**Covid-19 pandEmic impacts on mental health Related conditions Via multi-database nEtwork: a LongitutinaL Observational study (CERVELLO)**

**Version:** 1.4

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# Table of contents

[1 Table of contents 2](#_Toc56109667)

[2 List of abbreviations 3](#_Toc56109668)

[3 Abstract 3](#_Toc56109669)

[4 Amendment and Updates 3](#_Toc56109670)

[5 Milestones 3](#_Toc56109671)

[6 Rationale and Background 3](#_Toc56109672)

[7 Research Questions and Objectives 4](#_Toc56109673)

[7.1 Research Questions 4](#_Toc56109674)

[7.2 Objectives 4](#_Toc56109675)

[8 Research methods 5](#_Toc56109676)

[8.1 Study Design 5](#_Toc56109677)

[8.2 Data Source(s) 5](#_Toc56109678)

[8.3 Study population 5](#_Toc56109679)

[8.3.1 Anxiety disorder 6](#_Toc56109680)

[8.3.2 Depressive disorders 7](#_Toc56109681)

[8.3.3 Bipolar disorders 7](#_Toc56109682)

[8.3.4 Non-affective psychoses 8](#_Toc56109683)

[8.3.5 Personality disorders 8](#_Toc56109684)

[8.3.6 Alcohol misuse or dependence 9](#_Toc56109685)

[8.3.7 Substance misuse or dependence 9](#_Toc56109686)

[8.3.8 Dementia 9](#_Toc56109687)

[8.3.9 ADHD 10](#_Toc56109688)

[8.3.10 Neruodevelopmental disorder 11](#_Toc56109689)

[8.4 Outcomes of interest 11](#_Toc56109690)

[8.4.1 Antipsychotics 11](#_Toc56109691)

[8.4.2 Anxiolytics 12](#_Toc56109692)

[8.4.3 Hypnotics/sedatives 13](#_Toc56109693)

[8.4.4 Antidepressants 15](#_Toc56109694)

[8.4.5 Antiepileptics 17](#_Toc56109695)

[8.4.6 Lithium 18](#_Toc56109696)

[8.4.7 ADHD drugs 18](#_Toc56109697)

[8.4.8 Anti-dementia 18](#_Toc56109698)

[8.5 Covariates 19](#_Toc56109699)

[9 Data Analysis Plan 19](#_Toc56109700)

[9.1 Output 21](#_Toc56109701)

[9.2 Evidence Evaluation 21](#_Toc56109702)

[10 Study Diagnostics 22](#_Toc56109703)

[10.1 Sample Size and Study Power 22](#_Toc56109704)

[10.2 Cohort Comparability 22](#_Toc56109705)

[10.3 Systematic Error Assessment 22](#_Toc56109706)

[11 Strengths and Limitations of the Research Methods 22](#_Toc56109707)

[12 Protection of Human Subjects 22](#_Toc56109708)

[13 Management and Reporting of Adverse Events and Adverse Reactions 22](#_Toc56109709)

[14 Plans for Disseminating and Communicating Study Results 22](#_Toc56109710)

[15 References 23](#_Toc56109711)

# List of abbreviations

OHDSI Observational Health Data Sciences and Informatics

# Abstract

The mental health effects of COVID-19 may vary across populations. Specific sections of the population are suspected to be more vulnerable than others to the psychological, social, and neuropsychiatric effects. This study will examine the mental health effects of the COVID-19 pandemic across vulnerable groups, including people with established psychiatric disorders including dementia and neurodevelopmental disorders.

# Amendment and Updates

|  |  |  |  |
| --- | --- | --- | --- |
| Version | Date | Person | Changes |
| 1.0 | 16 Sep 2020 | Hao Luo | Initial draft |
| 1.1 | 8 Oct 2020 | Hao Luo | Added concept IDs for outcomes of interest |
| 1.2 | 26 Oct 2020 | Hao Luo | Added inclusion and exclusion criteria for each study cohort |
| 1.3 | Jan 13 2021 | Hao Luo | Added concept sets to each cohort after cohort diagnostics |
| 1.4 | 21st Jan 2021 | C.O. Torre | Final draft |

# Milestones

|  |  |
| --- | --- |
| Milestone |  |
| Start cohort definition and cohort diagnosis | 16 Sep 2020 |
| Start of analysis | 21 Jan 2021 |
| End of analysis | 5 Feb 2021 |
| Presentation of results | tbd |

# Rationale and Background

The COVID-19 pandemic is having a profound effect on the mental health of populations across the globe.[1](#_ENREF_1) For people who have contracted the disease, the coronavirus may infect the brain or trigger an immune response that causes additional adverse effects on brain function and mental health.[2](#_ENREF_2),[3](#_ENREF_3) As observed from previous large-scale coronavirus outbreaks like SARS and MERS, post-traumatic stress disorder (PTSD), depression and anxiety disorder were extremely prevalent in patients with SARS or MERS at the post-illness stage.[4](#_ENREF_4) For the general public, uncertain prognoses, severe shortage of resources, implementation of unprecedented public health measures and financial difficulties will undoubtedly contribute to emotional distress and elevated risk of adverse mental health outcomes.[5](#_ENREF_5) Moreover, some groups may be more vulnerable than others. During school closures, children and adolescents were less likely to interact with peers physically, which might potentially affect their development of social and interpersonal skills, hence leading to subsequent behavioural problems. People with disability, learning difficulties, neurodevelopmental disorders, and existing mental health issues may be affected by social distancing, loneliness, and disruption to daily routine and support.[6](#_ENREF_6) Older adults who are frail may be particularly affected by the disruption to end of life care and bereavement process, which may be further exacerbated by the digital divide.[1](#_ENREF_1) Recent surveys of the general population have initially revealed increased anxiety, depression, stress, and other negative emotions during the COVID-19 pandemic.[7](#_ENREF_7) Moving beyond such snapshots of the current situation, high-quality international research is needed for systematically examining the mental health effects of the pandemic on both COVID-19 patients and the general population.[1](#_ENREF_1)

The mental health effects of COVID-19 may vary across populations. Specific sections of the population are suspected to be more vulnerable than others to the psychological, social, and neuropsychiatric effects. These include the direct effect of COVID-19 on mental health outcomes in those who contracted the disease; the indirect effect of the pandemic and lockdown on mental health outcomes in the whole population; and the impact of the pandemic on people with existing mental health issues and neurodevelopmental disorders.[1](#_ENREF_1) To ensure limited mental health resources are efficiently targeted to crucial areas of mental health problems, high-quality data on the short-, medium- and long-term mental health effects of the COVID-19 pandemic across the whole-population and vulnerable groups are needed. In this project, vulnerable groups of interest include patients with COVID-19 diagnosis, people with established psychiatric disorders including dementia and neurodevelopmental disorders.

# Objectives

## Objectives

7.1.1 Primary objective

Describe the baseline demographic, clinical characteristics, treatments and outcomes of interest among individuals with mental health conditions before the COVID-19 pandemic overall and stratified by sex, age, race and specific comorbidities.

7.1.2 Secondary objective

To measure the prevalence of psychotropic drug use in people with existing mental health issues and neurodevelopmental disorders by condition and calendar year to examine the temporal trends. We aim to compute the prevalence of eight types of drugs before and during the pandemic. The prevalence will be stratified by year before the pandemic and by month during the pandemic. All analysis will be stratified by age groups

# Research methods

## Study Design – primary objective

This first part of the study is going to focus on the primary objective.

This will be a cohort study characterization including ten disease-specific mental health cohorts. These include people with any existing condition(s) of 1) anxiety disorders, 2) depression, 3) bipolar disorders, 4) non-affective psychoses, 5) personality disorders, 6) alcohol misuse or dependence, 7) substance misuse or dependence, 8) dementia, 9) attention-deficit/hyperactivity disorder (ADHD) and 10) autism and other neurodevelopmental disorders, before 01/01/2020 (before the pandemic). These ten cohorts are not mutually exclusive as a single patient could be present in multiple cohorts.

For each cohort, we will include all individuals with observed time of at least 1 day during the study period (01/01/2016 to 31/12/2019).

## Data Source(s)

The study will aim to be conducted using multiple databases in the OHDSI network (details to be confirmed).

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Data source** | **Country** | **Patient Count** | **History** | **Patient Type** | **Data collection** |
| IQVIA  LPD France EMR | France | 30.9 M | 2009 - | Outpatient / General population/ Patients seen in the primary care setting | Electronic health records in ambulatory setting |
| IQVIA  Disease Analyser Germany EMR | Germany | 39.2 M | 1992 - | Outpatient only / General population/Public and private insurance | Electronic health records in ambulatory setting |
| IQVIA  UK IMRD | United Kingdom | 12.7 M | 1994 - | General population / Primary care records with hospitalisation / referral information | Pseudonymised Electronic Medical Records collected from Patient Management software used within UK Primary Care |
| IQVIA  LPD Italy | Italy | 2.2 M | 2011 - | Outpatient / General population/ Patients seen in the primary care setting | Electronic health records in ambulatory setting |
| IQVIA  LPD Australia EMR | Australia | 3.2 M | 2011 - | Outpatient / General population/ Patients seen in the primary care setting | Electronic health records in ambulatory setting |
| IQVIA  US Ambulatory EMR | United States | 75.7 M | 2006 – | Outpatient | Electronic health records in ambulatory setting |

## Study population

The study population will include all patients in the databases from OHDSI as listed in **Section 8.2** with disease-specific mental health cohorts:

1. anxiety disorders,
2. depression,
3. bipolar disorders,
4. non-affective psychoses,
5. personality disorders,
6. alcohol misuse or dependence,
7. substance misuse or dependence,
8. dementia,
9. attention-deficit/hyperactivity disorder (ADHD)
10. autism and other neurodevelopmental disorders

The cohorts’ concept sets are defined in Appendix 1.

The entry and inclusion rules for each cohort are listed below.

### Anxiety disorder

Cohort Entry Events

Events having any of the following criteria

* a condition occurrence of anxiety disorders
  + occurrence start is: Between 2015-12-31 and 2019-12-31

with continuous observations at least 0 days before and 0 days after event index date

Limit initial events to: all events per person

Inclusion Criteria

* Inclusion Criteria #1: Has no prior diagnosis of bipolar disorder
  + Having all of the following criteria:
    - With exactly 0 occurrence of bipolar disorders where event starts between all days before and 1 days before index start date (allow events from outside observation period)
* Inclusion Criteria #2: Has no prior diagnosis of non-affective psychoses
  + Having all of the following criteria:
    - With exactly 0 occurrence of non-affective psychoses where event starts between all days before and 1 days before index start date (allow events from outside observation period)
* Inclusion Criteria #3: Has no prior diagnosis of dementia
  + Having all of the following criteria:
    - With exactly 0 occurrence of dementia where event starts between all days before and 1 days before index start date (allow events from outside observation period)
* Inclusion Criteria #4: Has no prior anti-dementia drug exposures
  + Having all of the following criteria:
    - With exactly 0 occurrence of non-affective psychoses where event starts between all days before and 1 days before index start date (allow events from outside observation period)
* Limit quantifying events to: all events per person

Cohort Exit

Event persistence:

Event will persist until: end of continuous observation

Censoring Events:

Exit Cohort based on the following criteria:

A death occurrence from Any Death

### Depressive disorders

Cohort Entry Events

Events having any of the following criteria

* a condition occurrence of depressive disorders
  + occurrence start is: Between 2015-12-31 and 2019-12-31

with continuous observations at least 0 days before and 0 days after event index date

Limit initial events to: all events per person

Inclusion Criteria

* Inclusion Criteria #1: Has no prior diagnosis of bipolar disorder
  + Having all of the following criteria:
    - With exactly 0 occurrence of bipolar disorders where event starts between all days before and 1 days before index start date (allow events from outside observation period)
* Inclusion Criteria #2: Has no prior diagnosis of non-affective psychoses
  + Having all of the following criteria:
    - With exactly 0 occurrence of non-affective psychoses where event starts between all days before and 1 days before index start date (allow events from outside observation period)
* Inclusion Criteria #3: Has no prior diagnosis of dementia
  + Having all of the following criteria:
    - With exactly 0 occurrence of dementia where event starts between all days before and 1 days before index start date (allow events from outside observation period)
* Inclusion Criteria #4: Has no prior anti-dementia drug exposures
  + Having all of the following criteria:
    - With exactly 0 occurrence of non-affective psychoses where event starts between all days before and 1 days before index start date (allow events from outside observation period)
* Limit quantifying events to: all events per person

Cohort Exit

Event persistence:

Event will persist until: end of continuous observation

Censoring Events:

Exit Cohort based on the following criteria:

A death occurrence from Any Death

### Bipolar disorders

Cohort Entry Events

Events having any of the following criteria

* a condition occurrence of bipolar disorders
  + occurrence start is: Between 2015-12-31 and 2019-12-31

with continuous observations at least 0 days before and 0 days after event index date

Limit initial events to: all events per person

Inclusion Criteria

nil

Cohort Exit

Event persistence:

Event will persist until: end of continuous observation

Censoring Events:

Exit Cohort based on the following criteria:

A death occurrence from Any Death

### Non-affective psychoses

Cohort Entry Events

Events having any of the following criteria

* a condition occurrence of non-affective psychoses
  + occurrence start is: Between 2015-12-31 and 2019-12-31

with continuous observations at least 0 days before and 0 days after event index date

Limit initial events to: all events per person

Inclusion Criteria

nil

Cohort Exit

Event persistence:

Event will persist until: end of continuous observation

Censoring Events:

Exit Cohort based on the following criteria:

A death occurrence from Any Death

### Personality disorders

Cohort Entry Events

Events having any of the following criteria

* a condition occurrence of personality disorders
  + occurrence start is: Between 2015-12-31 and 2019-12-31

with continuous observations at least 0 days before and 0 days after event index date

Limit initial events to: all events per person

Inclusion Criteria

nil

Cohort Exit

Event persistence:

Event will persist until: end of continuous observation

Censoring Events:

Exit Cohort based on the following criteria:

A death occurrence from Any Death

### Alcohol misuse or dependence

Cohort Entry Events

Events having any of the following criteria

* a condition occurrence of alcohol misuse or dependence
  + occurrence start is: Between 2015-12-31 and 2019-12-31

with continuous observations at least 0 days before and 0 days after event index date

Limit initial events to: all events per person

Inclusion Criteria

nil

Cohort Exit

Event persistence:

Event will persist until: end of continuous observation

Censoring Events:

Exit Cohort based on the following criteria:

A death occurrence from Any Death

### Substance misuse or dependence

Cohort Entry Events

Events having any of the following criteria

* a condition occurrence of substance misuse or dependence
  + occurrence start is: Between 2015-12-31 and 2019-12-31

with continuous observations at least 0 days before and 0 days after event index date

Limit initial events to: all events per person

Inclusion Criteria

nil

Cohort Exit

Event persistence:

Event will persist until: end of continuous observation

Censoring Events:

Exit Cohort based on the following criteria:

A death occurrence from Any Death

### Dementia

Cohort Entry Events

Events having any of the following criteria

* a condition occurrence of dementia
  + occurrence start is: Between 2015-12-31 and 2019-12-31
* a drug exposure of anti-dementia
  + occurrence start is: Between 2015-12-31 and 2019-12-31

with continuous observations at least 0 days before and 0 days after event index date

Limit initial events to: all events per person

Inclusion Criteria

* Inclusion Criteria #1: Has no prior diagnosis of HIV
  + Having all of the following criteria:
    - With exactly 0 occurrence of HIV where event starts between all days before and 1 days before index start date (allow events from outside observation period)
* Inclusion Criteria #2: Has no prior diagnosis of dementia due to Pick’s disease
  + Having all of the following criteria:
    - With exactly 0 occurrence dementia due to Pick’s disease where event starts between all days before and 1 days before index start date (allow events from outside observation period)
* Inclusion Criteria #3: Has no prior diagnosis of dementia due to Huntington chore
  + Having all of the following criteria:
    - With exactly 0 occurrence of dementia due to Huntington chore where event starts between all days before and 1 days before index start date (allow events from outside observation period)
* Inclusion Criteria #4: Has no prior diagnosis of Parkinson’s disease
  + Having all of the following criteria:
    - With exactly 0 occurrence of Parkinson’s disease where event starts between all days before and 1 days before index start date (allow events from outside observation period)
* Limit quantifying events to: all events per person

Cohort Exit

Event persistence:

Event will persist until: end of continuous observation

Censoring Events:

Exit Cohort based on the following criteria:

A death occurrence from Any Death

### ADHD

Cohort Entry Events

Events having any of the following criteria

* a condition occurrence of ADHD
  + occurrence start is: Between 2015-12-31 and 2019-12-31
* a drug exposure of ADHD medications
  + occurrence start is: Between 2015-12-31 and 2019-12-31

with continuous observations at least 0 days before and 0 days after event index date

Limit initial events to: all events per person

Inclusion Criteria

nil

Cohort Exit

Event persistence:

Event will persist until: end of continuous observation

Censoring Events:

Exit Cohort based on the following criteria:

A death occurrence from Any Death

### Neurodevelopmental disorder

Cohort Entry Events

Events having any of the following criteria

* a condition occurrence of neurodevelopmental disorders
  + occurrence start is: Between 2015-12-31 and 2019-12-31

with continuous observations at least 0 days before and 0 days after event index date

Limit initial events to: all events per person

Inclusion Criteria

nil

Cohort Exit

Event persistence:

Event will persist until: end of continuous observation

Censoring Events:

Exit Cohort based on the following criteria:

A death occurrence from Any Death

# Data Analysis Plan

For each of the ten cohorts, person time of follow-up is calculated for each subject, stratified by calendar year and age group. Age will be assessed on a day-by-day basis, and grouped as <18, 18-24, 25-44, 45-64, 65-74, 75-84, 85+ years. For the ADHD and neurodevelopmental disorder cohort, age will be groups as <6, 6-11 years, and 12-17 years.

For the second objective, we are going to use the person count of each cohort as the denominator to calculate the prevalence rates. If a person was observed for at least one day in an age group, that person will be counted in the denominator for that category. Over the study period, and within a calendar year/month, a person can contribute to more than one age category and more than one cohort.

# Strengths and Limitations of the Research Methods

Strengths

To our knowledge, this will be the largest study that include collaborators from countries and regions with different levels of COVID-19 infection officially reported and covered by media. Clinical trials will not be sufficient to answer the questions on the medium- and long-term outcomes of patients with COVID-19 and population mental health. The application of epidemiological and statistical techniques using large clinical and administrative records is the only viable option. The study will be able to generate a spectrum of evidence addressing the COVID-19 related impact on mental health from a global perspective.

Limitations

Due to the observational nature of the study, we cannot exclude the possibility of residual confounding factors. To overcome this potential limitation, all known confounding variables for which there is adequate information available will be included in the study.

# Protection of Human Subjects

This study will only use de-identified patient data which will not involve any direct contact or primary collection of individual human subject data. The study results will be aggregated and presented in tabular form that omits subject identification. Any publications will not include subject identifiers. Cells with patient counts <5 will be masked to prevent unintentional disclosure of patient identity.

# Management and Reporting of Adverse Events and Adverse Reactions

There is no potential to collect adverse events or adverse reactions during the conduct of this research, as the minimum criteria needed to report adverse events (e.g. an identifiable patient) are not available in any databases.

# Plans for Disseminating and Communicating Study Results

The study results will be made available in the OHDSI website after completion of the study. We intend to publish our findings in a peer reviewed journal as well as to present them at relevant scientific conferences.

# References

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2. Baig AM, Khaleeq A, Ali U, Syeda H. Evidence of the COVID-19 Virus Targeting the CNS: Tissue Distribution, Host-Virus Interaction, and Proposed Neurotropic Mechanisms. *ACS Chem Neurosci* 2020; **11**(7): 995-8.

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6. Lee J. Mental health effects of school closures during COVID-19. *Lancet Child Adolesc Health* 2020; **4**(6): 421.

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# Appendix 1

## Concept sets

### Anxiety disorders

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Concept Id | Concept Name | Domain | Vocabulary | Excluded | Descendants |
| 440985 | Phobia | Condition | SNOMED | NO | YES |
| 442077 | Anxiety disorder | Condition | SNOMED | NO | YES |
| 4008683 | Anxiety neurosis | Condition | SNOMED | NO | YES |
| 4012101 | Nosophobia | Condition | SNOMED | NO | YES |
| 4058397 | Claustrophobia | Condition | SNOMED | NO | YES |
| 4087190 | Performance anxiety | Condition | SNOMED | NO | YES |
| 4102977 | Disturbance of anxiety and fearfulness in childhood and adolescence | Condition | SNOMED | NO | YES |
| 4103273 | Recurrent anxiety | Condition | SNOMED | NO | YES |
| 4112929 | Parasitophobia | Condition | SNOMED | NO | YES |
| 4114006 | Parental anxiety | Observation | SNOMED | NO | YES |
| 4155074 | School phobia | Condition | SNOMED | NO | YES |
| 4209114 | Phonophobia | Condition | SNOMED | NO | YES |
| 4214746 | Severe anxiety | Condition | SNOMED | NO | YES |
| 4261239 | Anticipatory anxiety | Condition | SNOMED | NO | YES |
| 4263429 | Moderate anxiety | Condition | SNOMED | NO | YES |
| 4322025 | Mild anxiety | Condition | SNOMED | NO | YES |
| 4332995 | Needle phobia | Condition | SNOMED | NO | YES |
| 4338032 | Anxiety hysteria | Condition | SNOMED | NO | YES |
| 42538968 | Anxiety in pregnancy | Condition | SNOMED | NO | YES |

### Depressive disorders

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Concept Id | Concept Name | Domain | Vocabulary | Excluded | Descendants | Mapped |
| 440383 | Depressive disorder | Condition | SNOMED | NO | YES | NO |
| 2106304 | Major depressive disorder, mild (MDD) | Observation | CPT4 | NO | YES | NO |
| 2106305 | Major depressive disorder, moderate (MDD) | Observation | CPT4 | NO | YES | NO |
| 2106310 | Major depressive disorder, severe without psychotic features (MDD) | Observation | CPT4 | NO | YES | NO |
| 2106322 | Major depressive disorder, severe with psychotic features (MDD) | Observation | CPT4 | NO | YES | NO |
| 4114513 | Depression - motion | Observation | SNOMED | NO | YES | NO |
| 4295031 | Depression management program | Observation | SNOMED | NO | YES | NO |

### Bipolar disorder and drugs

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Concept Id | Concept Name | Domain | Vocabulary | Excluded | Descendants | Mapped |
| 436665 | Bipolar disorder | Condition | SNOMED | NO | YES | NO |
| 4128935 | Bipolar | Observation | SNOMED | NO | YES | NO |
| 751246 | lithium carbonate | Drug | RxNorm | NO | YES | NO |
| 767410 | lithium citrate | Drug | RxNorm | NO | YES | NO |
| 4147954 | On lithium | Observation | SNOMED | NO | YES | NO |
| 19071904 | lithium succinate | Drug | RxNorm | NO | YES | NO |
| 19071905 | lithium sulfate | Drug | RxNorm | NO | YES | NO |
| 19113039 | lithium acetate | Drug | RxNorm | NO | YES | NO |
| 19124477 | lithium | Drug | RxNorm | NO | YES | NO |
| 19127669 | lithium aspartate | Drug | RxNorm | NO | YES | NO |

### Non-affective psychoses

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Concept Id | Concept Name | Domain | Vocabulary | Excluded | Descendants | Mapped |
| 375229 | Organic delusional disorder | Condition | SNOMED | NO | YES | NO |
| 432590 | Delusional disorder | Condition | SNOMED | NO | YES | NO |
| 436073 | Psychotic disorder | Condition | SNOMED | NO | YES | NO |
| 439706 | Psychosis with origin in childhood | Condition | SNOMED | NO | YES | NO |
| 4168389 | Borderline schizophrenia | Condition | SNOMED | NO | YES | NO |
| 40480415 | Affective psychosis | Condition | SNOMED | YES | YES | NO |
| 44805667 | [X]Paranoid state in remission | Condition | SNOMED | NO | YES | NO |

### Personality disorders

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Concept Id | Concept Name | Domain | Vocabulary | Excluded | Descendants | Mapped |
| 441838 | Personality disorder | Condition | SNOMED | NO | YES | NO |

### Alcohol misuse and dependence

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Concept Id | Concept Name | Domain | Vocabulary | Excluded | Descendants | Mapped |
| 378726 | Dementia associated with alcoholism | Condition | SNOMED | NO | YES | NO |
| 432609 | Acute alcoholic intoxication in remission, in alcoholism | Condition | SNOMED | NO | YES | NO |
| 433735 | Acute alcoholic intoxication in alcoholism | Condition | SNOMED | NO | YES | NO |
| 433753 | Alcohol abuse | Condition | SNOMED | NO | YES | NO |
| 435243 | Alcohol dependence | Condition | SNOMED | NO | YES | NO |
| 435532 | Episodic chronic alcoholism | Condition | SNOMED | NO | YES | NO |
| 436953 | Continuous chronic alcoholism | Condition | SNOMED | NO | YES | NO |
| 439005 | Chronic alcoholism in remission | Condition | SNOMED | NO | YES | NO |
| 4218106 | Alcoholism | Condition | SNOMED | NO | YES | NO |
| 4275257 | Detoxication psychiatric therapy for alcoholism | Procedure | SNOMED | NO | YES | NO |
| 4296409 | Substance use treatment: alcohol withdrawal | Procedure | SNOMED | NO | YES | NO |
| 44788279 | Alcohol misuse - enhanced services administration | Observation | SNOMED | NO | YES | NO |
| 44788303 | Alcohol misuse - enhanced service completed | Observation | SNOMED | NO | YES | NO |

### Substance misuse and dependence

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Concept Id | Concept Name | Domain | Vocabulary | Excluded | Descendants | Mapped |
| 440069 | Drug dependence | Condition | SNOMED | NO | YES | NO |
| 440787 | Drug dependence in mother complicating pregnancy, childbirth AND/OR puerperium | Condition | SNOMED | NO | YES | NO |
| 443274 | Psychostimulant dependence | Condition | SNOMED | NO | YES | NO |
| 4004672 | Psychoactive substance use disorder | Condition | SNOMED | NO | YES | NO |
| 4217840 | Substance misuse behavior | Condition | SNOMED | NO | YES | NO |
| 4219382 | Persistent substance misuse | Condition | SNOMED | NO | YES | NO |
| 4279309 | Substance abuse | Condition | SNOMED | NO | YES | NO |
| 4319165 | Therapeutic drug dependence | Condition | SNOMED | NO | YES | NO |
| 37116660 | Marijuana user | Condition | SNOMED | NO | YES | NO |
| 37116661 | Cocaine user | Condition | SNOMED | NO | YES | NO |
| 434697 | Maternal tobacco abuse | Observation | SNOMED | NO | YES | NO |
| 4151569 | Drug addiction notification | Observation | SNOMED | NO | YES | NO |
| 4269905 | Referral to drug abuse counselor | Observation | SNOMED | NO | YES | NO |
| 44786481 | Documentation that patient is a current tobacco user | Observation | HCPCS | NO | YES | NO |
| 44787894 | Referral to community drug dependency team | Observation | SNOMED | NO | YES | NO |
| 2796056 | Substance Abuse Treatment, Pharmacotherapy | Procedure | ICD10PCS | NO | YES | NO |
| 4149607 | Drug addiction therapy - methadone | Procedure | SNOMED | NO | YES | NO |
| 4302387 | Substance use treatment: drug withdrawal | Procedure | SNOMED | NO | YES | NO |
| 44790195 | Delivery of rehabilitation for drug addiction | Procedure | SNOMED | NO | YES | NO |
|  |  |  |  |  |  |  |

### Dementia

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Concept Id | Concept Name | Domain | Vocabulary | Excluded | Descendants | Mapped |
| 4043378 | Frontotemporal dementia | Condition | SNOMED | NO | YES | NO |
| 4059191 | H/O: dementia | Observation | SNOMED | NO | YES | NO |
| 4182210 | Dementia | Condition | SNOMED | NO | YES | NO |
| 35610623 | Dementia advance care plan agreed | Observation | SNOMED | NO | YES | NO |
| 42742407 | Functional status for dementia assessed and results reviewed (DEM) | Observation | CPT4 | NO | YES | NO |
| 44782763 | Lewy body dementia with behavioral disturbance | Condition | SNOMED | NO | YES | NO |
| 44790944 | Dementia monitoring | Observation | SNOMED | NO | YES | NO |
| 44804339 | Dementia monitoring invitation | Observation | SNOMED | NO | YES | NO |
| 46284876 | Dementia care plan agreed | Observation | SNOMED | NO | YES | NO |
| 46284877 | Dementia care plan reviewed | Observation | SNOMED | NO | YES | NO |

|  |  |  |  |  |  |  |
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| Concept Id | Concept Name | Domain | Vocabulary | Excluded | Descendants | Mapped |
| 701322 | memantine | Drug | RxNorm | NO | YES | NO |
| 715997 | donepezil | Drug | RxNorm | NO | YES | NO |
| 733523 | rivastigmine | Drug | RxNorm | NO | YES | NO |
| 757627 | galantamine | Drug | RxNorm | NO | YES | NO |
| 836654 | tacrine | Drug | RxNorm | NO | YES | NO |

### ADHD

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Concept Id | Concept Name | Domain | Vocabulary | Excluded | Descendants | Mapped |
| 438409 | Attention deficit hyperactivity disorder | Condition | SNOMED | NO | YES | NO |
| 40480225 | Adult attention deficit hyperactivity disorder | Condition | SNOMED | NO | YES | NO |
| 45765570 | Drug therapy for attention deficit hyperactivity disorder | Procedure | SNOMED | NO | YES | NO |

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| --- | --- | --- | --- | --- | --- | --- |
| Concept Id | Concept Name | Domain | Vocabulary | Excluded | Descendants | Mapped |
| 704053 | methamphetamine | Drug | RxNorm | NO | YES | NO |
| 705944 | methylphenidate | Drug | RxNorm | NO | YES | NO |
| 709567 | lisdexamfetamine | Drug | RxNorm | NO | YES | NO |
| 714785 | amphetamine | Drug | RxNorm | NO | YES | NO |
| 719311 | dextroamphetamine | Drug | RxNorm | NO | YES | NO |
| 731533 | dexmethylphenidate | Drug | RxNorm | NO | YES | NO |
| 742185 | atomoxetine | Drug | RxNorm | NO | YES | NO |
| 4101536 | Methamphetamine measurement | Measurement | SNOMED | NO | YES | NO |
| 4273557 | Amphetamine measurement | Measurement | SNOMED | NO | YES | NO |
| 19026274 | p-hydroxyamphetamine | Drug | RxNorm | NO | YES | NO |
| 36683664 | Exposure to methamphetamine | Observation | SNOMED | NO | YES | NO |

### Neurodevelopmental disorders

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Concept Id | Concept Name | Domain | Vocabulary | Excluded | Descendants | Mapped |
| 442335 | Dyslexia | Condition | SNOMED | NO | YES | NO |
| 4024717 | Dyslexia AND/OR speech dysfunction | Condition | SNOMED | NO | YES | NO |
| 4136053 | Learning disabilities health action plan reviewed | Observation | SNOMED | NO | YES | NO |
| 4165912 | On learning disability register | Observation | SNOMED | NO | YES | NO |
| 40480225 | Adult attention deficit hyperactivity disorder | Condition | SNOMED | NO | YES | NO |
| 40483181 | History of neurodevelopmental disorder | Observation | SNOMED | NO | YES | NO |
| 45765570 | Drug therapy for attention deficit hyperactivity disorder | Procedure | SNOMED | NO | YES | NO |
| 45771096 | Neurodevelopmental disorder | Condition | SNOMED | NO | YES | NO |