# Sample Selection:

Starting from MarketScan Medicaid dataset, we selected enrollees who has a clean period in 2013, meaning that the selected enrollee does not have an opioid RX during last 6 months of 2013.

Specifically, RX is a lists of code sets (icd9 and icd10) for or related to Opioid User Disorder.

In addition, the selected enrollee:

* Must have 11+ months of eligibility in each year from 2013 from 2016
* Must be 12+ years old as start of Measurement Year 2014 (1/1/2014)
* All members in Pharmacy, Medical Claims and Admissions will have an eligibility record for each year

# Training/Testing Set Selection:

Starting from the pre-selected enrollees mentioned above in the ‘Sample Selection’ section, we queried all relevant variables from MarketScan Medicaid data of year 2014, 2015 and 2016 based on their enrollment ID (enrolid).

The variables, including both native and engineered, are listed below by segment :

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| **Eligibility: Members** | |
| Dataset: elig13\_16\_1 | |
| Variable | Notes |
| client | client + enrolid = unique ID |
| enrolid |
| age | age as of 1.1.14 |
| sex | sex as of 1.1.16 |
| recipzip | 3-digit zip as of 1.1.16 |
| stdrace | race as of 1.1.16 |
| msa | msa as of 1.1.16 |
| recipcty | county as of 1.1.16 |
| recipgeoloc | state as of 1.1.16 |
| rural | rural as of 1.1.16 |
| enrmon13 | # of months of enrollment in 2013; 11 or 12 |
| enrmon14 | # of months of enrollment in 2014; 11 or 12 |
| enrmon15 | # of months of enrollment in 2015; 11 or 12 |
| enrmon16 | # of months of enrollment in 2016; 11 or 12 |

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| **Medical (Inpatient + Outpatient): Claims** | |
| Datasets: med14, med5, med16 | |
| Variable | Notes |
| adv | Diagnosis of Adverse Affects due to Opioids |
| cancer | Diagnosis of Cancer (see subcategories used) |
| death | Discharge Status of Expired |
| hospice | Procedure or Revenue Code for Hospice |
| hx\_neo | Diagnosis of History of Malignant Neoplasm (one of the cancer criteria) |
| ip\_op | Inpatient/Outpatient Flag: IP/OP |
| mal\_neo | Diagnosis of Malignant Neoplasm (one of the cancer criteria) |
| mh | Diagnosis of Mental Health Disorder |
| morphine | Procedure Code for Morphine Injection |
| nas | Diagnosis of Neonatal Abstinence Syndrome in Infant (Neonatal Withdrawal) |
| nas\_mom | Diagnosis of Neonatal Abstinence Syndrome in Mother (Newborn Affected by Mother's Drug Use) |
| od | Overdose due to Opioids (Poisoning, Accidental Poisoning) |
| oth\_neo | Diagnosis of Other Malignant Neoplasms (one of the cancer criteria) |
| oud | Opioid Use Disorder (Dependence, Use, Abuse) |
| oudr | Opioid Use Disorder in Remission |
| sud | Substance Use Disorder (non-opioid) |
| treat | Substance Abuse Treatment (Pharmacotherapy, Med Mgmt) Opioid/Other Drugs Proc Code |
| treat\_rx | Injection of Naloxone or Buprenorphine to Treat Opioid Addiction |
| ed | ED visit via CPT/revenue code |
| pcp | PCP (stdprov = MD, Osteopath, Int Med, Multi-Spec, Fam Pract, Geriatric, Ped, Ped Spec, NP, PA) |
| new\_user\_dt | First opioid Rx date in 2014 (no Rx prior 180d); excl removed (hospice/cancer); else missing |
| client | client + enrolid = unique ID |
| enrolid |
| age | age as of svcdate |
| sex | sex as of svcdate |
| svcdate | First date of service |
| tsvcdat | Last date of service |
| stdprov | Provider type |
| stdrace | race as of svcdate |
| rural | rural as of 1.1.16 |
| enrmon13 | # of months of enrollment in 2013; 11 or 12 |
| enrmon14 | # of months of enrollment in 2014; 11 or 12 |
| enrmon15 | # of months of enrollment in 2015; 11 or 12 |
| enrmon16 | # of months of enrollment in 2016; 11 or 12 |

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| **Medical (Inpatient + Outpatient): Members** | |
| Datasets: med14, med15, med16 | |
| Variable | Notes |
| adv | 1+ Diagnosis of Adverse Affects due to Opioids during year |
| cancer | 1+ Diagnosis of Cancer during year |
| death | 1+ Discharge Status of Expired during year |
| hospice | 1+ Procedure or Revenue Code for Hospice during year |
| mh | 1+ Diagnosis of Mental Health Disorder during year |
| morphine | 1+ Procedure Code for Morphine Injection during year |
| nas | 1+ Diagnosis of Neonatal Abstinence Syndrome in Infant (Neonatal Withdrawal) during year |
| nas\_mom | 1+ Dx of Neonatal Abs Syn in Mom (Newborn Affected by Mom's Drug Use) during year |
| od | 1+ Overdose due to Opioids (Poisoning, Accidental Poisoning) during year |
| oud | 1+ Opioid Use Disorder (Dependence, Use, Abuse) during year |
| oudr | 1+ Opioid Use Disorder in Remission during year |
| sud | 1+ Substance Use Disorder (non-opioid) during year |
| treat | 1+ Subst Abuse Trmt (Pharmacotherapy, Med Mgmt) Opioid/Other Drugs Proc during year |
| treat\_rx | 1+ Injection of Naloxone or Buprenorphine to Treat Opioid Addiction during year |
| ed | 1+ ED visit during year |
| pcp | 1+ visit to PCP during year |
| new\_user\_dt | First opioid Rx date in 2014 (no Rx prior 180d); excl removed (hospice/cancer); else missing |
| client | client + enrolid = unique ID |
| enrolid |
| age | age as of svcdate |
| sex | sex as of last claim |
| stdrace | race as of 1.1.16 |
| rural | rural as of 1.1.16 |
| enrmon13 | # of months of enrollment in 2013; 11 or 12 |
| enrmon14 | # of months of enrollment in 2014; 11 or 12 |
| enrmon15 | # of months of enrollment in 2015; 11 or 12 |
| enrmon16 | # of months of enrollment in 2016; 11 or 12 |

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| **Admission: Admissions** | |
| Datasets: adm14, adm15, adm16 | |
| Variable | Notes |
| treat | ICD10 procedure for therapy for substance (opioid) abuse |
| client | client + enrolid = unique ID |
| enrolid |
| age | age as of svcdate |
| sex | sex as of svcdate |
| svcdate | First date of service |
| admdate | admission date |
| disdate | discharge date |
| stdrace | race as of svcdate |
| rural | rural as of svcdate |
| enrmon13 | # of months of enrollment in 2013; 11 or 12 |
| enrmon14 | # of months of enrollment in 2014; 11 or 12 |
| enrmon15 | # of months of enrollment in 2015; 11 or 12 |
| enrmon16 | # of months of enrollment in 2016; 11 or 12 |

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| **Admission: Members** | |
| Datasets: adm14\_1, adm15\_1, adm16\_1 | |
| Variable | Notes |
| treat1 | 1+ procedures for substance (opioid) abuse during year |
| client | client + enrolid = unique ID |
| enrolid |
| age | age as of last admission |
| sex | sex as of last admission |
| stdrace | race as of 1.1.16 |
| rural | rural as of 1.1.16 |
| enrmon13 | # of months of enrollment in 2013; 11 or 12 |
| enrmon14 | # of months of enrollment in 2014; 11 or 12 |
| enrmon15 | # of months of enrollment in 2015; 11 or 12 |
| enrmon16 | # of months of enrollment in 2016; 11 or 12 |

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| **Pharmacy Recodes: Claims** | |
| Datasets: (rx13 only for checking clean period), rx14, rx15, rx16 | |
| Variable | Notes |
| antidepressant | Antidepressant Prescription based on generid = 1; else = 0 |
| antipsychotic | Antipsychotic Prescription based on generid = 1; else = 0 |
| bad\_pot | Bad Potentiator based on generid = 1; else = 0 |
| barbiturate | Barbiturate/Sedative prescription based on generid = 1; else = 0 |
| benzodiazepine | Benzodiazepine Prescription based on generid = 1; else = 0 |
| buprenorphine | Buprenorphine Prescription based on generid = 1; else = 0 |
| fentanyl | Fentanyl Prescription based on generid = 1; else = 0 |
| good\_pot | Fentanyl Prescription based on generid = 1; else = 0 |
| gt7d | >7 Days Supply = 1; else = 0 |
| le7d | <=7 Days Supply = 1; else = 0 |
| long\_acting | Long Acting Opioid Rx based on generid = 1; else = 0 |
| methadone | Methadone Rx based on generid = 1; else = 0 |
| naloxone | Naloxone Rx based on generid = 1; else = 0 |
| naltrexone | Naloxone Rx based on generid = 1; else = 0 |
| nat\_opioid | Natural Opioid Rx based on generid = 1; else = 0 |
| op\_lax | Opioid Laxative Rx based on generid = 1; else = 0 |
| opioid | Opioid Prescription based on generid = 1; else 0 |
| semi\_opioid | Semi-Synthetic Opioid Rx based on generid = 1; else = 0 |
| short\_acting | Short Acting Opioid Rx based on generid = 1; else = 0 |
| syn\_opioid | Synthetic Opioid Rx based on generid = 1; else = 0 |
| muscle | Muscle Relaxant Rx based on generid =1; else = 0 |
| cns\_dep | CNS Depressant Rx based on generid = 1; else = 0 |
| new\_user\_dt | First opioid Rx date in 2014 (no Rx prior 180d); excl removed (hospice/cancer); else missing |
| client | client + enrolid = unique ID |
| enrolid |
| age | age as of svcdate |
| sex | sex as of svcdate |
| svcdate | Date Rx filled |
| ord\_prov | Physician who ordered Rx |
| pharmid | Pharmacy that filled Rx |
| daysupp | # days supply of Rx |
| stdrace | race as of 1.1.16 |
| rural | rural as of 1.1.16 |
| enrmon13 | # of months of enrollment in 2013; 11 or 12 |
| enrmon14 | # of months of enrollment in 2014; 11 or 12 |
| enrmon15 | # of months of enrollment in 2015; 11 or 12 |
| enrmon16 | # of months of enrollment in 2016; 11 or 12 |

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| **Pharmacy Recodes: 1 record per Member** | |
| Datasets: (rx13\_1 only for checking clean period), rx14\_1, rx15\_1, rx16\_1 | |
| Variable | Notes |
| antidepressant1 | At least 1 antidepressant Rx during year |
| antipsychotic1 | At least 1 antidepressant Rx during year |
| bad\_pot1 | At least 1 bad potentiator Rx during year |
| barbiturate1 | At least 1 barbiturate/sedative Rx during year |
| benzodiazepine1 | At least 1 benzodiazepine Rx during year |
| buprenorphine1 | At least 1 buprenorphine Rx during year |
| fentanyl1 | At least 1 fentanyl Rx during year |
| good\_pot1 | At least 1 good potentiator Rx during year |
| long\_acting1 | At least 1 long acting opioid Rx during year |
| methadone1 | At least 1 methadone Rx during year |
| naloxone1 | At least 1 naloxone Rx during year |
| naltrexone1 | At least 1 naltrexone Rx during year |
| nat\_opioid1 | At least 1 natural opioid Rx during year |
| op\_lax1 | At least 1 opioid laxative Rx during year |
| opioid1 | At least 1 opioid Rx during year |
| semi\_opioid1 | At least 1 semi-synthetic opioid Rx during year |
| short\_acting1 | At least 1 short acting opioid Rx during year |
| syn\_opioid1 | At least 1 synthetic opioid Rx during year |
| op\_benz | At least 1 opioid & 1 benzodiazepine during year |
| op\_lax\_c | At least 1 opioid & 1 laxative during year |
| op\_dep | At least 1 opioid & 1 antidepressant during year |
| op\_psy | At least 1 opioid & 1 antipsychotic during year |
| muscle1 | At least 1 muscle relaxant Rx during year |
| trinity | At least 1 opioid & 1 benzo & 1 muscle relax during year |
| cns\_dep1 | At least 1 CNS depressant Rx during year |
| opioid\_days | sum of days supply of opioids during year |
| new\_user\_dt | First opioid Rx date in 2014 (no Rx prior 180d); excl removed (hospice/cancer); else missing |
| client | client + enrolid = unique ID |
| enrolid |
| age | age as of last claim |
| sex | sex as of last claim |