**Supplemental Table 1. ICD-10-CM Diagnosis Codes**

|  |  |
| --- | --- |
| **Comorbid conditions** | **ICD-10 CM Codes** |
| *Substance use disorder* |  |
| Alcohol use disorder | F101X, F102X, F109X |
| Cannabis use disorder | F121X, F122X, F129X |
| Cocaine use disorder | F141X, F142X, F149X |
| Sedative and hypnotic related  disorder | F131X, F132X, F139X |
| Stimulant use disorder | F151X, F152X, F159X |
| Other psychoactive substance  use disorder | F161X, F162X, F169X, F181X, F182X, F189X, F191X, F192X, F199X |
|  |  |
| *Psychiatric conditions* |  |
| Anxiety | F400X, F401X, F402X, F408X, F409X, F410, F411, F413, F418, F419, F42.2, F423, F424, F428, F429 |
| Bipolar disorder | F301X, F302, F303, F304, F308, F309 |
| Major depression | F320, F321, F322, F323, F324, F325, F3281, F3289, F329 |
| Other mood disorder | F340, F341, F3481, F3489, F349, F39 |
| Attention deficit hyperactivity  Disorder (ADHD) | F900, F901, F902, F908, F909 |
| Post-traumatic stress disorder  (PTSD) | F4310, F4311, F4312 |
| Schizophrenia | F200, F201, F202, F203, F205, F208X, F209, F250, F251, F258, F259, F29 |
|  |  |
| *Pain conditions* |  |
| Back pain | M2578, M4000, M4003, M4004, M4005, M40202, M40203, M40204, M40205, M40209, M40292, M40293, M40294, M40295, M40299, M4030, M4035, M4036, M4037, M4100, M4102, M4103, M4104, M4105, M4106, M4107, M4108, M41112, M41113, M41114, M41115, M41116, M41117, M41119, M41122, M41123, M41124, M41125, M41126, M41127, M41129, M4120, M4122, M4123, M4124, M4125, M4126, M4127, M4130, M4134, M4135, M4180, M4182, M4183, M4184, M4185, M4186, M4187, M419, M4300, M4301, M4302, M4303, M4304, M4305, M4306, M4307, M4308, M4309, M4310, M4311, M4312, M4313, M4314, M4315, M4316, M4317, M4318, M4319, M4320, M4321, M4322, M4323, M4324, M4325, M4326, M4327, M4328, M438X9, M4640, M4644, M4645,M4646, M4647, M4648, M4649, M4710, M4714, M4715, M4716, M4720, M4724, M4725, M4726, M4727, M4728, M47814, M47815, M47816, M47817, M47818, M47819, M47894, M47895, M47896, M47897, M47898, M47899, M479, M4800, M4804, M4805, M4806, M48061, M48062, M4807, M4808, M4810, M4811, M4812, M4813, M4814, M4815, M4816, M4817, M4818, M4819, M4820, M4821, M4822, M4823, M4824, M4825, M4826, M4827, M4830, M4831, M4832, M4833, M4834, M4835, M4836, M4837, M4838, M489, M5104, M5105, M5106, M5114, M5115, M5116, M5117,M5124, M5125, M5126, M5127, M5134, M5135, M5136, M5137, M5146, M5147, M5184, M5185, M5186, M5187, M519, M532X7, M532X8, M533, M5380, M5384, M5385, M5386, M5387, M5388, M539, M5403, M5404, M5405, M5406, M5407, M5408, M5409, M5414, M5415, M5416, M5417, M5418, M5430, M5431, M5432, M5440, M5441, M5442, M545, M546, M5489, M549, M62830, M961, M962, M963, M965, M9922, M9923, M9924, M9925, M9926, M9927, M9928, M9929, M9932, M9933, M9934, M9935, M9936, M9937, M9938, M9939, M9942, M9943, M9944, M9945, M9946, M9947, M9948, M9949, M9952, M9953, M9954, M9955, M9956, M9957, M9958, M9959, M9962, M9963, M9964, M9965, M9966, M9967, M9968, M9969, M9972, M9973, M9974, M9975, M9976, M9977, M9978, M9979, M9983, M9984, M9902, M9904, Q762 |
| Neck pain (e.g., cervical  spinal stenosis) | M47811, M47891, M4723, M4722, M4721, M47813, M47893, M47892, M47812, M47012, M4711, M47014, M47011, M4712, M47022, M47029, M47019, M47016, M47013, M47021, M4713, M47015, M50220, M5022, M5023, M5020, M50221, M50222, M50223, M5021, M5002, M5000, M5001, M50022, M50023, M50021, M50020, M5003, M5082, M5091, M5012, M50922, M50821, M5080, M5011, M50123, M50822, M50820, M50921, M5010, M4643, M5093, M50120, M50823, M5083, M50121, M5090, M4641, M50920, M50122, M4642, M5092, M50923, M5013, M5081, M9930, M9971, M9921, M9970, M4803, M9931, M9940, M9960, M9950, M4802, M9951, M4801, M9961, M9941, M9920, M542, M530, M531, M5413, M5411, M5412,  M436, M5400, M5402, M5401, M5382, M5481, M5381, M5383 |
| Migraine | G43001, G43009, G43011, G43019, G43101, G43109, G43111, G43119, G43C0, G43B0, G43D0, G43A0, G43A1, G43C1, G43B1, G43D1, G43401, G43409, G43411, G43419, G43501, G43509, G43511, G43519, G43609, G43619, G43601, G43611, G43701, G43711, G43709, G43719, G43801, G43811, G43809, G43819, G43901, G43911, G43909, G43919, G43821,  G43829, G43831, G43839 |
| Fibromyalgia | M797 |
| Osteoarthritis/joint cartilage | M129, M131X, M138X, M15X, M16X, M17X, M18X, M19X, M2210, M2211, M2212, M222X, M223X, M224X, M228X, M2290, M2291, M2292, M23X, M241X |
| Inflammatory joint disorder  (e.g., rheumatoid arthritis,  ankylosing spondylitis) | M05X, M06X, M08X, M120X, M255X, M353, M45X, M460X, M461, M465X, M468X, M469X, M488X, M498X, M790 |
| Periarticular/soft tissue  Disorders (e.g., peripheral  enthesopathies, synovitis, bursitis) | M2570, M25711, M25712, M25719, M25721, M25722, M25729, M25731, M25732, M25739, M25741, M25742, M25749, M25751, M25752, M25759, M25761, M25762, M25769, M2577X, M701X, M702X, M704X, M705X, M706X, M707X, M7500, M7501, M7502, M751X, M7520, M7521, M7522, M7530, M7531, M7532, M7540, M7541, M7542, M7550, M7551, M7552, M7580, M7581, M7582, M7590, M7591, M7592, M76X, M77X, M2161X, M2162X, M65X, M66X, M67X, M700X, M7030, M7031, M7032, M71X |

**Supplemental Table 2. Suboxone Dosage Conversion by Buprenorphine Product**

|  |  |  |
| --- | --- | --- |
| **Non-injection Buprenorphine products** | **Included in analysis as MOUD** | **Suboxone dosage conversion factor1** |
| Buprenorphine Hydrochloride | Yes | 1 |
| Buprenorphine-Naloxone | Yes | 1 |
| BUNAVAIL | Yes | 1.905 |
| SUBLOCADE | Yes | N/A\* |
| SUBOXONE | Yes | 1 |
| SUBUTEX | Yes | N/A\* |
| ZUBSOLV | Yes | 1.4 |
| BELBUCA | No | N/A |
| BUTRANS | No | N/A |

1 Because the majority of the products were Suboxone/Subutex (or generics), the conversion factors were based on these products and adjusted the other products per Food and Drug Administration approved labeling (BioDelivery Sciences Inc., 2019; INDIVIOR Inc., 2019; OREXO U.S., Inc., 2019).

\* No prescription was identified in our data

**Supplemental Table 3. Impact of out-of-pocket cost for buprenorphine on treatment retention and gaps in treatment coverage - Expanded**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Retained in treatment by retention perioda  aOR (95% CI)b | | | Percentage increase in number of days without treatment coverage by retention period  IRR (95% CI)c | | |
| Measure | 180 days | 360 days | 540 days | 180 days | 360 days | 540 days |
| Daily out-of-pocket cost ($) | 0.88\*  (0.86, 0.90) | 0.86\*  (0.84, 0.89) | 0.87\*  (0.84, 0.89) | 0.05\*  (0.05, 0.06) | 0.08\*  (0.08, 0.09) | 0.08\*  (0.08, 0.09) |
| Buprenorphine Dose | 1.02\*  (1.01, 1.02) | 1.01\*  (1.01, 1.02) | 1.01\*  (1.01, 1.02) | -0.03\*  (-0.03, -0.03) | -0.03\*  (-0.03, -0.03) | -0.03\*  (-0.03, -0.03) |
| Sex |  |  |  |  |  |  |
| Male | 1.04  (0.93, 1.16) | 1.12\*  (1.00, 1.25) | 1.12  (0.99, 1.25) | -0.05\*  (-0.08, -0.02) | -0.01  (-0.03, 0.01) | -0.01  (-0.02, 0.01) |
| Female (referent) | - | - | - | - | - | - |
| Age |  |  |  |  |  |  |
| Age: 18-34 | 0.65\*  (0.54, 0.77) | 0.63\*  (0.53, 0.75) | 0.60\*  (0.50, 0.72) | 0.20\*  (0.15, 0.24) | 0.13\*  (0.10, 0.17) | 0.07\*  (0.05, 0.10) |
| Age: 35-44 | 1.18  (0.98, 1.41) | 1.21\*  (1.01, 1.46) | 1.23\*  (1.02, 1.47) | 0.00  (-0.05, 0.05) | 0.01  (-0.03, 0.04) | -0.10\*  (-0.12, -0.07) |
| Age: 45-54 | 0.94  (0.78, 1.13) | 0.97  (0.81, 1.17) | 0.91  (0.75, 1.10) | 0.04  (-0.01, 0.09) | 0.09\*  (0.06, 0.13) | 0.02  (-0.01, 0.05) |
| Age: 55-64 (referent) | - | - | - | - | - | - |
| Region |  |  |  |  |  |  |
| Northeast | 1.18  (0.99, 1.41) | 1.24\*  (1.03, 1.49) | 1.31\*  (1.08, 1.58) | -0.21\*  (-0.25, -0.16) | -0.10\*  (-0.14, -0.07) | -0.08\*  (-0.11, -0.05) |
| Midwest | 1.36\*  (1.13, 1.62) | 1.41\*  (1.17, 1.70) | 1.52\*  (1.26, 1.84) | -0.17\*  (-0.21, -0.12) | -0.14\*  (-0.17, -0.10) | -0.16\*  (-0.18, -0.13) |
| South | 1.62\*  (1.38, 1.90) | 1.60\*  (1.36, 1.88) | 1.73\*  (1.46, 2.05) | -0.16\*  (-0.20, -0.12) | -0.13\*  (-0.16, -0.10) | -0.09\*  (-0.12, -0.07) |
| West (referent) | - | - | - | - | - | - |
| Substance Use Disorders |  |  |  |  |  |  |
| Opioid Use Disorder | 1.28\*  (1.15, 1.43) | 1.25\*  (1.12, 1.39) | 1.27\*  (1.13, 1.42) | -0.11\*  (-0.14, -0.08) | -0.06\*  (-0.08, -0.04) | -0.02\*  (-0.04, -0.01) |
| Alcohol Use Disorder | 0.83  (0.66, 1.04) | 0.75\*  (0.60, 0.95) | 0.86  (0.68, 1.09) | -0.06\*  (-0.12, -0.01) | -0.26\*  (-0.30, -0.21) | -0.10\*  (-0.13, -0.06) |
| Cannabis Use Disorder | 0.61\*  (0.47, 0.79) | 0.70\*  (0.54, 0.91) | 0.68\*  (0.51, 0.89) | -0.15\*  (-0.23, -0.08) | 0.14\*  (0.09, 0.19) | 0.16\*  (0.11, 0.20) |
| Sedative Use Disorder | 0.83  (0.64, 1.07) | 0.86  (0.66, 1.11) | 0.84  (0.64, 1.10) | 0.19\*  (0.12, 0.26) | 0.14\*  (0.09, 0.19) | 0.10\*  (0.05, 0.14) |
| Cocaine Use Disorder | 0.57\*  (0.41, 0.80) | 0.63\*  (0.44, 0.89) | 0.57\*  (0.39, 0.83) | 0.31\*  (0.22, 0.40) | 0.39\*  (0.32, 0.45) | 0.17\*  (0.11, 0.23) |
| Stimulant Use Disorder | 0.51\*  (0.36, 0.73) | 0.47\*  (0.32, 0.69) | 0.39\*  (0.25, 0.60) | -0.20\*  (-0.32, -0.08) | 0.30\*  (0.23, 0.37) | -0.21\*  (-0.29, -0.13) |
| Nicotine Use Disorder | 1.19  (0.99, 1.41) | 1.18  (0.99, 1.40 | 1.12  (0.94, 1.34) | 0.06\*  (0.02, 0.10) | 0.09\*  (0.05, 0.12) | -0.10\*  (-0.13, -0.08) |
| Psychiatric Diagnosis |  |  |  |  |  |  |
| Anxiety | 1.12  (0.97, 1.28) | 1.05  (0.92, 1.20) | 1.02  (0.89, 1.18) | 0.01  (-0.02, 0.05) | -0.03\*  (-0.06, -0.01) | -0.04\*  (-0.07, -0.02) |
| Bipolar Disorder | 0.87  (0.68, 1.12) | 0.96  (0.75, 1.24) | 0.85  (0.65, 1.10) | 0.08\*  (0.02, 0.15) | 0.23\*  (0.19, 0.28) | 0.09\*  (0.05, 0.13) |
| Major Depression | 0.95  (0.82, 1.10) | 0.98  (0.85, 1.14) | 0.98  (0.85, 1.14) | -0.06\*  (-0.10, -0.02) | 0.02  (-0.01, 0.05) | -0.04\*  (-0.06, -0.01) |
| ADHD | 1.07  (0.83, 1.39) | 1.10  (0.85, 1.43) | 0.93  (0.71, 1.22) | 0.12\*  (0.05, 0.18) | 0.28\*  (0.23, 0.33) | 0.06\*  (0.01, 0.10) |
| PTSD | 0.72  (0.49, 1.07) | 0.99  (0.66, 1.46) | 0.86  (0.56, 1.30) | -0.22\*  (-0.34, -0.10) | 0.19\*  (0.12, 0.26) | 0.15\*  (0.08, 0.21) |
| Schizophrenia | 0.95  (0.50, 1.81) | 1.16  (0.60, 2.23) | 1.16  (0.59, 2.28) | -0.28\*  (-0.48, -0.08) | -0.15\*  (-0.27, -0.03) | 0.09  (-0.02, 0.19) |
| Pain Diagnosis |  |  |  |  |  |  |
| Back Pain | 0.91  (0.79, 1.04) | 0.89  (0.78, 1.02) | 0.85\*  (0.74, 0.97) | 0.10\*  (0.07, 0.14) | 0.06\*  (0.03, 0.08) | 0.08\*  (0.06, 0.11) |
| Neck Pain | 0.91  (0.76, 1.08) | 0.90  (0.75, 1.07) | 0.93  (0.77, 1.11) | 0.04  (-0.01, 0.08) | 0.04\*  (0.01, 0.08) | 0.01  (-0.01, 0.04) |
| Migraine | 0.92  (0.71, 1.21) | 0.90  (0.69, 1.19) | 0.98  (0.74, 1.29) | -0.06  (-0.13, 0.01) | -0.02  (-0.07, 0.04) | 0.16\*  (0.12, 0.20) |
| Fibromyalgia | 0.79  (0.57, 1.11) | 0.79  (0.56, 1.11) | 0.67\*  (0.47, 0.96) | -0.04  (-0.13, 0.05) | 0.05  (-0.02, 0.11) | -0.08\*  (-0.14, -0.02) |
| Osteoarthritis | 1.29\*  (1.03, 1.61) | 1.27\*  (1.02, 1.59) | 1.14  (0.91, 1.42) | 0.14\*  (0.09, 0.19) | 0.08\*  (0.04, 0.12) | 0.01  (-0.03, 0.04) |
| Inflammatory Joint Disorder | 0.98  (0.83, 1.15) | 0.95  (0.80, 1.12) | 1.01  (0.85, 1.19) | 0.01  (-0.03, 0.05) | -0.02  (-0.05, 0.01) | 0.05\*  (0.03, 0.08) |
| Periarticular | 0.73\*  (0.56, 0.95) | 0.66\*  (0.50, 0.87) | 0.65\*  (0.49, 0.86) | 0.16\*  (0.10, 0.23) | 0.38\*  (0.33, 0.43) | 0.33\*  (0.29, 0.37) |
| Other Prescriptions |  |  |  |  |  |  |
| Opioids | 1.01  (0.89, 1.15) | 1.07  (0.94, 1.22) | 1.09  (0.96, 1.23) | -0.03\*  (-0.07, -0.01) | -0.04\*  (-0.06, -0.01) | -0.08\*  (-0.10, -0.06) |
| Antidepressants | 1.03  (0.91, 1.16) | 1.02  (0.90, 1.15) | 1.04  (0.92, 1.17) | 0.06\*  (0.03, 0.09) | 0.02  (-0.00, 0.04) | 0.05\*  (0.04, 0.07) |
| Benzodiazepines | 0.77\*  (0.67, 0.87) | 0.73\*  (0.64, 0.84) | 0.73\*  (0.63, 0.83) | 0.02  (-0.01, 0.06) | 0.04\*  (0.01, 0.07) | 0.09\*  (0.07, 0.11) |
| Stimulants | 0.86  (0.70, 1.07) | 0.84  (0.68, 1.05) | 0.87  (0.70, 1.09) | 0.12\*  (0.07, 0.18) | -0.08\*  (-0.13, -0.04) | 0.03  (-0.01, 0.06) |
| Notes: Data Source: IBM® MarketScan® commercial claims and encounters database.  a Retained = Patient’s buprenorphine prescriptions (days supplied) cover at least 80% of the days within the retention window, which refers to the number of days since treatment inception during the analysis period.  b Multivariable logistic regression models with binary dependent variable (retained=1, not retained=0).  c Multivariable Poisson regression models with count dependent variable representing the number of days a patient was without daily supply during the retention window. Models includes only individuals defined as retained during the stated retention window.  \*  p<0.05 | | | | | | |