1. New Opioid Use Disorder (OUD) diagnosis rates by Quarter in BC among people aged 12 and over at time of diagnosis.

***Note** this Figure represents **quarterly** data, therefore the rates in this figure differ from those in the Change Point Analysis in Figure 5 which reflect **monthly** data.

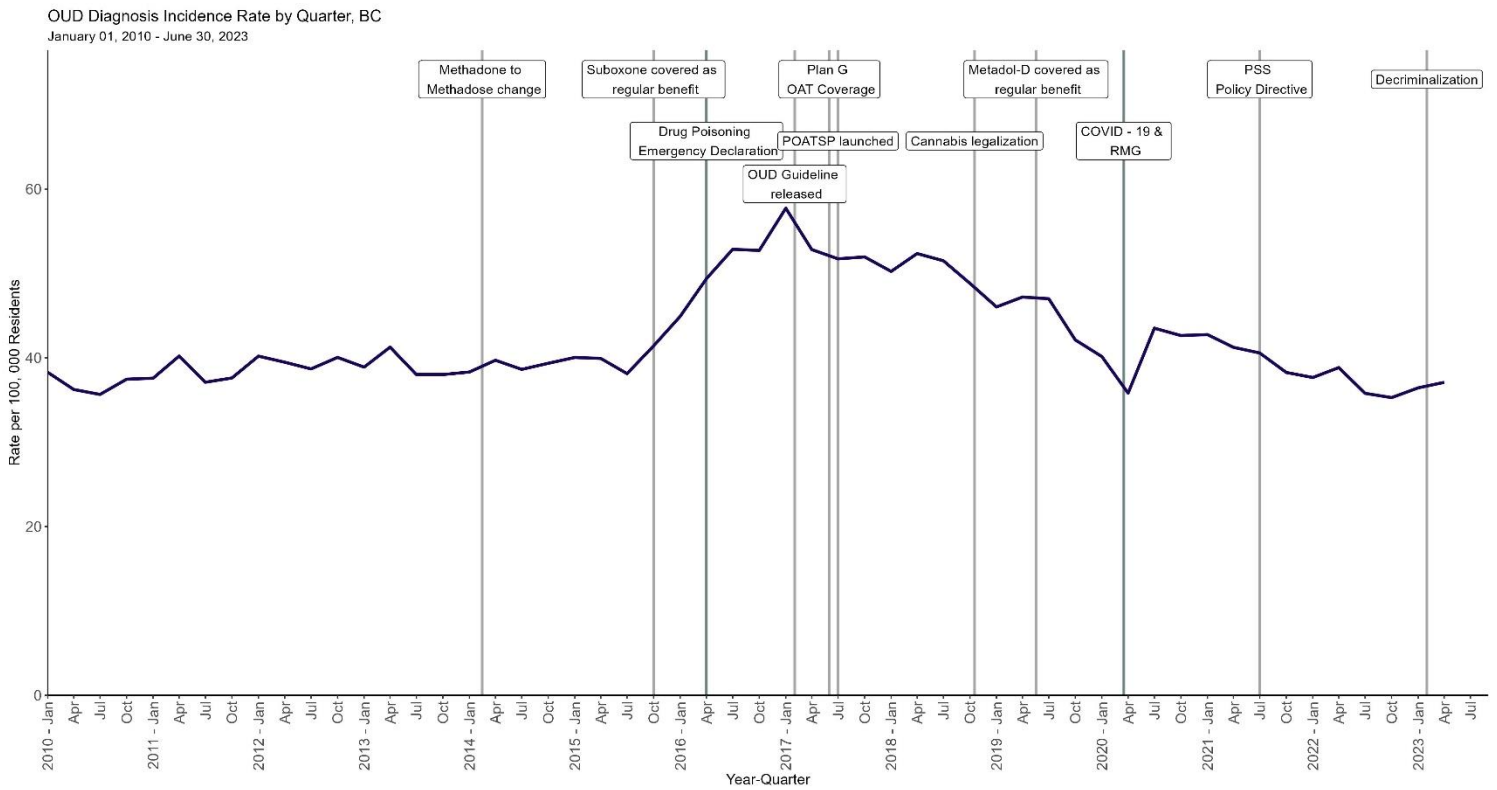


Figure 2. New Opioid Use Disorder (OUD) diagnosis rates in BC by Quarter and Health Authority

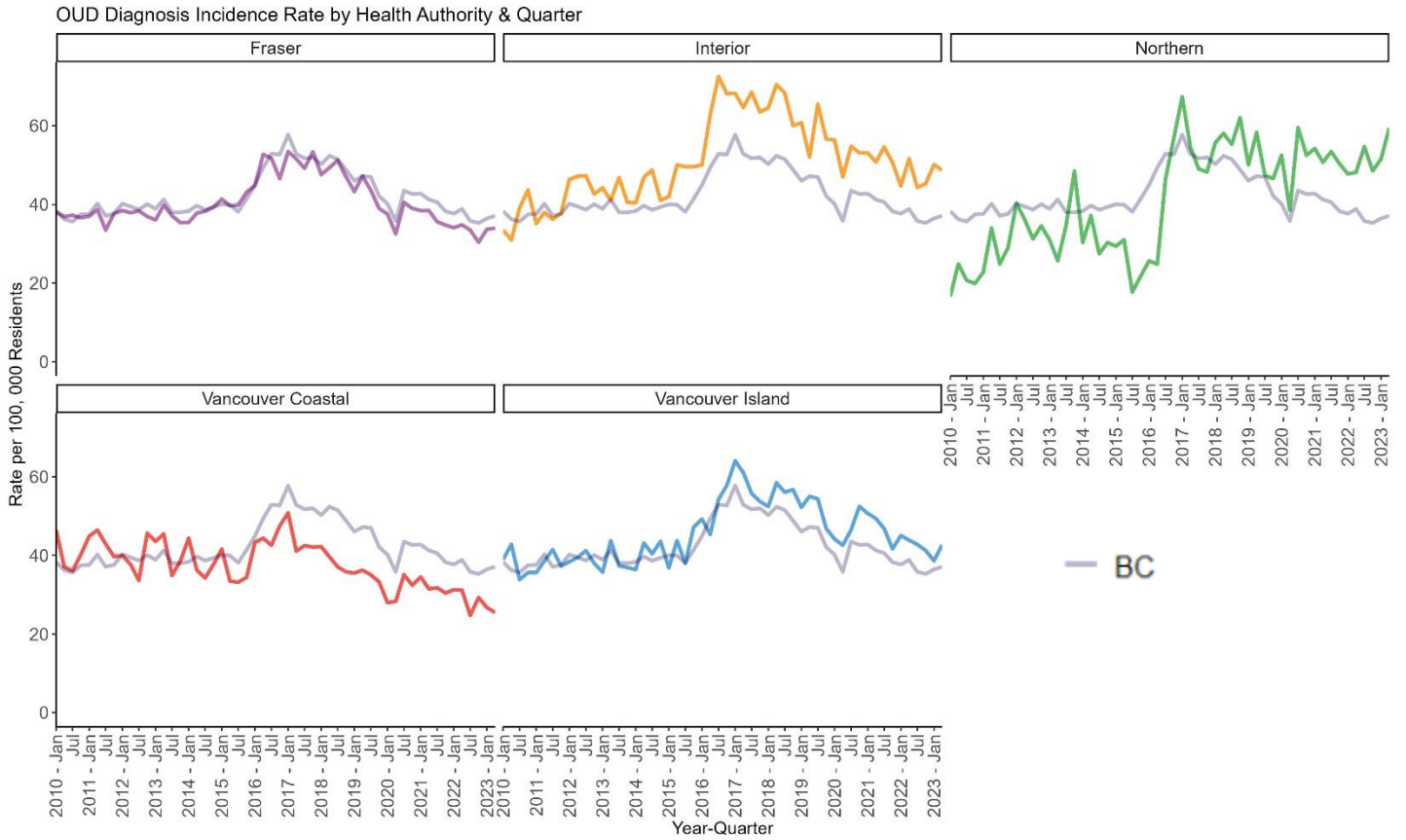


Figure 3. New Opioid Use Disorder (OUD) diagnosis rates in BC by Age Group and Quarter

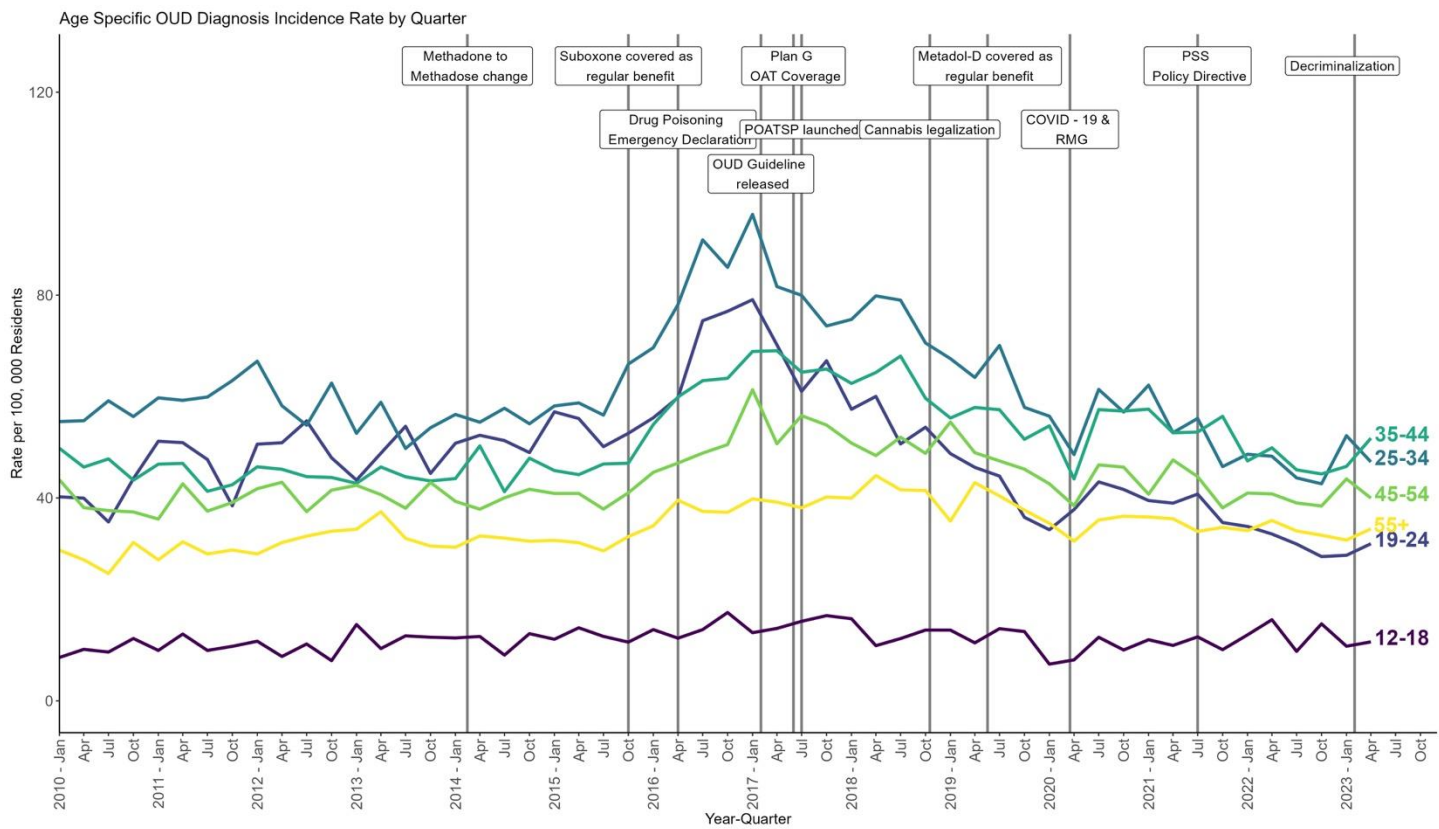


Figure 4. New Opioid Use Disorder (OUD) diagnosis rates in BC by Health Authority and Quarter among 12-18 and 19-24 year olds

***Note** incidence rates are suppressed when cell counts are <5 due to reidentification risk per the MoH data policy. This results in missing trend lines where the rate was suppressed.

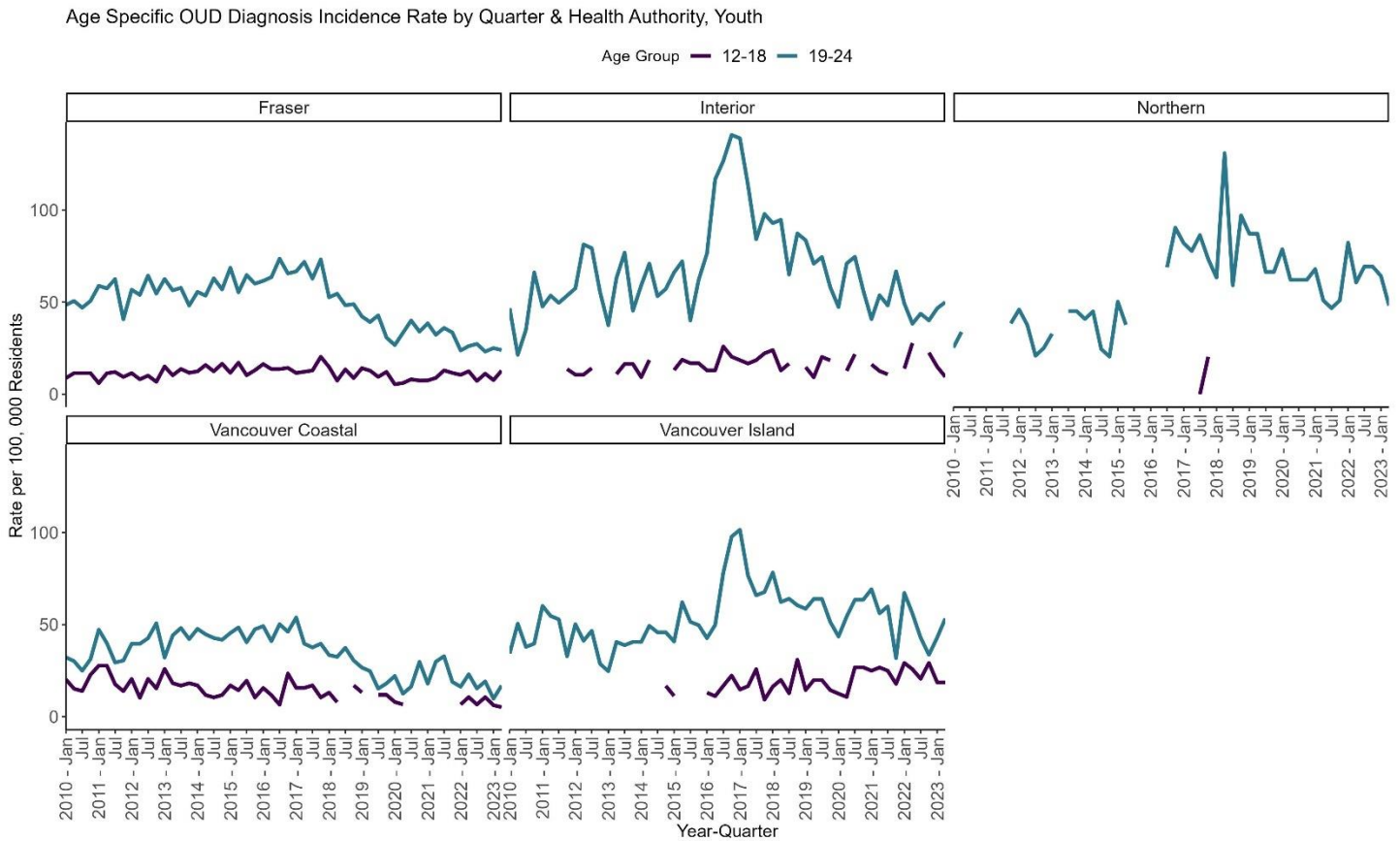


Figure 5. Change Points identified in Monthly New OUD diagnosis Rate, BC.

* **Note** the change point analysis was run over **monthly** data, therefore the rates in this image are lower than the rates in Figure 1 which contains **quarterly** data.

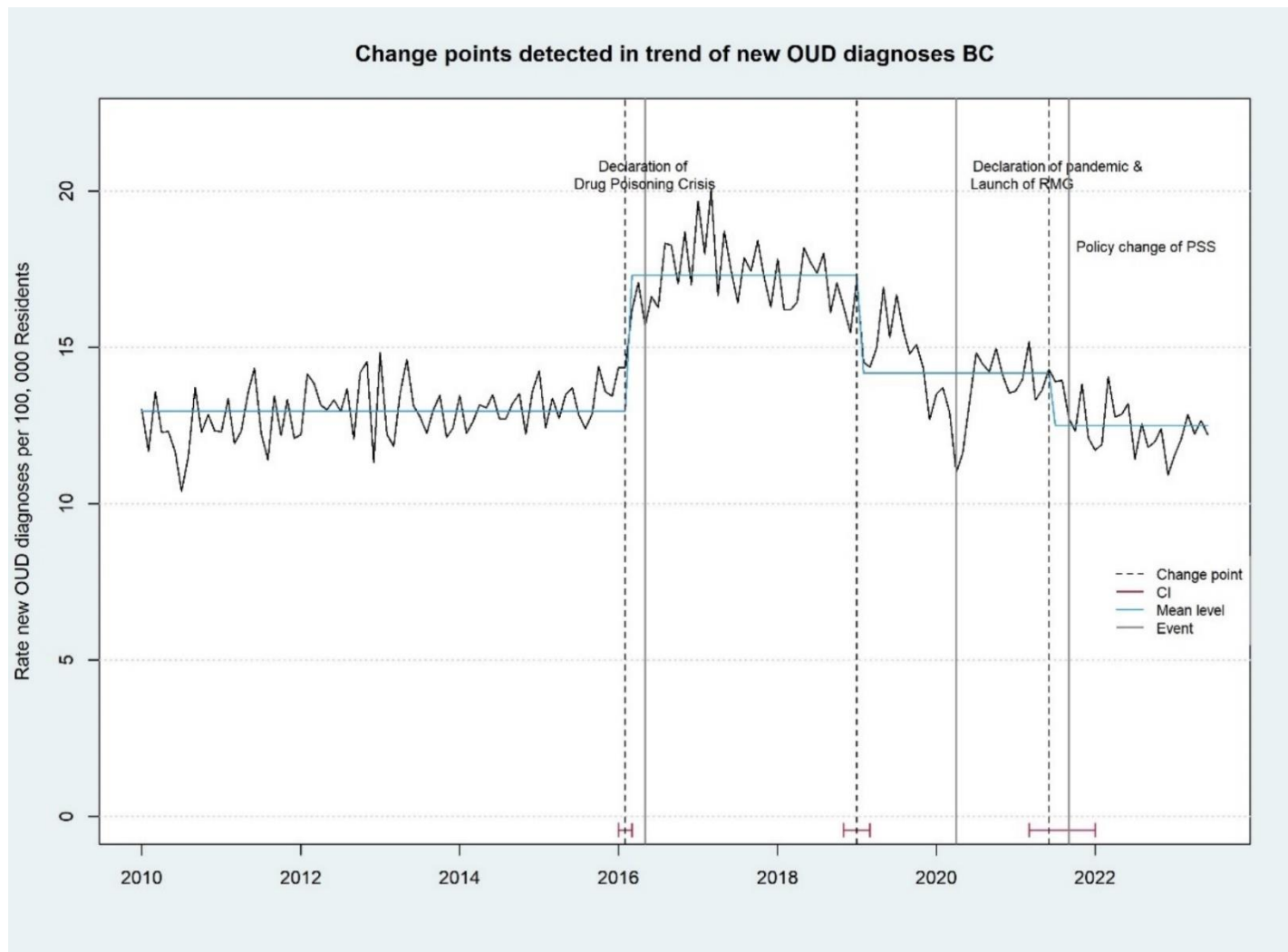
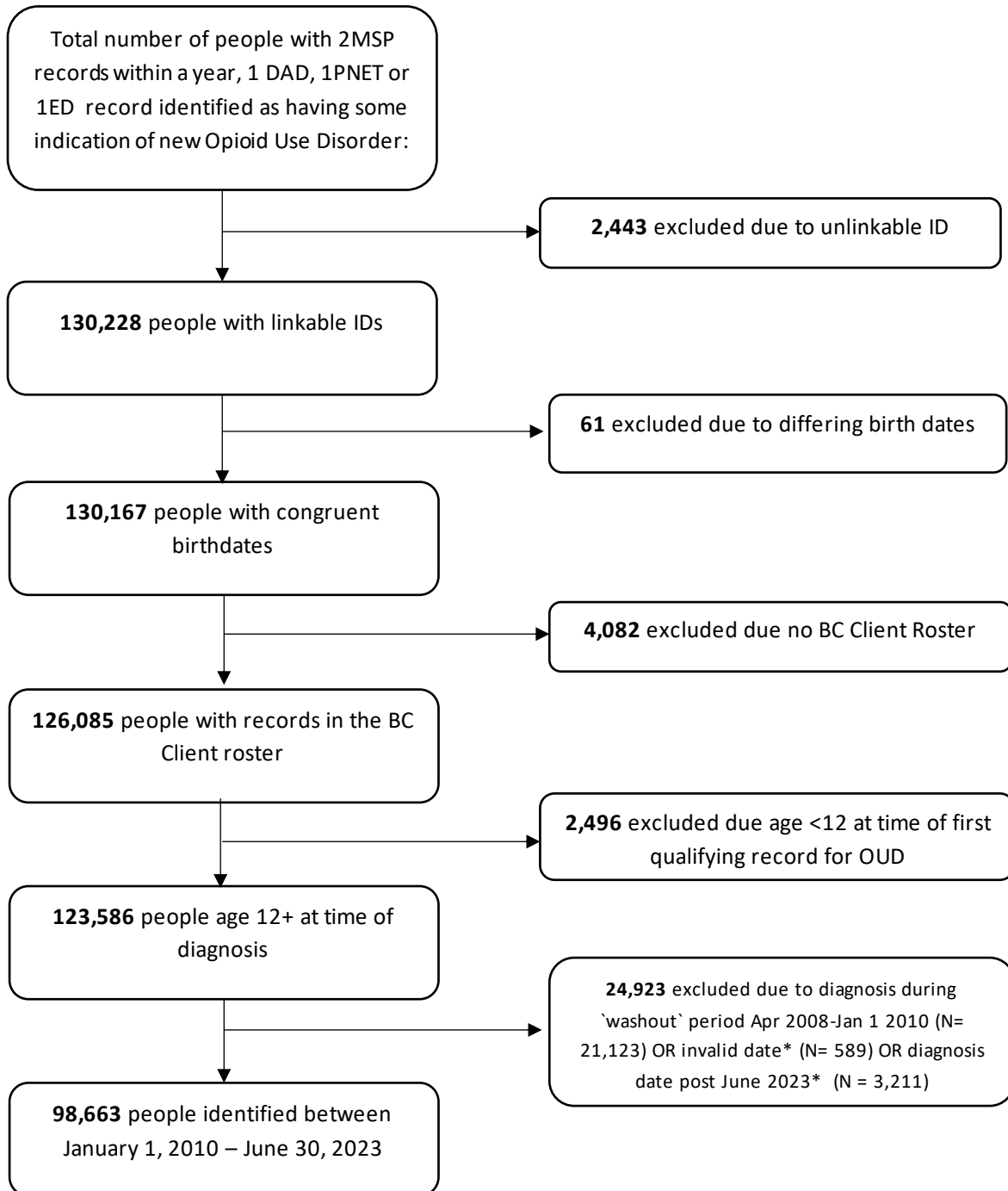


Table 1: Descriptive data: Change Points identified in Monthly New OUD diagnosis Rate, BC

Period	Changepoint	Changepoint time (95% CI)	Start of period	End of period	Mean (SD), per 100, 000 population	% change on previous period
1	-	-	Jan 2010	Feb 2016	12.96 (0.89)	-
2	1	Feb 2016 (Jan 2016, Mar 2016)	Feb 2016	Jan 2019	17.30 (1.08)	33.49%
3	2	Jan 2019 (Nov 2018, Mar 2019)	Jan 2019	June 2021	14.19 (1.27)	-17.98%
4	3	June 2021 (Mar 2021, Jan 2022)	June 2021	June 2023	12.50 (0.84)	-11.91%

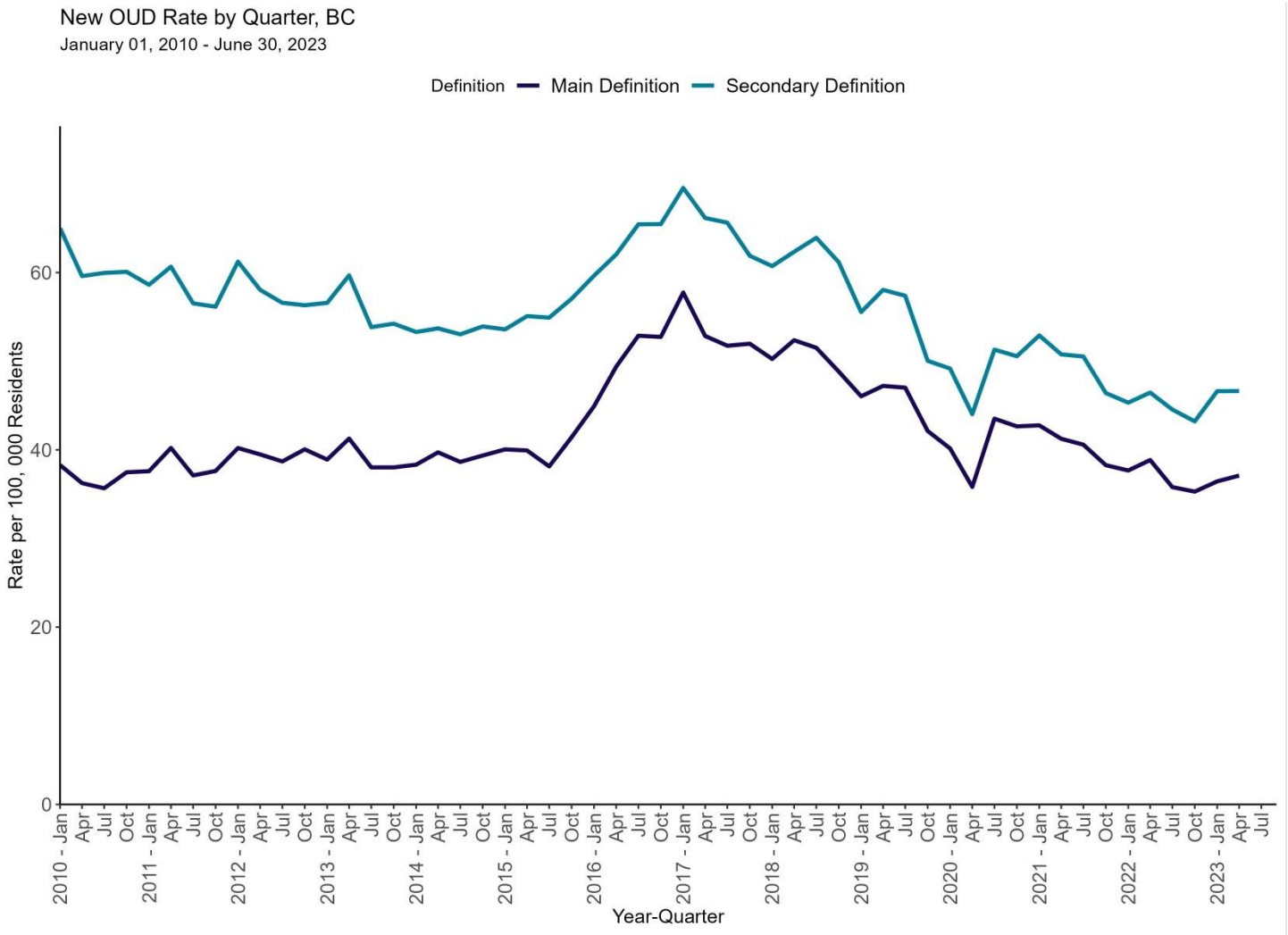
Appendix

Figure A1. Definition of People with Opioid Use Disorder Diagnosis



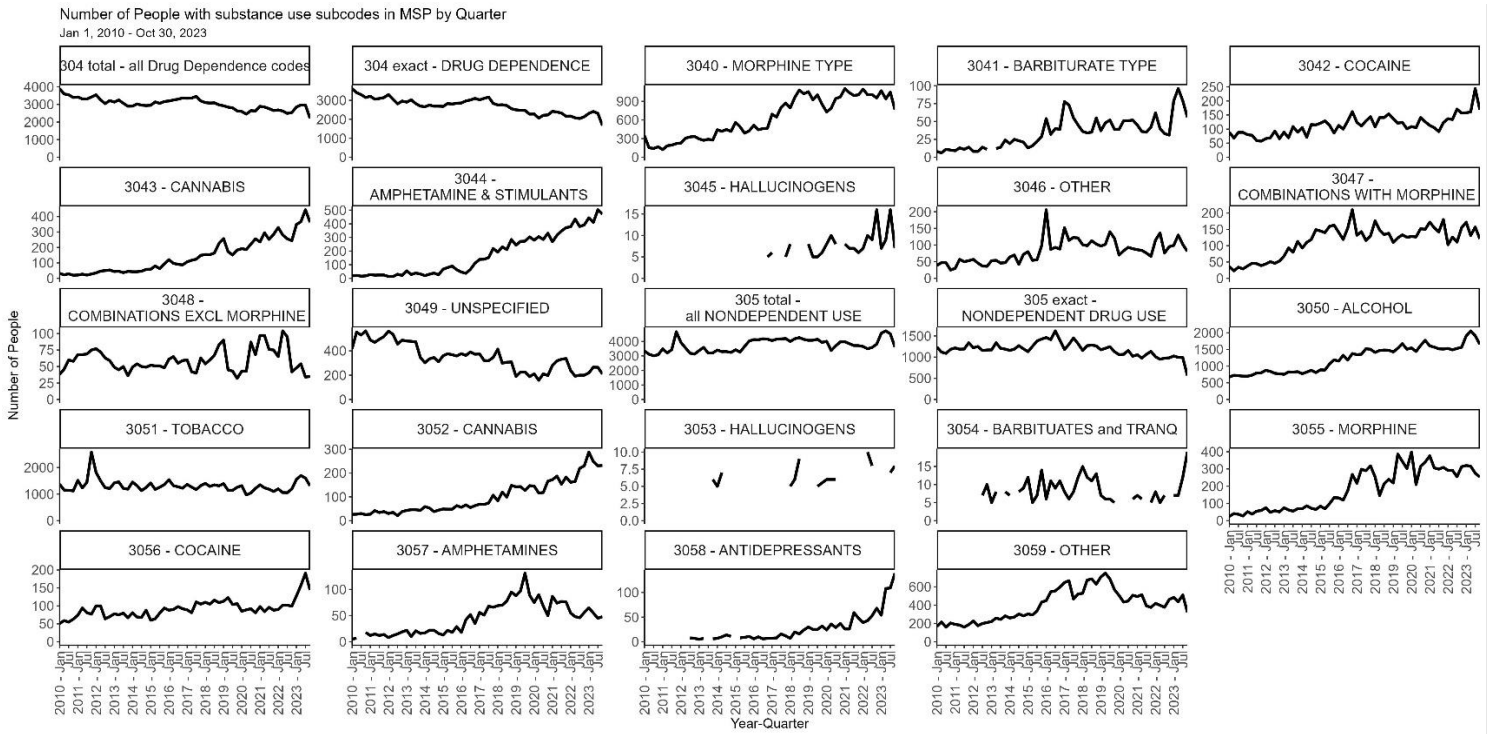
*Invalid date = 'diagnosis' date prior to 2008. Diagnoses post June 2023 were excluded due to lag times until data is complete or considered stable.

Figure A2. New Opioid Use Disorder (OUD) by Definition and Quarter, BC



- In the sensitivity analysis where ICD-304 exact code for Drug Dependence was included, the incidence of OUD was higher (e.g. 46.6 per 100,000 in Q2 2023 with 304 exact included compared to 37.09 per 100,000 without). However, overall trends of OUD incidence remained the same across both methods, i.e. with the inclusion or exclusion of the ICD-304 code (Figure A1).

Figure A3. Panel of Substances included under Parent Codes 304 and 305 in MSP



*Counts <5 are suppressed due to reidentification risk policies.

- ICD-304 identifies people with Drug Dependence generally therefore we are unable to distinguish between OUD compared to substance use disorders related to stimulant, cannabis and tobacco consumption. The main analysis excluded the 304 exact code due to this inability to distinguish between substances. Additionally, we were likely to reidentify many of the cases where the 304 exact code was used through PNET, and the OAT fee items in MSP. Figure A2 shows the substances that are included in the 304 code and the number of people identified at least once by this code.

Table A1. Number of People identified with OUD by Data Source

Data Source	Number of People Identified
1 record in DAD (hospitalization)	16888 (12.73%)
1 record in NACRS (ED visit)	3530 (2.66%)
1 record in PNET (Pharmacy Dispensations)	99353 (74.89)
2 records within a year in MSP (Physician Billings)	12900 (9.72%)

*Note a person may have had records across multiple data sources. This table identifies the data source where the first record related to OUD was found. The numbers in this table report the number of people identified by source, prior to application of the exclusion criteria shown in Figure A1.

Table A2. Detailed ICD Codes and DIN PINs used to identify Opioid Use Disorder (Adapted from Dr Nosyk et al)

OUD defined as 2MSP visits within 1 year, 1 DAD, 1 PNET or 1 ED using the following codes:

Datasource	Code	Description
PharmaNet	999792, 999793, 66999990, 66999991, 66999992, 66999993, 66999997, 66999998, 66999999, 67000000, 67000001, 67000002, 67000003, 67000004, 67000005, 67000006, 67000007, 67000008, 67000009, 67000010, 67000011, 67000012, 67000013, 67000014, 67000015, 67000016, 67000017, 67000018, 67000019, 67000020, 22123374	DIN/PIN for methadone as OAT
PharmaNet	2295695, 2295709, 2408090, 2408104, 2424851, 2424878, 2453908, 2453916, 2468085, 2468093, 2502313, 2502321, 2502348, 2502356, 2517175, 2517183	DIN/PIN for buprenorphine/naloxone as OAT
PharmaNet	22123346, 22123347, 22123348, 22123349	DIN/PIN for Slow release morphine (Kadian)
PharmaNet	2483084, 2483092, 2474921, 9858127, 9858128, 2242963, 2242964	DIN/PIN for buprenorphine (Sublocade, Probuphine, Subutex)
PharmaNet	2146126, 22123340, 2469413, 22123357, 66123367	DIN/PIN for Injectable OAT
PharmaNet	66128316, 66128328, 66128314, 66128329, 66128330, 66128331, 66128315	DIN/PIN for fentanyl dispensed as PSS
PharmaNet	655619, 781460, 781479, 655627, 2524996, 2525003	DIN/PIN for diacetyl morphine
MSP	39, 15039, 13013, 13014, 36521	Fee items related to OAT
MSP	Starts with 304.0, 304.7	ICD9 for dependent use of opioid
MSP	Starts with 305.5	ICD9 for non-dependent use of opioid
DAD	Starts with F11	ICD10 for use of opioid
NACRS	F11.9	CED-DxS for opioid use