Supplementary Figure 1: Flow diagram

Flow diagram depicting total number of patients eligible from the Medicaid-HIVRN data linkage and the number of patients excluded for each of the exclusion criterion. The final study sample contained 1,814 patients.

Supplementary Table 1: Exploration of two types of Medicaid plans

|  |  |  |
| --- | --- | --- |
|  | Patients with ≥1 prescription (any) | Patients with ≥1 opioid prescription |
| Fee-for-service plans (N=3,344) | | |
| State of residence  Massachusetts (n=422)  Maryland (n=283)  New York (n=2,629) | 407 (96.4)  192 (67.8)  2,578 (97.7) | 228 (54.0)  106 (37.5)  1,805 (68.4) |
| Mean prescriptions per person per year  Massachusetts  Maryland  New York | 45.5  67.3  76.0 | 6.1  10.5  7.2 |
| Median prescriptions per person per year (IQR)  Massachusetts  Maryland  New York | 36 (15, 61)  46 (14, 103)  66 (34, 107) | 2 (1, 7)  4 (2, 12.5)  5 (2, 12) |
| Comprehensive managed care plans (N=3,133) | | |
| State of residence  Massachusetts (n=52)  Maryland (n=1,542)  New York (n=1,539) | 40 (76.9)  1,496 (97.0)  1,497 (97.3) | 17 (32.7)  1,092 (70.8)  864 (56.1) |
| Mean prescriptions per person  Massachusetts  Maryland  New York | 34.6  51.9  65.9 | 6.2  7.2  6.2 |
| Median prescriptions per person per year (IQR)  Massachusetts  Maryland  New York | 20.5 (10, 38.5)  41 (16, 75)  52 (23, 95) | 5 (1, 9)  3 (1, 10)  3 (1, 11) |

IQR: interquartile range

Supplementary Table 2: Exposure definitions

|  |  |
| --- | --- |
| **Diagnosis** | **ICD-9 Codes used for Case Definition** |
| Cancer | 140-239 |
| Depression | 296.20 296.21 296.22 296.23 296.24 296.25 296.30 296.31 296.32 296.33 296.34 296.35 300.4 311 296.5 296.6 296.82 296.90 309.0 309.1 309.28 |
| Chronic pain | 338.2 338.21 338.22 338.28 338.29 338.4 307.8 307.89 338 719.41 719.49 719.45 719.46 719.47 720 720.2 720.9 721 721.1 721.2 721.3 721.41 721.42 721.6 721.8 721.9 721.91 722 722.1 722.11 722.2 722.3 722.31 722.32 722.39 722.4 722.51 722.52 722.6 722.7 722.71 722.73 722.8 722.81 722.82 722.83 722.9 722.91 722.92 722.93 723 723.1 723.3 723.4 723.5 723.6 723.7 723.8 723.9 724 724.01 724.02 724.09 724.1 724.2 724.3 724.4 724.5 724.6 724.7 724.79 724.8 724.9 729 729.1 729.2 729.4 729.5 |

Supplementary Table 3: Incidence rate of subsequent high-risk opioid use patterns among patients who met multiple criteria for high-risk use, by first-occurring high-risk use pattern

N=538 patients with at least one high-risk use event

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | | Incidence Rate (per 100 person-years) of Additional High-risk Use Patterns following First Occurrence of High-Risk Use | | | |
| High daily dosage | Overlapping prescriptions | Early refills | Multiple prescribers |
| First Occurring High-Risk Use Pattern | High daily dosage  (N=56) | -- | 17.6 | 22.0 | 34.5 |
| Overlapping prescriptions  (N=128) | 17.5 | -- | 23.0 | 35.6 |
| Early refills  (N=147) | 11.7 | 46.8 | -- | 40.1 |
| Multiple prescribers  (N=207) | 6.3 | 26.3 | 26.2 | -- |