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Contraception claims by medication for opioid use disorder prescription status among insured women with opioid use disorder, United States, 2018

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Abstract

Objective(s): To understand how contraception method use differed between women prescribed and not prescribed medications for opioid use disorder (MOUD) among commercially-insured and Medicaid insured women.

Study Design: IBM Watson Health MarketScan Commercial Claims and Encounters database and the Multi-State Medicaid database were used to calculate the (1) crude prevalence, and (2) adjusted odds ratios (adjusted for demographic characteristics) of using long-acting reversible or short-acting hormonal contraception methods or female sterilization compared with none of these methods (no method) in 2018 by MOUD status among women with OUD, aged 20 to 49 years, with continuous health insurance coverage through commercial insurance or Medicaid for ≥6 years. Claims data was used to define contraception use. Fisher exact test or χ^2 test with a *P*-value ≤ 0.0001, based on the Holm-Bonferroni method, and 95% confidence intervals were used to determine statistically significant differences for prevalence estimates and adjusted odds ratios, respectively.

Results: Only 41% of commercially-insured and Medicaid-insured women with OUD were prescribed MOUD. Medicaid-insured women with OUD prescribed MOUD had a significantly lower crude prevalence of using no method (71.1% vs 79.0%) and higher odds of using female sterilization (aOR, 1.33; 95% CI: 1.06–1.67 vs no method) than those not prescribed MOUD. Among commercially-insured women there were no differences in contraceptive use by MOUD status and 66% used no method.

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The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention (CDC).

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Conclusions: Among women with ≥ 6 years of continuous insurance coverage, contraceptive use differed by MOUD status and insurance. Prescribing MOUD for women with OUD can be improved to ensure quality care.

Implications: : Only two in five women with OUD had evidence of being prescribed MOUD, and majority did not use prescription contraception or female sterilization. Our findings support opportunities to improve prescribing for MOUD and integrate contraception and MOUD services to improve clinical care among women with OUD.

Keywords

Birth control; Commercial insurance; Health insurance; Marketscan; Medicaid; Medication assisted therapy

1. Introduction

Women with opioid use disorder (OUD) use contraception at lower rates than the general population and report unintended pregnancy rates of over 75%, compared with 45% in the general United States (US) population [1–6]. The rate of pregnant women with opioid-related diagnoses during delivery hospitalization more than doubled between 2010 and 2017 [7]. OUD during pregnancy is associated with adverse pregnancy outcomes, including premature delivery, low birth weight, and neonatal opioid withdrawal syndrome [8, 9]. Several organizations including the Centers for Disease Control and Prevention, the American Academy of Pediatrics, and the American College of Obstetricians and Gynecologists support increased efforts to reduce neonatal opioid withdrawal syndrome, including strategies to prevent unintended pregnancy and improve access to contraception among women who use opioids [8–11].

A recommended treatment for OUD is medication for OUD (MOUD), such as buprenorphine [12]. MOUD, although associated with neonatal opioid withdrawal syndrome, reduces adverse pregnancy outcomes [8]. The American College of Obstetricians and Gynecologists recommends that women of reproductive age with OUD be routinely offered voluntary contraception services, including client-centered contraceptive counseling and the full range of contraception methods, alongside MOUD as part of OUD treatment [8]. Recent evidence shows that integrating family planning services and substance use disorder treatment in various settings (e.g., substance use disorder treatment centers, criminal justice system, obstetric settings) may be effective in improving access to contraception for women with OUD [2, 5].

We examined whether patterns of prescription contraception method and female sterilization use differed by MOUD status among commercially-insured or Medicaid-insured women of reproductive age with at least 6 years of continuous coverage. This information can help identify and support opportunities to improve integration of MOUD and contraception services to improve clinical care among women with OUD.

2. Materials and Methods

2.1. Database

We used the IBM Watson Health MarketScan Commercial Claims and Encounters database and the Multi-State Medicaid database to study commercially and Medicaid-insured women, respectively. The Commercial Claims and Encounters database consists of a large convenience sample representative of the US population covered by employer-sponsored insurance and the Multistate Medicaid database pools Medicaid data from nine to 13 dispersed states [13]. Both databases link person-level enrollment to inpatient and outpatient medical claims and prescription drug claims [13]. Because the data are deidentified, the Centers for Disease Control and Prevention determined that this was not human subjects research and Institutional Review Board review was not required.

2.2. Study Sample

We determined contraceptive use in 2018 among women who were continuously enrolled for at least 6 years (2013–2018) in each database; 6 years of continuous enrollment was used to identify previously initiated long-acting reversible contraception (LARC) methods or female sterilization.* The cohorts included women ages 20 to 49 years on January 1, 2018 who had health insurance plans with prescription drug coverage. Adolescents under 20 years of age were excluded because they may have different barriers to obtaining prescription contraceptives than older women [14]. Women were excluded if they had a diagnosis or procedure code indicating infecundity for purposes other than sterilization (i.e., hysterectomy, infertility) any time during 2013 through 2018 or if they were pregnant at any time during 2018 because it may have influenced their contraceptive use. Pregnancy was identified if there was a diagnosis or procedure code during 2018 with the following outcomes at least once: any pregnancy, delivery, ectopic pregnancy, molar pregnancy, or abortion (spontaneous or induced). We used Classification of Diseases, Ninth revision, Clinical Modification (ICD-9-CM), Classification of Diseases, Tenth revision, Clinical Modification (ICD-10-CM), Classification of Diseases, Tenth revision, Procedure Coding System, Healthcare Common Procedure Coding System, Current Procedural Terminology codes, Generic Product Identification and National Drug Codes (NDC) to identify exclusion criteria, exposures, outcomes and covariates for this analysis; the specific codes used are listed in the Appendix.

2.3. Exposures of Interest

Our primary exposures of interest were women's MOUD statuses. The presence of ICD-10-CM codes in 2017 or 2018 reflecting the Diagnostic and statistical manual of mental disorders 5th edition (DSM-5) were used to identify women with OUD in inpatient and outpatient databases. Women with codes indicating OUD in remission were included as

*By conducting a ≥ 6 year continuous enrollment, we identified 116 and 62 commercially-insured women and 97 and 243 Medicaid-insured women who used LARC and who had sterilization, respectively, that would not have been identified had we chosen a ≥ 3 year continuous enrollment.
Sample sizes with continuous enrollment ≥ 6 years for commercially-insured and Medicaid-insured women (3085 and 3841, respectively) were smaller than ≥ 3 years (6603 and 35,418, respectively). Women prescribed MOUD made up 41% of each sample size with ≥ 6 years and ≥ 3 years continuous enrollment, except among Medicaid-insured women with ≥ 3 year continuous enrollment where they made up 60%.

individuals with OUD if they had evidence of being prescribed MOUD in outpatient databases during 2018 [15]. MOUD was defined as buprenorphine, buprenorphine and/or naloxone, methadone or naltrexone formulations that were approved by the Federal Drug Administration for treating OUD [16]. Women were considered to be prescribed MOUD if they had OUD and there was at least one outpatient prescription, outpatient service administration or supply code in 2018 of the approved formulations.

2.4. Outcomes of Interest

Our primary outcome of interest was prescription contraception method use or female sterilization, classified as (1) LARC, (2) short-acting hormonal contraception (SAHC), (3) female sterilization, and (4) no prescription method or female sterilization (no method). LARC included the use of intrauterine devices (IUD) and contraceptive implants. A woman was identified as an IUD or implant user if an inpatient or outpatient procedure code or supply code for an IUD was used any time during the 6 year period or if an inpatient or outpatient procedure or supply code for an implant was identified in 2018 or 3 years prior, without being followed by a removal code. SAHC use included injectable, pill, patch, or ring contraceptives identified at least once in 2018. Injectable contraception users were identified by inpatient and outpatient claims if there was a medroxyprogesterone supply code or a family planning encounter coupled with a generic injection procedure code on the same day. Contraceptive pill, patch, and ring users were identified using National Drug Codes or Generic Product Identification codes to identify outpatient prescription claims, which were used as a proxy for contraception use. A woman was considered sterilized if any sterilization code was used throughout the 6 year period in inpatient or outpatient databases. If prescription contraception or female sterilization was not identified, the woman was categorized as not using any method. If a woman used more than one type of contraception method in 2018, she was categorized by the most effective method documented [17].

2.5. Covariates

We included three age categories (20–29 years, 30–39 years, and 40–49 years) and selected medical conditions as potential covariates because of their potential to confound any association between being prescribed MOUD and contraception use. Medical conditions of interest were those considered by the US Medical Eligibility Criteria for Contraceptive Use to be (1) conditions associated with adverse health events in pregnancy, or (2) conditions for which certain contraceptives are considered unsafe or the risks outweigh the benefits [18]. These conditions included: diabetes, hypertension, epilepsy, breast cancer, endometrial cancer, ovarian cancer, tuberculosis, sickle cell disease, systemic lupus erythematosus, cirrhosis, thrombogenic mutations, schistosomiasis with fibrosis of liver, liver cancer, gestational trophoblastic disease, ischemic heart disease, valvular heart disease, stroke, transplantation, peripartum cardiomyopathy, bariatric surgery, and migraines (with or without aura). Women with these conditions were identified if the corresponding ICD-9-CM and ICD-10-CM codes were present in the outpatient database at least twice 30 days apart or at least once in the inpatient database any time during the 6 year period, except for migraines which were identified at least once in the inpatient or outpatient database. In the Commercial Claims analyses, we also included US regions defined by IBM Watson (Northeast, North Central, South, West, unknown) as a potential covariate; this information was not available

in the Medicaid database. For the Medicaid analyses, we included race and/or ethnicity categories (Hispanic, non-Hispanic Black, non-Hispanic White, other); this information was not available in the Commercial Claims database.

2.6. Statistical Analysis

All statistical analyses were performed with SAS (version 9.4; SAS Institute Inc, Cary, NC). We calculated the crude prevalence of demographic characteristics of our study population for the commercial and Medicaid data, including age, medical conditions and, when available, region and race and/or ethnicity. We also calculated the crude prevalence of contraception methods used among women with OUD by MOUD status. Bivariate analyses were performed with Fisher exact test or χ^2 test. A P-value ≤ 0.0001, based on the Holm-Bonferroni method to adjust for multiple comparisons [19], was used to determine statistically significant differences of demographic characteristics and contraception methods. In cases where cell counts were < 5, the numbers and corresponding percentages were not reported to protect individual-level data. If it was possible to calculate one of the other cells of that variable, a second cell count was not reported.

Multivariable multinomial logistic regression was conducted to calculate the adjusted odds ratios, and associated 95% confidence intervals (CIs), of using each method group versus no method between women with OUD prescribed and not prescribed MOUD. We evaluated covariates of age, medical conditions, and region or race/ethnicity as applicable. Covariates that were significant at the $P < 0.05$ significance level were included in the final model for adjusted odds ratios.

3. Results

3.1. Women with at least 6 years of continuous commercial insurance

In 2018, 3085 women with OUD met inclusion criteria from the commercial database, of which 1266 (41.0%) were prescribed MOUD. The distributions of age, region and medical conditions were significantly different between women with OUD prescribed and not prescribed MOUD (Table 1). A smaller proportion of women prescribed MOUD lived in the South and had medical conditions (32.7% vs 42.9% and 44.2% vs 58.7%, respectively) than those without MOUD. There was no significant difference in contraception use among women with OUD by MOUD status (Table 2).

After controlling for age and medical conditions there was no association between being prescribed MOUD and contraception method type among women with OUD (Table 3).

3.2. Women with at least 6 years of continuous Medicaid insurance

In 2018, 3841 women with OUD were included from the Medicaid database, of which 1580 (41.1%) were prescribed MOUD. The distributions of age, race and medical conditions were significantly different between women with OUD prescribed and not prescribed MOUD (Table 1). A smaller proportion of women prescribed MOUD were Black and had medical conditions compared with women not prescribed MOUD (13.2% vs 33.4% and 55.9% vs 79.0%, respectively). Significantly more women with OUD prescribed MOUD used female

sterilization (12.0% vs 7.5%) and significantly fewer used no method (71.1% vs 79.0%) than those not prescribed MOUD (Table 2).

Women with OUD prescribed MOUD had a significantly higher odds of using female sterilization versus no method (aOR, 1.33; 95% CI: 1.06–1.67) than those not prescribed MOUD after controlling for age (Table 3).

4. Discussion

Women with OUD prescribed MOUD are likely to have increased engagement with health professionals for treatment and counseling, but our results showed no difference in odds of contraception use by MOUD status among commercially-insured women, though Medicaid-insured women with OUD prescribed MOUD had higher odds of female sterilization compared to those not prescribed MOUD and a lower proportion used no contraception method compared to those not prescribed MOUD. Delivery of recommended clinical care for women with OUD may be improved by integrating contraception and MOUD services, including alignment of medical services and support with reproductive health goals to ensure that all women are counseled and have access to the full range of methods, are able to make an informed choice of whether and which type of contraception to use, and can discontinue LARC at any time [20, 21].

With only 41% of women with OUD prescribed MOUD in both insurance groups, our study results also underscores the need for quality improvement efforts to increase prescribing of MOUD [22]. Among commercially insured women, a smaller proportion of women prescribed MOUD lived in the South; among Medicaid insured women, a smaller proportion of Black women were prescribed MOUD. Prior research has also found racial and regional disparities among people of color in accessing, being prescribed and continuing MOUD treatment, highlighting the need for social and structural interventions to allow more equitable and continued access to MOUD [23–25].

Among those with at least 6 years of continuous Medicaid insurance, women with OUD prescribed MOUD had a higher odds of undergoing female sterilization and lower prevalence of using no method than women not prescribed MOUD, but female sterilization did not differ by MOUD status among women with at least 6 years of continuous commercial insurance. Further research is needed to assess reasons for the differential patterns of contraceptive use by insurance type, which could include differences in consumer preferences and knowledge, provider influence or (lack of) prescribing behavior, coercive practices, or insurance coverage.

Several barriers to obtaining contraception also impact use, including health care practitioner behaviors or misconceptions, patient beliefs and knowledge, cost, access to care, and intimate partner violence [26, 27]. Women with OUD experience additional barriers, such as fear of criminalization, fragmented services, and stigma that may hinder women with substance use disorders to access and utilize contraception and MOUD services [26,28–30].

Our crude prevalence estimates of being prescribed MOUD and contraceptive use among women of reproductive age with OUD were consistent with prior studies. Analyses

conducted using the 2016 and 2017 National Survey on Drug Use and Health found that 21% of commercially-insured and 42% of Medicaid-insured non-elderly, majority male adults with OUD did not receive MOUD [31]. A 2015 systematic review of studies between 1948 and 2014 of contraception use among women with opioid and other substance use disorders found that about 56% of women with substance use disorders used any contraception method [4]. Overall contraception use was higher in the review than our study because, in the review, condoms were the most common form of contraception among women with OUD (62%), and our study could not assess non-prescription methods, including condoms [4].

We used stringent definitions to define our exposures, outcomes, and covariates to reduce misclassification (e.g., studying women with at least 6 years of continuous health insurance enrollment increased our likelihood of capturing female sterilization or LARC placement prior to the year we studied).

The generalizability of our study is limited. By only including women with at least 6 years of continuous health insurance coverage, our analyses excluded the experiences of all women without insurance and some women who lost or experienced changes in coverage. Gaps in Medicaid insurance coverage are common due to changes in an individual's eligibility over time (e.g., changes in income or number of individuals in a household can affect Medicaid eligibility) [32]. Consequently, our Medicaid sample is more likely to include individuals who have stable access to Medicaid, such as individuals with a disability or who live in low-income households for longer periods of time. Additionally, because young adults experience high rates of insurance gaps [33], younger women are less likely to be included in our study for both insurance types because they may not have had continuous insurance coverage for 6 years. We also excluded women that were pregnant in 2018 from the analyses, so we were unable to assess contraception use prior to or after pregnancy. Finally, the Multi-State Medicaid database only has data from nine to 13 US states.

In some instances, we used outpatient prescriptions as a proxy for medication use, but prescriptions may not accurately reflect actual use, particularly for user-dependent methods. Our study could not assess non-prescription methods, including condoms. Condoms may be preferred by women with OUD (e.g., fewer side effects, or easier access) [26]. Dual use of highly effective contraception and condoms is often recommended by healthcare professionals to prevent unintended pregnancy and sexually transmitted infections (STIs), respectively [34]. Of note, women with OUD are at higher risk of STIs [35]. We were also unable to measure the use of male sterilization in partners, over-the-counter emergency contraception and contraception received from publicly funded settings that did not file insurance reimbursement. We also were unable to control for other factors that could influence our study outcomes (e.g., smoking status, other medical conditions, contraception knowledge).

Efforts to improve delivery of recommended clinical care for women with OUD by improving prescribing for MOUD and integrating contraception and MOUD services by substance use disorder treatment providers and reproductive health care providers may

improve outcomes for women, prevent unintended pregnancy, and associated adverse pregnancy outcomes.

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Appendix: Medical and drug codes used to identify conditions and medications of interest

Conditions and medications	Medical and drug codes
Exclusion Criteria	
Infecundity for reasons other than sterilization [*,†]	*Any of these codes in 2013–2018 in inpatient or outpatient database:* Infertility diagnosis codes: ICD-10-CM: E28.310, E28.319, E28.39, E89.40, E89.41, N95.0, N95.1, N95.2, Z78.0, N97.0, N97.1, N97.2, N97.8, N97.9 ICD-9-CM: 256, 256.1, 256.2, 256.31, 256.39, 256.8, 627.1, 627.2, 627.3, 627.8, 627.9, V49.81, V88.01 Hysterectomy: ICD-10-CM: Z90.710, Z90.711 ICD-9-CM: 68.3, 68.4, 68.5, 68.6, 68.7, 68.8, 68.9 HCPCS codes: 45126, 51597, 51925, 58150, 58152, 58180, 58200, 58210, 58240, 58260, 58262, 58263, 58267, 58270, 58275, 58280, 58285, 58290, 58291, 58292, 58293, 58294, 58541, 58542, 58543, 58544, 58548, 58550, 58552, 58553, 58554, 58570, 58571, 58572, 58573, 58943, 58950, 58951, 58953, 58954, 58956, 58957, 58958, 58960, 59100, 59135, 59525, G9774
Pregnancy [*] or delivery outcome [§] (delivery, ectopic, molar pregnancy, spontaneous or induced abortion)	*Any of these codes in 2018 in inpatient or outpatient database:* Pregnancy: ICD-10-CM: O09.00, O09.01, O09.02, O09.03, O09.10, O09.11, O09.12, O09.13, O09.211, O09.212, O09.213, O09.219, O09.291, O09.292, O09.293, O09.299, O09.30, O09.31, O09.32, O09.33, O09.40, O09.41, O09.42, O09.43, O09.511, O09.512, O09.513, O09.519, O09.521, O09.522, O09.523, O09.529, O09.611, O09.612, O09.613, O09.619, O09.621, O09.622, O09.623, O09.629, O09.70, O09.71, O09.72, O09.73, O09.811, O09.812, O09.813, O09.819, O09.821, O09.822, O09.823, O09.829, O09.891, O09.892, O09.893, O09.899, O09.90, O09.91, O09.92, O09.93, O10.011, O10.012, O10.013, O10.019, O10.111, O10.112, O10.113, O10.119, O10.211, O10.212, O10.213, O10.219, O10.311, O10.312, O10.313, O10.319, O10.411, O10.412, O10.413, O10.419, O10.911, O10.912, O10.913, O10.919, O11.1, O11.2, O11.3, O11.9, O12.00, O12.01, O12.02, O12.03, O12.10, O12.11, O12.12, O12.13, O12.20, O12.21, O12.22, O12.23, O13.1, O13.2, O13.3, O13.9, O14.00, O14.02, O14.03, O14.10, O14.12, O14.13, O14.20, O14.22, O14.23, O14.90, O14.92, O14.93, O15.00, O15.02, O15.03, O15.9, O16.1, O16.2, O16.3, O16.9, O20.0, O20.8, O20.9, O21.0, O21.1, O21.2, O21.8, O21.9, O22.00, O22.01, O22.02, O22.03, O22.10, O22.11, O22.12, O22.13, O22.20, O22.21, O22.22, O22.23, O22.30, O22.31, O22.32, O22.33, O22.40, O22.41, O22.42, O22.43, O22.50, O22.51, O22.52, O22.53, O22.8X1, O22.8X2, O22.8X3, O22.8X9, O22.90, O22.91, O22.92, O22.93, O23.00, O23.01, O23.02, O23.03, O23.10, O23.11, O23.12, O23.13, O23.20, O23.21, O23.22, O23.23, O23.30, O23.31, O23.32, O23.33, O23.40, O23.41, O23.42, O23.43, O23.511, O23.512, O23.513, O23.519, O23.521, O23.522, O23.523, O23.529, O23.591, O23.592, O23.593, O23.599, O23.90, O23.91, O23.92, O23.93, O24.011, O24.012, O24.013, O24.019, O24.111, O24.112, O24.113, O24.119, O24.311, O24.312, O24.313, O24.319, O24.410, O24.414, O24.419, O24.811, O24.812, O24.813, O24.819, O24.911, O24.912, O24.913, O24.919, O25.10, O25.11, O25.12, O25.13, O26.00, O26.01, O26.02, O26.03, O26.10, O26.11, O26.12, O26.13, O26.20, O26.21, O26.22, O26.23, O26.30, O26.31, O26.32, O26.33, O26.40, O26.41, O26.42, O26.43, O26.50, O26.51, O26.52, O26.53, O26.611, O26.612, O26.613, O26.619, O26.711, O26.712, O26.713, O26.719, O26.811, O26.812, O26.813, O26.819, O26.821, O26.822, O26.823, O26.829, O26.831, O26.832, O26.833, O26.839, O26.841, O26.842, O26.843, O26.849, O26.851, O26.852, O26.853, O26.859, O26.86, O26.872, O26.873, O26.879, O26.891, O26.892, O26.893, O26.899, O26.90, O26.91, O26.92, O26.93, O28.0, O28.1, O28.2, O28.3, O28.4, O28.5, O28.8, O28.9, O29.011, O29.012, O29.013, O29.019, O29.021, O29.022, O29.023, O29.029, O29.091, O29.092, O29.093, O29.099, O29.111, O29.112, O29.113, O29.119, O29.121, O29.122, O29.123, O29.129, O29.191, O29.192, O29.193, O29.199, O29.211, O29.212, O29.213, O29.219, O29.291, O29.292, O29.293, O29.299, O29.3X1, O29.3X2, O29.3X3, O29.3X9, O29.40, O29.41, O29.42, O29.43, O29.5X1, O29.5X2, O29.5X3, O29.5X9, O29.60, O29.61, O29.62, O29.63, O29.8X1, O29.8X2, O29.8X3, O29.8X9, O29.90, O29.91, O29.92, O29.93, O30.001, O30.002, O30.003, O30.009, O30.011, O30.012, O30.013, O30.019, O30.021,

Conditions and medications	Medical and drug codes
	O30.022, O30.023, O30.029, O30.031, O30.032, O30.033, O30.039, O30.041, O30.042, O30.043, O30.049, O30.091, O30.092, O30.093, O30.099, O30.101, O30.102, O30.103, O30.109, O30.111, O30.112, O30.113, O30.119, O30.121, O30.122, O30.123, O30.129, O30.191, O30.192, O30.193, O30.199, O30.201, O30.202, O30.203, O30.209, O30.211, O30.212, O30.213, O30.219, O30.221, O30.222, O30.223, O30.229, O30.291, O30.292, O30.293, O30.299, O30.801, O30.802, O30.803, O30.809, O30.811, O30.812, O30.813, O30.819, O30.821, O30.822, O30.823, O30.829, O30.891, O30.892, O30.893, O30.899, O30.90, O30.91, O30.92, O30.93, O31.00X0, O31.00X1, O31.00X2, O31.00X3, O31.00X4, O31.00X5, O31.00X9, O31.01X0, O31.01X1, O31.01X2, O31.01X3, O31.01X4, O31.01X5, O31.01X9, O31.02X0, O31.02X1, O31.02X2, O31.02X3, O31.02X4, O31.02X5, O31.02X9, O31.03X0, O31.03X1, O31.03X2, O31.03X3, O31.03X4, O31.03X5, O31.03X9, O31.10X0, O31.10X1, O31.10X2, O31.10X3, O31.10X4, O31.10X5, O31.10X9, O31.11X0, O31.11X1, O31.11X2, O31.11X3, O31.11X4, 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Conditions and medications	Medical and drug codes
	O36.5910, O36.5911, O36.5912, O36.5913, O36.5914, O36.5915, O36.5919, O36.5920, O36.5921, O36.5922, O36.5923, O36.5924, O36.5925, O36.5929, O36.5930, O36.5931, O36.5932, O36.5933, O36.5934, O36.5935, O36.5939, O36.5990, O36.5991, O36.5992, O36.5993, O36.5994, O36.5995, O36.5999, O36.60X0, O36.60X1, O36.60X2, O36.60X3, O36.60X4, O36.60X5, O36.60X9, O36.61X0, O36.61X1, O36.61X2, O36.61X3, O36.61X4, O36.61X5, O36.61X9, O36.62X0, O36.62X1, O36.62X2, O36.62X3, O36.62X4, O36.62X5, O36.62X9, O36.63X0, O36.63X1, O36.63X2, O36.63X3, O36.63X4, O36.63X5, O36.63X9, O36.70X0, O36.70X1, O36.70X2, O36.70X3, O36.70X4, O36.70X5, O36.70X9, O36.71X0, O36.71X1, O36.71X2, O36.71X3, O36.71X4, O36.71X5, O36.71X9, O36.72X0, O36.72X1, O36.72X2, O36.72X3, O36.72X4, O36.72X5, O36.72X9, O36.73X0, O36.73X1, O36.73X2, O36.73X3, O36.73X4, O36.73X5, O36.73X9, O36.80X0, O36.80X1, O36.80X2, O36.80X3, O36.80X4, O36.80X5, O36.80X9, O36.8120, O36.8121, O36.8122, O36.8123, O36.8124, O36.8125, O36.8129, O36.8130, O36.8131, 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O43.102, O43.103, O43.109, O43.111, O43.112, O43.113, O43.119, O43.121, O43.122, O43.123, O43.129, O43.191, O43.192, O43.193, O43.199, O43.211, O43.212, O43.213, O43.219, O43.221, O43.222, O43.223, O43.229, O43.231, O43.232, O43.233, O43.239, O43.811, O43.812, O43.813, O43.819, O43.891, O43.892, O43.893, O43.899, O43.90, O43.91, O43.92, O43.93, O44.00, O44.01, O44.02, O44.03, O44.10, O44.11, O44.12, O44.13, O45.001, O45.002, O45.003, O45.009, O45.011, O45.012, O45.013, O45.019, O45.021, O45.022, O45.023, O45.029, O45.091, O45.092, O45.093, O45.099, O45.8X1, O45.8X2, O45.8X3, O45.8X9, O45.90, O45.91, O45.92, O45.93, O46.001, O46.002, O46.003, O46.009, O46.011, O46.012, O46.013, O46.019, O46.021, O46.022, O46.023, O46.029, O46.091, O46.092, O46.093, O46.099, O46.8X1, O46.8X2, O46.8X3, O46.8X9, O46.90, O46.91, O46.92, O46.93, O48.0, O48.1, O86.0, O88.011, O88.012, O88.013, O88.019, O88.111, O88.112, O88.113, O88.119, O88.211, O88.212, O88.213, O88.219, O88.311, O88.312, O88.313, O88.319, O88.811, O88.812, O88.813, O88.819, O90.1, O90.2, O91.011, O91.012, O91.013, O91.019, O91.111, O91.112, O91.113, O91.119, O91.211, O91.212, O91.213, O91.219, O92.011, O92.012, O92.013, O92.019, O92.111, O92.112, O92.113, O92.119, O98.011, O98.012, O98.013, O98.019, O98.111, O98.112, O98.113, O98.119, O98.211, O98.212, O98.213, O98.219, O98.311, O98.312, O98.313, O98.319, O98.411, O98.412, O98.413, O98.419, O98.511, O98.512, O98.513, O98.519, O98.611, O98.612, O98.613, O98.619, O98.711, O98.712, O98.713, O98.719, O98.811, O98.812, O98.813, O98.819, O98.911, O98.912, O98.913, O98.919, O99.011, O99.012, O99.013, O99.019, O99.111, O99.112, O99.113, O99.119, O99.210, O99.211, O99.212, O99.213, O99.280, O99.281, O99.282, O99.283, O99.310, O99.311, O99.312, O99.313, O99.320, O99.321, O99.322, O99.323, O99.330, O99.331, O99.332, O99.333,

Conditions and medications	Medical and drug codes
	O99.340, O99.341, O99.342, O99.343, O99.350, O99.351, O99.350, O99.351, O99.352, O99.353, O99.411, O99.412, O99.413, O99.419, O99.511, O99.512, O99.513, O99.519, O99.611, O99.612, O99.613, O99.619, O99.711, O99.712, O99.713, O99.719, O99.810, O99.820, O99.830, O99.840, O99.841, O99.842, O99.843, O9A.111, O9A.112, O9A.113, O9A.119, O9A.211, O9A.212, O9A .213, O9A .219, O9A .311, O9A .312, O9A .313, O9A .319, O9A .411, O9A .412, O9A .413, O9A .419, O9A .511, O9A .512, O9A .513, O9A .519, Z34.00, Z34.01, Z34.02, Z34.03, Z34.80, Z34.81, Z34.82, Z34.83, Z34.90, Z34.91, Z34.92, Z34.93, Z33.1, Z32.01, ICD-10-PCS: 102073Z, 10207YZ, 10H003Z, 10H00YZ, 10H073Z, 10H07YZ, 10J00ZZ, 10J03ZZ, 10J04ZZ, 10J07ZZ, 10J08ZZ, 10J0XZZ, 10J10ZZ, 10J13ZZ, 10J14ZZ, 10J17ZZ, 10J18ZZ, 10J1XZZ, 10P003Z, 10P00YZ, 10P073Z, 10P07YZ, 10Q00YE, 10Q00YF, 10Q00YG, 10Q00YH, 10Q00YJ, 10Q00YK, 10Q00YL, 10Q00YM, 10Q00YN, 10Q00YP, 10Q00YQ, 10Q00YR, 10Q00YS, 10Q00YT, 10Q00YV, 10Q00YY, 10Q00ZE, 10Q00ZF, 10Q00ZG, 10Q00ZH, 10Q00ZJ, 10Q00ZK, 10Q00ZL, 10Q00ZM, 10Q00ZN, 10Q00ZP, 10Q00ZQ, 10Q00ZR, 10Q00ZS, 10Q00ZT, 10Q00ZV, 10Q00ZY, 10Q03YE, 10Q03YF, 10Q03YG, 10Q03YH, 10Q03YJ, 10Q03YK, 10Q03YL, 10Q03YM, 10Q03YN, 10Q03YP, 10Q03YQ, 10Q03YR, 10Q03YS, 10Q03YT, 10Q03YV, 10Q03YY, 10Q04YE, 10Q04YF, 10Q04YG, 10Q04YH, 10Q04YJ, 10Q04YK, 10Q04YL, 10Q04YM, 10Q04YN, 10Q04YP, 10Q04YQ, 10Q04YR, 10Q04YS, 10Q04YT, 10Q04YV, 10Q04YY, 10Q04ZE, 10Q04ZF, 10Q04ZG, 10Q04ZH, 10Q04ZJ, 10Q04ZK, 10Q04ZL, 10Q04ZM, 10Q04ZN, 10Q04ZP, 10Q04ZQ, 10Q04ZR, 10Q04ZS, 10Q04ZT, 10Q04ZV, 10Q04ZY, 10Q07YE, 10Q07YF, 10Q07YG, 10Q07YH, 10Q07YJ, 10Q07YK, 10Q07YL, 10Q07YM, 10Q07YN, 10Q07YP, 10Q07YQ, 10Q07YR, 10Q07YS, 10Q07YT, 10Q07YV, 10Q07YY, 10Q07ZE, 10Q07ZF, 10Q07ZG, 10Q07ZH, 10Q07ZJ, 10Q07ZK, 10Q07ZL, 10Q07ZM, 10Q07ZN, 10Q07ZP, 10Q07ZQ, 10Q07ZR, 10Q07ZS, 10Q07ZT, 10Q07ZV, 10Q07ZY, 10Q08YE, 10Q08YF, 10Q08YG, 10Q08YH, 10Q08YJ, 10Q08YK, 10Q08YL, 10Q08YM, 10Q08YN, 10Q08YP, 10Q08YQ, 10Q08YR, 10Q08YS, 10Q08YT, 10Q08YV, 10Q08YY, 10Q08ZE, 10Q08ZF, 10Q08ZG, 10Q08ZH, 10Q08ZJ, 10Q08ZK, 10Q08ZL, 10Q08ZM, 10Q08ZN, 10Q08ZP, 10Q08ZQ, 10Q08ZR, 10Q08ZS, 10Q08ZT, 10Q08ZV, 10Q08ZY, 10S07ZZ, 10S0XZZ, 10Y03ZE, 10Y03ZF, 10Y03ZG, 10Y03ZH, 10Y03ZJ, 10Y03ZK, 10Y03ZL, 10Y03ZM, 10Y03ZN, 10Y03ZP, 10Y03ZQ, 10Y03ZR, 10Y03ZS, 10Y03ZT, 10Y03ZV, 10Y03ZY, 10Y04ZE, 10Y04ZF, 10Y04ZG, 10Y04ZH, 10Y04ZJ, 10Y04ZK, 10Y04ZL, 10Y04ZM, 10Y04ZN, 10Y04ZP, 10Y04ZQ, 10Y04ZR, 10Y04ZS, 10Y04ZT, 10Y04ZV, 10Y04ZY, 10Y07ZE, 10Y07ZF, 10Y07ZG, 10Y07ZH, 10Y07ZJ, 10Y07ZK, 10Y07ZL, 10Y07ZM, 10Y07ZN, 10Y07ZP, 10Y07ZQ, 10Y07ZR, 10Y07ZS, 10Y07ZT, 10Y07ZV, 10Y07ZY Delivery outcomes: ICD-10-CM: O0.486, O00.0, O00.00, O00.01, O00.10, O00.101, O00.102, O00.109, O00.11, O00.111, O00.112, O00.119, O00.2, O00.20, O00.201, O00.202, O00.209, O00.21, O00.211, O00.212, O00.219, O00.8, O00.80, O00.81, O00.9, O00.90, O00.91, O001, O01.0, O01.1, O01.9, O02.0, O02.81, O02.89, O02.9, O03.0, O03.1, O03.2, O03.30, O03.31, O03.32, O03.33, O03.34, O03.35, O03.36, O03.37, O03.38, O03.39, O03.4, O03.5, O03.6, O03.7, O03.80, O03.81, O03.82, O03.83, O03.84, O03.85, O03.86, O03.87, O03.88, O03.89, O03.9, O04.5, O04.6, O04.7, O04.80, O04.81, O04.82, O04.83, O04.84, O04.85, O04.87, O04.88, O04.89, O07.0, O07.1, O07.2, O07.30, O07.31, O07.32, O07.33, O07.34, O07.35, O07.36, O07.37, O07.38, O07.39, O07.4, O08.0, O08.1, O08.2, O08.3, O08.4, O08.5, O08.6, O08.7, O08.81, O08.82, O08.83, O08.89, O08.9, O80, O82, Z37.1, Z37.2, Z37.3, Z37.4, Z37.50, Z37.51, Z37.52, Z37.53, Z37.54, Z37.59, Z37.60, Z37.61, Z37.62, Z37.63, Z37.64, Z37.69, Z37.7, Z37.9, Z37.0 Delivery procedures: ICD-10-PCS: 10D00Z0, 10D00Z1, 10D00Z2, 10D07Z3, 10D07Z4, 10D07Z5, 10D07Z6, 10D07Z7, 10D07Z8, 10E0XZZ, 10A00ZZ, 10A03ZZ, 10A04ZZ, 10A07Z6, 10A07ZW, 10A07ZX, 10A07ZZ, 10A08ZZ Vaginal delivery: DRG: 767, 768, 774, 775 Cesarean delivery: DRG: 765, 766
Covariates: Medical conditions[7,17,18]	*Must have 2 outpatient codes 30 days apart or 1 inpatient code for the following medical conditions from 2013 to 2018:* Diabetes: ICD-10-CM: E10.X, E11.X ICD-9-CM: 250.X Hypertension: ICD-10-CM: I10.X, I11.X, I12.X, I13.X, I15.X ICD-9-CM: 401.X, 402.X, 403.X, 404.X, 405.X Epilepsy: ICD-10-CM: G40.X, G41.0, G41.1, G41.2, G41.8, G41.9 ICD-9-CM: 345.0, 345.1, 345.2, 345.3, 345.4, 345.5, 345.7, 345.8, 345.9 Breast Cancer: ICD-10-CM: C50.X, D05.0, D05.1, D05.8, D05.9 ICD-9-CM: 174.X, 198.81, 233.0, 238.3, 239.3 Endometrial cancer: ICD-10-CM: C54.0, C54.1, C54.2, C54.8, C54.9

Conditions and medications	Medical and drug codes
	ICD-9-CM: 182.X, 233.2 Ovarian cancer: ICD-10-CM: C56.X, C79.6, D39.1 ICD-9-CM: 183.X, 198.6, 236.2, Tuberculosis: ICD-10-CM: A15.X, A17.X, A18.X, A19.X ICD-9-CM: 010.X, 011.X, 012.X, 013.X, 014.X, 015.X, 016.X, 017.X, 018.X, Sickle cell disease: ICD-10-CM: D57.0, D57.1, D57.2 ICD-9-CM: 282.6X Systemic lupus erythematosus: ICD-10-CM: M32.0, M32.1X, M32.8, M32.9 ICD-9-CM: 710.0 Cirrhosis: ICD-10-CM: K70.3, K71.7, K74.3, K74.4, K74.5, K74.6 ICD-9-CM: 571.2, 571.5, 571.6 Thrombogenic mutations: ICD-10-CM: D68.5X, D68.6X ICD-9-CM: 289.81 Schistosomiasis (with fibrosis of liver– wasn't used in ICD 9 codes): ICD-10-CM: B65.X ICD-9-CM: ICD-9: 120.X Liver Cancer: ICD-10-CM: C22.X ICD-9-CM: 155.X, 197.7, 230.8, 235.3 Gestational trophoblastic disease: ICD-10-CM: O01.X ICD-9-CM: 630.X, Ischemic heart disease: ICD-10-CM: I20.X, I21.X, I22.X, I24.X, I25.X ICD-9-CM: 410.X, 411.X, 412.X, 413.X, 414.X Valvular heart disease: ICD-10-CM: I05.X, I06.X, I07.X, I08.X, I34.X, I35.X, I38.X, Q22.X ICD-9-CM: 394.X, 395.X, 396.X Stroke: ICD-10-CM: I61.X, I62.0, I62.1, I62.9, I63, I64 ICD-9-CM: 430.X, 431.X, 432.X, 433.X, 434.X, 435.X, 436.X, 437.X Transplantation: ICD-10-CM: Z94.X ICD-9-CM: 199.2, 238.77, 996.8X, V58.44, E87.80, V42.X Peripartum cardiomyopathy: ICD-10-CM: O90.3 (O903) ICD-9-CM: 674.5X Bariatric surgery: ICD-10-CM: Z98.84 (Z9884) ICD-9-CM: V45.86 CPT: 43770, 43771, 43773, 43886, 43887, 43888, 43644, 43645, 43842, 43843, 43845, 43846, 43847, 43848 *Must have 1 outpatient or 1 inpatient code of the following condition 2013–2018:* Migraines with and without aura: ICD-10-CM: G43.X ICD-9-CM: 346.0X, 346.1X, 346.2X, 346.3X, 346.4X, 346.5X, 346.6X, 346.7X, 346.8X, 346.9X
Exposures of Interest:	
Opioid Use Disorder[#**††]	*Meet either of the following:* ICD-10-CM: F11.1X (excluding F11.11) or F11.2X (excluding F11.21) in 2017 or 2018 in inpatient or outpatient databases (F11.1, F11.10, F11.12, F11.120, F11.121, F11.122, F11.129, F11.14, F11.15, F11.150, F11.159, F11.18, F11.181, F11.182, F11.188, F11.19, F11.2, F11.20, F11.22, F11.220, F11.221, F11.222, F11.229, F11.23, F11.24, F11.25, F11.250, F11.251, F11.259, F11.28, F11.281, F11.282, F11.29, F11.288, F111.51) OR ICD-10-CM: F11.11 or F11.21 in 2017 or 2018 in inpatient or outpatient databases AND 1 outpatient prescription/outpatient administration code/outpatient supply code of GPI or HCPCS codes for MAT (buprenorphine, buprenorphine/suboxone, naltrexone or methadone) per codes below in 2018
Opioid Use Disorder prescribed MOUD treatment[#**††]	*Must meet both criteria:* ICD-10-CM: F11.1X or F11.2X in 2017 or 2018 in inpatient or outpatient database (F11.1, F11.10, F11.11, F11.12, F11.120, F11.121, F11.122, F11.129, F11.14, F11.15, F11.150, F11.159, F11.18, F11.181, F11.182, F11.188, F11.19, F11.2, F11.20, F11.21, F11.22, F11.220,

Conditions and medications	Medical and drug codes
	F11.221, F11.222, F11.229, F11.23, F11.24, F11.25, F11.250, F11.251, F11.259, F11.28, F11.281, F11.282, F11.29, F11.288, F111.51) AND 1 outpatient prescription/outpatient administration code/outpatient supply code of GPI or HCPCS codes for MAT (buprenorphine, buprenorphine/suboxone, naltrexone or methadone) per codes below in 2018
Opioid Use Disorder not prescribed MOUD treatment[#**††]	*Must meet both criteria:* ICD-10-CM: F11.1X (excluding F11.11) or F11.2X (excluding F11.21) in 2017 or 2018 in inpatient or outpatient database (F11.1, F11.10, F11.12, F11.120, F11.121, F11.122, F11.129, F11.14, F11.15, F11.150, F11.159, F11.18, F11.181, F11.182, F11.188, F11.19, F11.2, F11.20, F11.22, F11.220, F11.221, F11.222, F11.229, F11.23, F11.24, F11.25, F11.250, F11.251, F11.259, F11.28, F11.281, F11.282, F11.29, F11.288, F111.51) AND No outpatient prescription/outpatient administration code/outpatient supply code of GPI or HCPCS codes for MAT (buprenorphine, buprenorphine/suboxone, naltrexone or methadone) per codes below in 2018
Medications for Opioid Use Disorder (MOUD)[**††‡]	*To be used in combination with Opioid use disorder diagnostic codes described above:* Buprenorphine (ER inj, implant, sublingual): GPI: 123029, 123030, 132799, 134483, 135068 Buprenorphine/naloxone (buccal, sublingual film and tab): GPI: 131213, 131214, 131215, 131216, 131218, 131219, 131221, 131222, 131645, 131670, 132062, 133578, 134294, 134295, 134296 HCPCS (Outpatient administration of buprenorphine/naloxone): J0571, J0572, J0573, J0574, J0575 Methadone (tab, oral concentrate, inj): GPI: 102392 102393 102394 102395 102396 102397 102398 123566 HCPCS (Outpatient admin of Methadone): H0020, S0109, J1230 Naltrexone (IM inj): GPI: 125094 HCPCS (Outpatient Naltrexone injection): J2315
Outcomes of Interest:	
Long-acting Reversible Contraception:	
Intrauterine Device (IUD)[*†‡]	*Must meet both criteria:* Any of the following codes from 2013 to 2018 *in inpatient or outpatient database* Presence: ICD-10-CM: Z97.5 Insertion: ICD-10-CM: Z30.014, Z30.430, Z30.433 ICD-9-CM: V25.11, V25.13 ICD-10-PCS: OUH90HZ, 0UH97HZ, 0UH98HZ, 0UHC7HZ, 0UHC8HZ ICD-9-PCS: 69.7 CPT: 58300 HCPCS: J7296, J7297, J7298, J7300, J7301, J7302(deleted 01/01/2016), S4989, Q0090 (deleted 1/1/2014), S4981 Not followed by any of these codes in inpatient or outpatient database: Removal: ICD-10-CM: Z30.432 ICD-10-PCS: OUPD7HZ, OUPD8HZ ICD-9-CM: V25.12, ICD-9-PCS: 97.71 CPT: 58301
Implant[*†‡]	*Must meet both criteria:* Any of these codes used from 2015 to 2018 in inpatient or outpatient database: Presence: ICD-9-CM: V45.52 Insertion: ICD-10-CM: Z30.017, Z30.46 ICD-9-CM: V25.5 CPT: 11975, 11977, 11981, 11983 HCPCS: J7306, J7307 Not followed by these codes in inpatient or outpatient database: Removal: CPT: 11976, 11982

Conditions and medications	Medical and drug codes
Short-acting Hormonal Contraception:	
Injectable Contraception *†‡	*Either criteria of the following must be met in inpatient or outpatient database in 2018:* Injection of medroxyprogesterone acetate: HCPCS: J1050 OR Family Planning encounter: ICD-10-CM: Z30.0, Z30.012, Z30.018, Z30.019, Z30.09, Z30.40, Z30.49, Z30.8, Z30.9 AND on same day Injection: CPT: 96372
Contraceptive patch *†‡‡	*Any of the following codes in 2018 in outpatient prescriptions:* GPI: 119146, 128775, 131135
Contraceptive ring *†‡‡	*Any of the following codes in 2018 in outpatient prescriptions:* GPI: 123340
Contraceptive pills *†‡‡	*Any of the following codes in 2018 in outpatient prescriptions:* GPI: 101027, 101489, 101490, 102153, 102759, 102761, 102762, 102765, 102768, 102769, 102772, 102775, 102776, 108159, 108160, 109514, 109630, 109788, 110119, 112742, 113426, 113486, 114407, 115052, 122790, 122792, 122793, 122794, 122795, 122796, 122799, 122800, 122801, 122802, 122803, 122804, 122806, 122807, 122809, 122810, 122812, 122870, 122908, 123025, 123044, 123058, 123545, 123546, 123548, 123771, 123773, 123779, 124749, 125060, 125086, 125218, 125234, 125375, 125376, 125561, 125789, 125947, 126318, 127463, 128230, 128236, 128449, 128593, 128656, 128732, 128748, 128839, 128856, 129061, 129213, 129929, 130110, 130644, 130698, 130775, 131061, 131315, 133235, 134350, 134922, 134928 NDC: 00008005603, 00008007802, 00008007803, 00014008158, 00014008184, 00014015142, 00014015160, 00014016156, 00014016184, 00014040107, 00014040108, 00014040113, 00014040124, 00014040160, 00014040163, 00014042109, 00014042114, 00014042115, 00025005131, 00025007113, 00025008114, 00025010150, 00025015113, 00025016114, 00025031103, 00025032103, 00025033106, 00025034106, 00062135108, 00062139015, 00062139115, 00062176022, 00062176122, 00062177022, 00062177122, 00071090111, 00071090146, 00071090335, 00071090336, 00071090411, 00071090446, 00071090535, 00071090536, 00071090735, 00071090736, 00071091336, 00071091546, 00071091646, 00071091736, 00251341010, 00251381010, 00304205621, 00304205628, 00304205721, 00304205728, 00304210428, 00536405544, 00536405644, 00536405744, 17236038528, 17236046012, 17236046028, 42987010213, 42987010214, 42987010223, 42987010224, 42987010227, 42987010228, 42987010312, 42987010320, 47202290921, 47202291028, 54765003521, 54765003528, 99999100026, 99999100063, 99999100068, 99999100084, 99999200026, 99999200063, 99999200068, 99999200084, 99999777603, 99999777604, 99999777606, 99999777607
Female Sterilization *‡	*Any of the following codes used from 2013 to 2018 in inpatient or outpatient databases:* ICD-10-CM: Z30.2 ICD-9-CM: V25.2, 66.2, 66.3 CPT: 58565, 58579, 58600, 58605, 58611, 58615, 58670, 58671 HCPCS: A4264

ICD-10-CM = International Classification of Diseases, Tenth Edition, Clinical Modification

ICD-9-CM = International Classification of Diseases, Ninth Edition, Clinical Modification

HCPCS = Healthcare Common Procedure Coding System

ICD-10-PCS = International Classification of Diseases, Tenth Edition, Procedure Coding System

DRG = Diagnosis-Related Group

GPI = Generic Product Identification

ICD-9-PCS = International Classification of Diseases, Ninth Edition, Procedure Coding System

CPT = Current Procedural Terminology

NDC = National Drug Code

* Office of Population Affairs, Claims Code Sets, Contraceptive-Code-Lookup-v2-2018, https://www.hhs.gov/opa/performance-measures/claims-data-sas-program-instructions/index.html [accessed 18 September 2020]

† Optum 360 Encoder Pro, http://www.encoderpro.com [accessed 23 September 2020]

‡Haddad LB, Monsour M, Tepper NK, Whiteman MK, Kourtis AP, Jamieson DJ. Trends in contraceptive use according to HIV status among privately insured women in the United States. *Am J Obstet Gynecol*. 2017;217(6):676.e1-676.e11. http://doi.org/10.1016/j.ajog.2017.08.006

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‖Dynamed, https://www.dynamed.com [accessed 30 July 2021]

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††U.S. Federal Food and Drug Administration. Information about Medication-Assisted Treatment (MAT). Last updated February 14, 2019, https://www.fda.gov/drugs/information-drug-class/information-about-medication-assisted-treatment-mat [accessed 30 July 2021]

‡‡IBM Watson RED BOOK®

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Table 1

Characteristics of U.S. women 20−49 years with opioid use disorder, by medications for opioid use disorder prescription status and insurance type, IBM Watson MarketScan, 2018

	Commercial Insurance					**Medicaid Insurance**				
	Prescribed MOUD[a]		**Not Prescribed MOUD[a]**			**Prescribed MOUD[a]**		**Not Prescribed MOUD[a]**		
	***N* = 1,266 (41.0%)**		***N* = 1,819 (59.0%)**			**N = 1,580 (41.1%)**		**N = 2,261 (58.9%)**		
	N	**%**	***N***	**%**	***p*-value[b]**	***N***	**%**	***N***	**%**	***p*-value[b]**
Age (years)					<0.0001[c]					<0.0001[c]
20 – 29	500	39.5	607	33.4		345	21.8	324	14.3	
30 – 39	361	28.5	383	21.0		835	52.9	914	40.4	
40 – 49	405	32.0	829	45.6		400	25.3	1023	45.3	
Region					<0.0001[c]					
Northeast	361	28.5	431	23.7		-	-	-	-	
North Central	318	25.1	354	19.4		-	-	-	-	
South	414	32.7	780	42.9		-	-	-	-	
West	NR[d]	NR[d]	254	14.0		-	-	-	-	
Unknown	NR[d]	NR[d]	0	0		-	-	-	-	
Race/Ethnicity										<0.0001[c]
White	-	-	-	-		1191	75.4	1279	56.6	
Black	-	-	-	-		208	13.2	755	33.4	
Hispanic	-	-	-	-		7	0.4	7	0.3	
Other	-	-	-	-		148	9.4	181	8.0	
Unknown	-	-	-	-		26	1.6	39	1.7	
Medical Conditions[e]	560	44.2	1068	58.7	<0.0001[f]	883	55.9	1786	79.0	<0.0001[f]

MOUD, medications for opioid use disorder.

[a]Opioid use disorder is defined by diagnostic codes, procedural codes and outpatient prescriptions in claims data (Appendix)

[b]Holm-Bonferroni adjustment: *P*-values ≤ 0.0001 are statistically significant

[c]Chi-square Test

[d] NR – not reported; not reported to protect individual level data

[e] Selected medical condition identified through diagnostic and procedural codes in claims data (Appendix): diabetes, hypertension, epilepsy, breast cancer, endometrial cancer, ovarian cancer, tuberculosis, sickle cell disease, systemic lupus erythematosus, cirrhosis, thrombogenic mutations, schistosomiasis with fibrosis of liver, liver cancer, gestational trophoblastic disease, ischemic heart disease, valvular heart disease, stroke, transplantation, peripartum cardiomyopathy, bariatric surgery, and migraines (without or without aura)

[f] Fisher's Exact Test

Table 2

Crude prevalence of contraceptive methods in 2018 among U.S. women 20−49 years with opioid use disorder, by medications for opioid use disorder prescription status and insurance type, IBM Watson MarketScan, 2018

	Commercial Insurance					Medicaid Insurance				
	Prescribed MOUD		Not prescribed MOUD			Prescribed MOUD		Not prescribed MOUD		
	N = 1,266 (41.0%)		*N* = 1,819 (59.0%)			*N* = 1,580 (41.1%)		*N* = 2,261 (58.9%)		
	N	%	*N*	%	*p*-value[a]	*N*	%	*N*	%	*p*-value[a]
Long-acting reversible contraception[b]	178	14.1	233	12.8	0.332	155	9.8	168	7.4	0.009
Short-acting hormonal contraception[c]	213	16.8	327	18.0	0.413	112	7.1	137	6.1	0.206
Female sterilization	42	3.3	56	3.1	0.755	190	12.0	170	7.5	<0.0001
No prescription contraception or female sterilization	833	65.8	1,203	66.1	0.847	1,123	71.1	1,786	79.0	<0.0001

MOUD, medications for opioid use disorder.

Opioid use disorder is defined by diagnostic codes, procedural codes and outpatient prescriptions in claims data (Appendix)

Assignment of contraceptive method was by most effective method

Diagnostic codes, procedural codes and outpatient prescription drug claims were used to define contraception use (Appendix)

[a] Fisher's Exact Test by contraceptive method; Holm-Bonferroni adjustment: *P*-values ≤ 0.0001 are statistically significant

[b] Includes intrauterine devices and implant contraceptives

[c] Includes injectable, pill, patch or ring contraceptives

Table 3

Multivariable multinomial regression models of prescription contraceptive prevalence among U.S. women 20−49 years with opioid use disorder, by medications for opioid use disorder prescription status and insurance type, IBM Watson MarketScan 2018

		Long-acting reversible contraception	Short-acting hormonal contraception	Female sterilization	No prescription contraception or female sterilization[b]
		aOR (95% CI)	aOR (95% CI)	aOR (95% CI)	
Commercial Insurance	Prescribed MOUD vs not prescribed[a]	0.97 (0.79, 1.21)	0.82 (0.67, 1.01)	1.03 (0.68, 1.57)	ref
Medicaid Insurance	Prescribed MOUD vs not prescribed[c]	1.10 (0.87, 1.40)	1.05 (0.81, 1.38)	1.33 (1.06, 1.67)	ref

MOUD, medications for opioid use disorder; aOR, adjusted odds ratio; ref, reference.

Opioid use disorder is defined by diagnostic codes, procedural codes and outpatient prescriptions in claims data (Appendix)

Assignment of contraceptive method was by most effective method

Diagnostic codes, procedural codes and outpatient prescription drug claims were used to define contraception use (Appendix)

[a] adjusted for age and selected medical conditions identified through diagnosis codes (Appendix): diabetes, hypertension, epilepsy, breast cancer, endometrial cancer, ovarian cancer, tuberculosis, sickle cell disease, systemic lupus erythematosus, cirrhosis, thrombogenic mutations, schistosomiasis with fibrosis of liver, liver cancer, gestational trophoblastic disease, ischemic heart disease, valvular heart disease, stroke, transplantation, peripartum cardiomyopathy, bariatric surgery, and migraines (without or without aura).

[b] adjusted for age, race and medical conditions.

[c] adjusted for age