Project Specifications

Key Performance Indicators (KPI) Dashboard

A Scalable Framework for Large Organizations to Measure and Track the Impact of Opioid Use Disorder Prevention and Pain Management Strategies

KPI Definitions and Specifications

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Table of Contents

1. Document Purpose

The purpose of this document is to provide an overview of the concepts used in creation of a scalable framework for large organizations to measure and track the impact of opioid use disorder prevention and pain management strategies. This Key Performance Indicators (KPIs) dashboard was constructed in the large, geographically diverse administrative claims database housed within the OptumLabs Data Warehouse using data from 2014 - 2016. This document includes terminology, variable definitions, denominator specifications, and concepts used to create the KPIs.

NB: Throughout this document and in the accompanying data dictionary, ICD9-CM diagnosis codes are used to identify various conditions. While only the ICD9 codes are listed here, the ICD10 equivalents were also used (identified via ICD9/ICD10 crosswalk tables).

NB: The KPIs can be calculated using a calendar year (CY), a rolling 12 months period (R12), or quarterly (QTRLY). This document describes calculation using a CY, easily modified to an R12 approach. Modifications for QTRLY reporting are available on request.

2. Abbreviations

Abbreviation	Definition
“benzo”	Benzodiazepine
CDC	Centers for Disease Control and Prevention
CE	Continuous Enrollment (a period membership in health plan with no breaks in enrollment longer than 30 days)
COMM	Commercial (enrolled in a commercial health plan)
CY	Calendar Year
DD	Data Dictionary
ED	Emergency Department
ER	Extended Release
KPI	Key Performance Indicator
LBP	Low Back Pain
LTC	Long Term Care
MA	Medicare Advantage
MAT	Medication Assisted Therapy
MCH	Maternal and Child Health
MED	Medical, in this context used to indicate medical benefit enrollment
MME	Morphine Milligram Equivalents
NAS	Neonatal Abstinence Syndrome
NDC	National Drug Code (a coding system used to identify medications)
NH	Nursing Home
OD	Overdose
OUD	Opiate Use Disorder
PN	Pain
PV	Prevention

QTRLY	Quarterly
R12	Rolling 12 months period
RX	Prescription, in this context used either to indicate prescriptions and enrollment in a pharmacy benefit plan
SA	Sustained Action
SNF	Skilled Nursing Facility

3. Key Performance Indicators List

	Alpha-Numeric Shorthand[1]	Definition[2]
Domain: Prevention		
Primary[3]	**PV1_0**	Initial opioid is prescribed in compliance with CDC guidelines (composite – true only if all of **PV1_X** are true)
Secondary	**PV1_1**	Initial opioid is prescribed while patient is not exposed to benzodiazepines
Secondary	**PV1_2**	Initial opioid prescription is not for methadone
Secondary	**PV1_3**	Initial opioid prescription is for short acting formulation
Secondary	**PV1_4**	Initial opioid dose is <50MME/day
Secondary	**PV1_5**	Initial opioid is prescribed for <=7 days' supply
Primary	**PV2_0**	New opioid fills per 1000 enrollees
Primary	**PV6_0**	Percentage of new fillers who avoid chronic opioid use
Primary	**OUD2_0**	Cases of OD per 100,000 person-years
Secondary	**PV3_0**	Appropriate physician contact before a 2nd opioid fill (new opioid fillers only)
Secondary	**PV5_0**	No use of opioids to treat new-onset low back pain (LBP)
Secondary	**OUD5_0**	No concurrent opioid and benzodiazepine use
Domain: Pain Management		
Primary	**PN1_0**	Chronic opioid use is well-managed (composite – true only if all of **PN1_X** are true)
Secondary	**PN1_1**	Appropriate frequency of contact with provider while chronic opioid user
Secondary	**PN1_2**	No Emergency Department (ED) visit for breakthrough pain
Secondary	**PN1_4**	Evidence of non-opioid pharmacological treatments for pain
Secondary	**PN1_5**	Evidence of non-pharmacological treatments for pain

Primary	**PN2_0**	Post-surgical pain is well-managed
Domain: Opioid Use Disorder Treatment		
Primary	**PV4_0**	Cases of opioid use disorder (OUD) per 1,000 person-years
Primary	**OUD1_0**	Evidence of medication assisted therapy (MAT) among patients with OUD or OD
Secondary	**OUD3_0**	Evidence of MAT following OD
Secondary	**OUD6_0**	Evidence of naloxone fills among patients with OUD or OD
Secondary	**OUD7_0**	No opioid prescription fills following OUD or OD diagnosis
Domain: Maternal & Child Health		
Primary	**MCH6_0**	Cases of OD per 100,000 person-years among enrollees <18
Primary	**MCH7_0**	Initial opioid is prescribed in compliance with CDC guidelines (composite – true only if all of **PV1_X** are true) – enrollees <18
Primary	**MCH8_0**	Percentage of infants with NAS born to mothers on MAT
Secondary	**MCH1_0**	Cases of neonatal abstinence syndrome (NAS) per 1000 live births
Secondary	**MCH4_0**	New opioid fills per 1,000 enrollees <18
Secondary	**MCH5_0**	Cases of OUD per 1,000 person-years among enrollees <18

[1]Note that in the course of dashboard finalization, some measures originally included were removed and some measures were shifted to different domains. Alpha-numeric short hand names tie back to programmer specifications, therefore these shorthand names were retained in their original form. This explains why, for example, OUD2_0 falls in the prevention domain. [2]Unless otherwise specified, measures were created for members age >=18 years. [3]Measures are classified as primary or secondary. Primary measures appear on the main dashboard pages; secondary measures appear on detail level pages.

4. Base Population

The base population includes all subjects who meet the criteria below. Each KPI is applied to a population denominator which is drawn from the base population.

Plan enrollees are included in the base population if they meet all of the following criteria:

- Commercial or Medicare Advantage enrollee
- Qualify for denominator population (unique to each measure)
- Age 18 and older, except for measures specified as relating to maternal and child health.

Plan enrollees are excluded from the base population if they meet any of the following criteria:

- Unknown or conflicting gender or year of birth
- Evidence of malignant cancer, chemotherapy, or radiation during the calendar year (CY) of the dashboard
- In hospice or palliative care, long term care (LTC), skilled nursing facility (SNF), nursing home care (medication delivery in these settings is not fully visible in claims):
    - Hospice includes any hospice claims in CY
    - Palliative care includes any claims for palliative care in CY
    - LTC, NH, SNF is defined as >= 90 days (not necessarily contiguous) in SNF, NH, or other LTC facility

5. Denominators

The variables defined below are required to create necessary denominators (See Table 1):

- **New Opioid RX in calendar year:** Evidence of a new opioid prescription in the CY is defined as no opioid RXs in the 12 months prior to the earliest occurring opioid RX in the CY.
- **At least 2 opioid fill dates in year of interest**: Enrollees with at least 2 opioid prescriptions fill dates during the CY (prescriptions can be of same or different strengths, generic name, formulation).
- **Denominator for Concurrent benzo & opioid use (OUD5_0).** The denominator for OUD5_0 includes individuals with a minimum level of opioid use defined as:
    - **a)** CE in RX AND MED plan during CY of interest; AND
    - **b)** 2 or more opioid fill dates during CY of interest); AND
    - **c)** Total days' supply >=15 from all opioid claims filled in calendar year. If two RXs are filled on the same date, only days' supply from one claim, the claim with the longest days' supply, was used

Table 1. Measure Definitions

Alpha-Numeric Shorthand	Definition	Denominator[1]	Numerator
PV1_X	Initial opioid is prescribed in compliance with CDC guidelines (composite)	• CE in MED and RX in CY • New opioid RX in CY • 12 months of RX CE prior to earliest opioid claim in CY	• New opioid Rx where o Not for methadone o **And** for short-acting formulation o **And** < 50 MME per day o **And** <= 7 days' supply o **And** patient not on prior benzodiazepine use
PV2_0	New opioid fills per 1000 enrollees	• CE in MED and RX in CY • CE in RX in the 12 month prior to CY of interest	• New opioid Rx in CY
PV6_0	Percentage of new fillers who avoid chronic opioid use	• CE in MED and RX in CY • New opioid RX in Q1 of CY • 12 months of RX CE prior to and following earliest opioid claim in CY	• New opioid users who do not transition to chronic use
OUD2_0	Cases of OD per 100,000 person-years	• All members of base population	• OD in CY of interest
PV3_0	Appropriate physician contact before a 2nd opioid fill (new opioid fillers only)	• CE in MED and RX in CY • New opioid RX in CY • 12 months of RX CE prior to earliest opioid claim in CY • At least 2 opioid fill dates in CY	• Appropriate physician contact before a 2nd opioid fill

PV5_0	No use of opioids to treat new-onset low back pain (LBP)	• CE in MED and RX in CY • New LPB in CY (see section 2.3.2 below) • CE in MED and RX in 6 months prior to evidence of new LBP • No opioid RX in 6 months prior to new LBP	• No opioid fill following new-onset of low back pain (LBP)
OUD5_0	No concurrent opioid and benzodiazepine use	• CE in MED and RX in CY • At least 2 opioid fill dates in CY • Total days' supply from RX claims >=15 days in the CY	• No concurrent opioid and benzodiazepine use (< 30 days of overlap)
PN1_X	Chronic opioid use is well-managed (composite – true only if all of **PN1_X** are true)	• CE in MED and RX in CY • Meet definition of chronic opioid use in CY (see section 2.3.1, below)	• Chronic opioid use where: o Appropriate contact with provider o **And** no ER visit for breakthrough pain o **And** evidence of non-opioid pharmacological treatment for pain o **And** evidence of non-pharmacological treatment for pain
PN2_0	Post-surgical pain is well-managed	• Among enrollees with CE in MED and RX in CY: • Total number of inpatient confinements with at least one qualifying surgery	• No evidence of opioid claim and ER visits following discharge
PV4_0	Cases of opioid use disorder	• All members of base population	• OUD in CY of interest

	(OUD) per 1,000 person-years		
OUD1_0	Evidence of medication assisted therapy (MAT) among patients with OUD or OD	• CE in RX and MED in CY • OUD or OD in CY of interest	• Evidence of MAT in CY of interest
OUD3_0	Evidence of MAT following OD	• CE in RX and MED in CY • OD in CY of interest	• Evidence of MAT following OD diagnosis
OUD6_0	Evidence of naloxone fills among patients with OUD or OD	• CE in RX and MED in CY • OUD or OD in CY of interest	• Evidence of naloxone in CY of interest
OUD7_0	No opioid prescription fills following OUD or OD diagnosis	• CE in RX and MED in CY • OUD or OD in CY of interest	• No opioid fill following OUD or OD diagnosis
MCH6_0	Cases of OD per 100,000 person-years among enrollees <18	• All members of base population <18 yrs	• OD in CY of interest
MCH7_0	Initial opioid is prescribed in compliance with CDC guidelines (composite) – enrollees <18	• CE in MED and RX in CY • New opioid RX in CY • 12 months of RX CE prior to earliest opioid claim in CY • Member <18 yrs	• New opioid Rx where o Not for methadone o **And** for short-acting formulation o **And** < 50 MME per day o **And** <= 7 days' supply • And patient not on prior benzodiazepine
MCH8_0	Percentage of infants with NAS born to mothers on MAT	• Number of eligible NAS deliveries in CY • Mothers with Rx coverage 6 months prior to delivery	• Evidence of MAT of mothers of babies born with NAS

MCH1_0	Cases of neonatal abstinence syndrome (NAS) per 1000 live births	• Total live births in CY	• Evidence of NAS in IP after deliveries
MCH4_0	New opioid fills per 1,000 enrollees <18	• All members of base population <18 yrs	• New opioid Rx in CY of interest
MCH5_0	Cases of OUD per 1,000 person-years among enrollees <18	• All members of base population <18 yrs	• OUD in CY of interest

[1]Unless otherwise specified, denominators include only members >=18 yrs.

5.1. Subpopulations of Interest

5.1.1. Chronic Opioid Users

Chronic opioid users are defined based on definitions used in the CONSORT study and cited by Hooten et al (2015) from the Mayo Educational Foundation.[1]

Patients are defined as chronic opioid users if they meet the following criteria during a 1 year period:

1) The patient has sum total days' supply for opioids >=90 days; AND
2) One of the following two criteria are met:
    a. Sum total days' supply for opioids >=120 days; OR
    b. >=10 prescription fills

Note: If a patient filled 2 opioid prescriptions on the same date, only one prescription for the days' supply calculation (the prescription with the longest days' supply) was used. However, if a patient filled 2 RXs on the same date, this counted as 2 RXs in the prescription fill count component.

5.1.2. New Low Back Pain (LBP) Denominator

Measure PV5_0 examines new prescribing of opioids among patients with new onset low back pain (LBP). This measure requires a cohort of patients with new onset LBP who have not been treated in the recent past with opioids.

Patients qualified for the denominator of this measure if they met all of the following criteria:

a) Had any diagnosis codes for LBP *in the primary position* in CY; AND
b) Had no evidence of claims *with LBP codes in any position* during the six months prior to the earliest LBP claim identified in (a)*; AND*
c) Had no evidence of opioid use in the 6 months prior to the earliest LBP identified in (a).

5.1.3. Surgical Pain Management Denominator

The KPI: "Surgical Pain is Well-Managed" (PN3_0) was assessed at the confinement level, among patients with at least one qualifying surgical confinement.

Patients may have had multiple qualifying surgical confinements. All qualifying confinements were captured and events of interest were identified in relation to all confinements. This measure is at the confinement level. To qualify for the denominator, the discharge was required to occur within the year of interest.

[1] Hooten, WM et al. Incidence and Risk Factors for Progression from Short Term to Episodic or Long-Term Opioid Prescribing: A Population Based Study. *Mayo Clin Proc.* 2015:90(7): 850 – 856.

6. Variables

6.1. Characteristics of Opioid Claims

- **Morphine Milligram Equivalents** (MME): Using MME conversion factor provided CDC, calculation of morphine milligram equivalents per day calculated as follows[2]:

$$MME\ per\ day = Strength\ per\ Unit\ * \frac{Number\ of\ Units}{Days\ Supply} * MME\ conversion\ factor$$

- **"New Opioid Claim"**: See above (under denominators).
- **"2nd Opioid Claim"** Enrollees were defined as having a 2nd opioid claim in the CY of interest if they had a second fill for an opioid (any type, not necessarily same type, dosage form, or strength as the initial claim) in the CY of interest. In order to qualify as a 2nd opioid claim, this claim must have had a fill date different (and later) than the fill date of the initial opioid claim.
- **Initial opioid claim is for short-acting formulation** New opioid users should start on short acting opioid formulations to be compliant with CDC recommendations. In the DD, Short Acting is abbreviated "SA" and long acting is abbreviated "LA".

  A patient is compliant with the measure PV1_3 (new opioid claim is for SA opioid), if both of the following are met:

  a) The opioid filled on the new fill date is for an SA formulation; AND

  b) The patient does NOT have a fill for an LA opioid on the same date (the new fill date)

- **Initial Opioid Prescribed Concurrent with Benzodiazepine Use:** The initial opioid prescription was considered to be prescribed concurrent with benzodiazepines in CY if the following criteria was met:

  Any benzo claim filled during 6 months prior to new opioid had a days' supply which overlapped with the 30 day period prior to and including the date of the initial opioid fill.

  Note that this measure is used as a part of the composite measure "initial opioid fill compliant with CDC recommendations," which required patients to have CE in their RX benefit prior to the CY. No benzo fills that were prior to the start of the CY were missed because enrollees subject to this measure were RX enrollment for the 12 months prior to their initial opioid fill date.

  Note the benzos were identified from RX claims only.

[2] National Center for Injury Prevention and Control. CDC compilation of benzodiazepines, muscle relaxants, stimulants, zolpidem, and opioid analgesics with oral morphine milligram equivalent conversion factors, 2016 version. Atlanta, GA: Centers for Disease Control and Prevention; 2016. Available at http://www.pdmpassist.org/pdf/BJA_performance_measure_aid_MME_conversion.pdf.

- **Days' Supply From Initial Opioid Claim** Measures PV1_5 includes assessment of days' supply from the first opioid claim for new opioid users. If patients had more than one opioid claim on the same date with different days' supplied amounts, the longest days' supply was used. This is true regardless of whether the NDCs from these claims were the same or different. (Multiple opioid fills on the same date was extremely infrequent, particularly when only the initial fill/fill date was considered.)
- **Concurrent Users of Opioids and Benzos** OUD5_0 looks for any concurrent benzo and opioid use. We adapted our measure from a definition developed by PQA. Patients qualified for this measure if they qualified for the denominator for this measure (described above), and also had:

  a) >= 2 benzo RXs filled on at least two different fill dates during the CY; AND

  b) Days' supply from benzo and opioid claims that overlapped by >=30 days. Overlap days did not have to be consecutive

  When constructing days of overlap, if a patient had 2 or more claims for opioids or benzos on the same date, only one claim (the one with the longest days' supply) was used.

6.2. Opioid Use & Pain Management Variables

- **"Contact" with a physician**;

  A physician office and telemedicine contact was defined as follows:

  - Physician office visit: claims with the following AMA site codes: 11, 26, 50, 53, 71 or 72
  - Outpatient: claims with the following AMA sites codes: 22, 24, 25, 62, or 65
  - Telemedicine visit: claims with the following CPT/HCPCS codes: G0425-G0427, G0406-G0408, 99201-99215, 99231-99233, 99307-99310, G0420, G0421, G0108, G0109, 96150-96154, 90832-90834, 90836-90838, G0459, 90791, 90792, 90951, 90952, 90954, 90955, 90957, 90958, 90960, 90961, 90963, 90964, 90965, 90966, 97802–97804, G0270, 96116, G0436, G0437, 99406, 99407, G0396, G0397, G0442, G0443, G0444, G0445, G0446, G0447, 99495, 99496, 90845, 90846, 90847, 99354, 99355, 99356, 99357, G0438, G0439 ***and*** corresponding "GT" modifier

  The total number contacts with physician (either telemedicine or in office) during CY was counted, counting a maximum of one visit per day, regardless of type (office or telemedicine) or provider. Therefore, for this count is actually "physician contact days" and the maximum value is 365, minimum value is = 0.

- **"Appropriate Contact" with provider (new opioid users, prior to 2nd opioid claim)**: For the prevention measure PV3_0, rates of physician contact before a second opioid fill, among those new to opioid therapy, were examined. This measure is only calculated among those new to opioid therapy in CY, and with a second opioid RX on a different and later fill date, during the CY.

  Patients were considered to have appropriate contact with a physician prior to 2nd opioid fill if they met both of the following:

  a) Had a physician contact as defined above during the three days prior to (and including) the fill date of the second claim, inclusive AND

b) Date of contact was after the fill date of the first opioid RX;

- **"Appropriate Contact" with provider (chronic opioid users):** Based on CDC recommendations that opioid use is discussed at least every three months, defined as a ratio of contact with physician to days covered by opioid that is greater than or equal to 1 in 90 days (>=0.011).

  Note that this measure is only used among patients with chronic opioid use.

- **ED Visit for Breakthrough Pain (PN1_2)** An emergency department visit for pain was defined as any ED visit with a primary diagnosis code of pain.
- **Opioid RX for Breakthrough Pain Following Surgery (PN2_0):** Patients were defined as having an opioid claim for breakthrough pain following surgery if they met the following criteria:
  1) At least one qualifying ED or urgent care visit during the 15 days following discharge from surgery; AND
  2) At least one opioid prescription fill; where the fill date is:
     a. on or after the date of earliest qualifying ED/urgent care visit identified above; **AND**
     b. During the 15 days following discharge from surgery

- **Non-pharmacological treatments for pain**. We looked for evidence of non-pharmacologic pain treatments among patient with evidence of chronic opioid use.

  Non-pharmacological treatments for pain include medical claims with the CPT or HCPC codes identifying non-pharmacologic treatments for pain.

- **Non-opioid pharmacologic treatments for pain (PN1_4)**: We looked for non-opioid pharmacologic treatment among chronic opioid users. Note that most OTC therapies cannot be captured:

  This measure does not account for the timing of these treatments in relation to the opioid claims that qualify the patient as a chronic user. The appearance of the non-opioid pharmacologic treatment was simply identified in the same year that the patient qualified as a chronic opioid user.

  Non-opioid pharmacological treatment was defined as at least one claim for any of the medications with the following generic names or in the following classes:

  - Gabapentin
  - Pregabalin
  - Carbamezapine
  - Tricyclic antidepressants
  - Duloxetine
  - Milnacipran
  - Capsaicin

- Lidocaine
- NSAIDs (Non-steroidal anti-inflammatory drugs)

- **New Opioid Treatment for New Onset LBP**. PV5_0 ("No treatment of new onset LBP with opioids") is applied to the population with new low back pain with no evidence of opioids in the 180 days prior to new LBP diagnosis only.

  Patients were considered to have new opioid treatment for new low back pain, if the patient had an opioid claim during *14 days following (including on)* the date of new LPB diagnosis.

6.3. Overdose, Abuse, and Medication Assisted Therapy Variables

- **Evidence of Opioid Overdose**. Evidence of opioid overdose was defined as the appearance of any OD diagnosis codes in any position.
- **Evidence of Opioid Use Disorder**. Evidence of opioid use disorder (OUD) was defined as any OUD diagnosis codes in any position OR evidence of MAT therapy (see below).
- **Medication Assisted Therapy**

  Medication Assisted Therapy (MAT) was identified via three routes:

  1) NDC codes on RX claims
  2) NDC codes on medical claims (where populated)
  3) Procedure codes (J-codes, HCPC, and ICD Proc)

  MAT therapy includes:

  A. Drugs used only in MAT (Buprenorphine (tablets and subdermal implant only), Buprenorphine/naloxone (any formulation), Naltrexone extended release injection (brand name: Vivitrol); AND
  B. Drugs used for other indications, but identified as MAT by dose/dosage form (methadone oral, naltrexone oral)

- **Evidence of MAT among patients with OUD or OD**. Defined as evidence of MAT therapy at any time during the measurement period among patients with OUD (either diagnosis code or MAT claim) or OD. (Patients with MAT therapy appear in both the numerator and the denominator. A single MAT claim may serve as both evidence of MAT and evidence of OUD). No criteria around timing of MAT in relation to the OD or OD claim is required.
- **Evidence of MAT among patients with OD**. Defined as evidence of MAT therapy on or following first diagnosis of OD
- **Evidence of Naloxone among patients with OUD**. Defined as evidence of naloxone on or after the earliest detected OUD claim.

- **Evidence of opioid fill on same date as or following OUD or OD**. Defined as a fill for an opioid not used in MAT therapy on or after the earliest claim for OD or OUD. Note that OUD is defined as presence of qualifying diagnosis code or any MAT therapy.

6.4. Maternal and Child Health Variables

- **Live Births**

  Live births were defined using the following diagnosis codes in any position indicating live births: V270, V272, V275, V276, V273, V279, or V27

  Live births were counted per each inpatient confinement with the diagnosis codes above.

  Note: Cases where the mother had two confinements within one year, both coded as a live births were dropped (~70 of 150,000 live births).

  Note: Confinements with multiple family IDs during the same live birth confinement were also dropped because we could not identify the mother in these cases (~3,000 or 150,000 live births).

- **Neonatal Abstinence Syndrome (NAS)**. Evidence of NAS was defined as any occurrence of ICD9 code 779.5 during an inpatient stay for infants within 30 days of delivery of date.
- **Babies born with NAS to mothers on MAT treatment** The denominator for this measure includes only NAS deliveries where the mother had 180 days of RX coverage prior to the birth. This pre-birth RX coverage from the mother is NOT required for MCH1_0.

  A baby born with NAS was defined as being born to a mother on MAT if the mother had evidence of MAT therapy during the 180 days prior to the date of birth, NOT including claims that appear during the delivery confinement.