Prevalence and predictors of medication for opioid use disorder among reproductive-aged women

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HIGHLIGHTS

- Pregnant women with OUD are more likely to receive **MOUD** than non-pregnant women.
- Only half of pregnant women in publicly funded treatment centers receive **MOUD**.
- The low rate of **MOUD** treatment among pregnant women has not changed in 20 years.

ARTICLE INFO

ABSTRACT

Background: Women of reproductive age would benefit from treatment of opioid use disorder (OUD) prior to pregnancy to improve maternal and infant outcomes. In this study, we aimed to identify the prevalence of medication for OUD (MOUD) and characterize correlates of MOUD receipt among 12–49-year-old women with OUD seeking treatment in publicly funded substance use disorder treatment programs at the time of their first treatment episode.
Methods: This cross-sectional study explores the demographic and clinical characteristics of women of reproductive age with OUD receiving publicly funded substance use treatment services. We used data from the concatenated 2015–2021 Treatment Episode Data Set–Admissions (TEDS-A), which documents demographic and clinical characteristics of patient admissions to publicly funded substance use treatment services in the United States.
Results: In the sample of females aged 12–49 with no prior treatment admissions and primary OUD (n=325,512), 40.53% received MOUD (n=131,930), including 39.40% of non-pregnant women (n=115,315) and 52.79% of pregnant women (n=8423). Pregnant women had significantly higher odds of receiving MOUD (aOR = 2.42, 95%CI: 2.30, 2.54) compared to non-pregnant women. Non-white race, treatment setting, and treatment self-referral were also associated with higher levels of MOUD.
Conclusions: We identified a significant unmet need among both pregnant and non-pregnant women with OUD seeking care in publicly funded treatment clinics. While women who are pregnant are significantly more likely to receive evidence-based treatment with MOUD, still 47.21% of pregnant women did not receive MOUD. All reproductive-aged women with OUD should be offered evidence-based treatment options, including MOUD.

1. Introduction

Opioid use among pregnant women has increased dramatically with the number of women with opioid-related diagnoses documented at delivery increasing by 131% from 2010 to 2017 (Hirai et al., 2021). Evidence-based medications for opioid use disorder (MOUD) include methadone, buprenorphine, and oral and long-acting injection formulations of naltrexone (Blanco and Volkow, 2019). Despite both

methadone and buprenorphine being the standard of care during pregnancy (American College of Obstetricians and Gynecologists, 2017), only 30–58% of patients with OUD during pregnancy receive MOUD (Jarlenski et al., 2021; Martin et al., 2015; Short et al., 2018). Barriers to MOUD for pregnant patients include stigma, lack of clinical training, and lack of integration of MOUD into practice (Madras et al., 2020).

With many birthing people not identifying pregnancy until well after conception, treating OUD with MOUD in the preconception period, before pregnancy, has the potential to lower the risk of the known adverse maternal and fetal outcomes associated with perinatal opioid use (Behnke et al., 2023). In a large regional sample, it was estimated that only 25.7% of treatment-seeking women with OUD received MOUD at treatment admission (Khachikian et al., 2022). In this study, we identify the prevalence of MOUD and explore correlates of MOUD treatment among 12–49-year-old women in a national dataset of publicly funded substance use treatment admissions. We hypothesize that there will be low uptake of MOUD among treatment-seeking people and that women who are pregnant will be more likely to receive MOUD.

2. Materials and methods

2.1. Data and sample

We used cross-sectional data from the 2015–2021 Treatment Episode Data Set–Admissions (TEDS-A), which documents demographic and clinical characteristics of admissions to federally-funded substance use treatment programs in the US (Substance Abuse and Mental Health Services Administration., 2023a). Although SAMHSA attempts to collect data on all admissions to substance use treatment facilities, the dataset is not exhaustive as the number of states and other jurisdictions participating may vary from year to year and the scope of facilities included in state administrative systems varies across states. TEDS-A data are compiled from state administrative systems and may exclude treatment records from settings not licensed or overseen by the state, such as hospital-based SUD treatment, correctional facility-based treatment, private practices receiving public funds, or Veterans' Health Administration-funded treatment (Substance Abuse and Mental Health Services Administration., 2023a). Sobering centers and SUD-related emergency department visits are excluded. The unit of analysis for TEDS-A is the treatment episode to the state-licensed or certified substance use treatment center, not the unique individual receiving treatment services. Data are collected on psychosocial and demographic information, the primary, secondary, or tertiary substance used by the patient, substance use patterns, prior treatment utilization, service setting, and planned use of MOUD.

The analytic sample included women aged 12—49 years with no prior treatment episodes, a primary OUD diagnosis, and data on whether MOUD was prescribed. Primary OUD was positive if the admission included a primary diagnosis of "heroin," "non-prescription methadone," or "other opiates and synthetics" use. We excluded women with prior treatment episodes to approximate the number of unique patients, since TEDS documents unique admissions rather than unique individuals, i.e., a patient with a prior treatment episode could be counted more than once in the analysis.

2.2. Measures

Measures included patient demographics, substance use, and service-related characteristics that are routinely collected in the TEDS-A. Any prescribed MOUD (yes/no) was derived from the variable "METHUSE," which identified whether methadone, buprenorphine, or naltrexone, were a part of the client's treatment plan. This administration may be inferred to be new MOUD receipt because the treatment episode documented no prior treatment. Of note, the specific medication prescribed was not reported. Selection of variables for inclusion was informed by prior empirical and theoretical literature but is limited in scope due to

the TEDS-A being an administrative dataset. Demographic characteristics included pregnancy status (yes/no), age (12–17, 18–24; 25–34; 35–49), race (American Indian/Alaskan Native [AIAN], Asian or Pacific Islander [API], Black, White, Other or Multiracial), ethnicity (Hispanic), education (less than high school, completed high school, any post-secondary education), housing status (independent, dependent, or homeless), employment status (employed, unemployed, not in labor force), past-month arrests (yes/no), marital status (yes/no), and geographic region (Northeast, Southeast, South, and West). Clinical and treatment characteristics included psychiatric comorbidity (yes/no), frequency of use (none in the past month, some, daily), route of administration (injection, oral, smoking, inhalation, other), referral source (self, community/healthcare agency, criminal justice system), and polysubstance use (yes/no). Polysubstance use was identified if clients had any secondary or tertiary substance use disorder (SUD) not including existing heroin, non-prescription methadone, or other opiates/synthetics use. In addition, service setting categories included 24-hour detoxification (either hospital inpatient or freestanding residential), residential (hospital-based, short-term, or long-term), or ambulatory (intensive outpatient, non-intensive outpatient, or detoxification).

2.3. Analysis

We used descriptive statistics to show the demographic and clinical characteristics of patients receiving MOUD. We conducted chi-square tests to explore the bivariate association between patient and service characteristics and MOUD. Correlates of MOUD were identified using multivariate logistic regression analyses. In the multivariate model, cases were deleted listwise. Analyses were conducted using Stata 16.1. Since this study used publicly available, de-identified data, the Saint Louis University Institutional Review Board determined that IRB approval was not required. Authors intend to provide relevant code on written reasonable request.

3. Results

From 2015–2021, 1,317,676 admissions included women aged 12–49 with no documented prior treatment. OUD was primary in 28.24% (n=352,451) of these admissions. MOUD data were available for 92.36% of admissions with primary OUD (n=325,512) and was prescribed in 40.53% of valid cases. Demographic characteristics are shown in Table 1. 52.79% of pregnant women received MOUD. Planned MOUD use was highest among those aged 35–49 (48.12%) relative to other age groups and lowest among those aged 12–17 (6.25%). Planned MOUD use was highest among admissions of women who were multiracial or other races (48.49%), followed by Black (47.45%), Asian or Pacific Islander (44.33%), white (38.31%), or American Indian/Alaskan Native (34.87%) women. Just over half of ambulatory treatment admissions were prescribed MOUD (52.43%), whereas only about 10% of residential or detoxification services prescribed MOUD. Just over half of self-referral admissions were prescribed MOUD, compared to 32.31% of community or healthcare referrals and 10.57% of criminal justice referrals.

Table 2 shows adjusted and unadjusted multivariate logistic regression results. Variance inflation factor values ranged from 1.02 to 1.30 (M = 1.09), indicating minimal multicollinearity. When adjusting for all other variables, pregnancy status had the strongest positive association with receiving MOUD (OR = 2.23, 95%CI:2.30, 2.54). Compared to treatment admissions of White clients, API had a similar likelihood of MOUD treatment, AIAN had about half the odds of receiving MOUD, and recipients who were Black, multiracial, or part of another racial group had slightly higher odds of MOUD treatment. MOUD was less likely to occur in residential or detoxification settings. Recipients were less likely to be referred from criminal justice or community/healthcare settings compared to self-referral.

Table 1

Demographic and clinical characteristics of females (12 – 49) with primary opioid use disorder by medication assisted treatment (MAT) status.

	MOUD (N = 131,946; 40.53%)		No MOUD (N = 193,566; 59.47%)	
	N	%	N	%
Pregnancy				
Pregnant	8423	52.79	7534	47.21
Not Pregnant	115,315	39.40	177,387	60.60
Age				
12 – 17	99	6.25	1486	93.75
18 – 24	16,842	31.42	36,758	68.58
25 – 34	63,803	38.92	100,127	61.08
35–49	51,202	48.12	55,195	51.88
Race				
American Indian/Alaskan Native	2024	34.87	3780	65.13
Asian or Pacific Islander	1103	44.33	1385	55.67
Black	13,060	47.45	14,461	52.55
White	97,585	38.31	157,141	61.69
Multiracial or other	11,505	48.49	12,223	51.51
Hispanic				
Yes	22,480	49.01	23,390	50.99
No	109,466	39.15	170,176	60.85
Education				
Less than high school/GED	26,391	37.87	43,305	62.13
High school/GED	60,068	40.74	87,368	59.26
Greater than high school/GED	29,687	36.55	51,527	63.45
Housing Status				
Independent living	95,599	43.54	123,950	56.46
Dependent living	17,112	32.83	35,009	67.17
Homeless	8889	27.05	23,978	72.95
Employment Status				
Unemployed	48,858	33.83	95,570	66.17
Employed	26,205	45.13	31,865	54.87
Not in labor force	44,293	42.47	59,995	57.53
Arrested (past 30 days)				
Yes	5205	25.45	15,248	74.55
No	115,685	39.81	174,911	60.19
Married				
Yes	14,492	40.27	21,497	59.73
No	73,899	35.79	132,564	64.21
Region				
Northeast	29,080	49.65	29,490	50.35
Midwest	17,041	35.35	31,159	64.65
South	44,869	33.52	88,989	66.48
West	40,956	48.25	43,928	51.75
Psychiatric Condition				
Yes	37,514	34.28	71,934	65.72
No	80,229	43.63	103,647	56.37
Polysubstance Use				
Yes	49,569	31.26	109,026	68.74
No	82,377	49.35	84,540	50.65
Frequency of Use (past 30 days)				
None	27,279	35.55	49,460	64.45
Some	20,207	33.12	40,807	66.88
Daily	79,641	44.14	100,800	55.86
Route of Administration				
Oral	32,005	38.11	51,983	61.89
Smoking	11,689	39.18	18,146	60.82
Inhalation	28,948	44.56	36,009	55.44
Injection	50,549	61.57	80,978	38.43
Other	7996	63.40	4615	36.60
Service Setting				
Ambulatory	122,773	52.43	111,404	47.57
Residential	4298	10.30	37,442	89.70
Detoxification	4875	9.83	44,720	90.17
Referral Source				
Self	99,186	51.75	92,476	48.25
Community/Healthcare	27,014	32.31	56,589	67.69
Criminal Justice	4634	10.57	39,209	89.43

Sample sizes for each variable differ due to missing data. All chi-square tests are statistically significant at p <.001

Table 2

Correlates of MOUD among females aged 12 – 49 with primary opioid use disorder (N = 178,740).

	Adjusted OR	95% CI	Unadjusted OR	95%CI
Pregnant	2.42***	2.30, 2.54	2.24***	2.14, 2.34
Age				
12 – 17	0.11***	0.08, 0.15	0.11***	0.09, 0.14
18 – 24	0.57***	0.55, 0.59	0.55***	0.53, 0.57
25 – 34	0.81***	0.79, 0.83	0.74***	0.72, 0.76
35 – 49 (reference)				
Psychiatric condition	0.99	0.97, 1.01	1.03**	1.01, 1.05
Polysubstance use	0.68***	0.66, 0.69	0.63***	0.61, 0.64
Married	1.04*	1.01, 1.07	1.25***	1.21, 1.28
Region				
Northeast (reference)				
Midwest	0.52***	0.50, 0.54	0.48***	0.46, 0.49
South	0.28***	0.27, 0.29	0.30***	0.29, 0.30
West	0.47***	0.45, 0.50	0.35***	0.33, 0.36
Race				
White (reference)				
American Indian/Alaskan Native	0.56***	0.51, 0.63	2.42***	2.06, 2.83
Asian or Native Hawaiian/ Pacific Islander	1.03	0.89, 1.20	2.93***	2.65, 3.24
Black	1.13***	1.09, 1.18	2.10***	1.91, 2.31
Other or Multiracial	1.21***	1.15, 1.29	2.91***	2.62, 3.23
Hispanic	1.13 ***	1.08, 1.18	1.34***	1.30, 1.39
Education				
< High school/GED (reference)				
High school/GED	1.00	0.97, 1.03	1.06***	1.04, 1.09
> High school/GED	0.79***	0.77, 0.82	0.98	0.96, 1.01
Housing status				
Independent (reference)				
Dependent	0.79***	0.76, 0.82	0.55***	0.53, 0.57
Homeless	0.81***	0.78, 0.85	0.53***	0.51, 0.55
Employment				
Unemployed (reference)				
Employed	1.21***	1.18, 1.25	1.75***	1.71, 1.79
Not in labor force	1.23***	1.19, 1.26	1.53***	1.49, 1.56
Arrested	0.93**	0.89, 0.98	0.65***	0.62, 0.68
Frequency of use				
None (reference)				
Some	0.74***	0.71, 0.77	0.77***	0.75, 0.80
Daily	1.33***	1.29, 1.37	1.23***	1.20, 1.26
Route				
Injection (reference)				
Oral	0.70***	0.68, 0.72	1.07***	1.04, 1.09
Smoking	0.67***	0.63, 0.71	0.70***	0.66, 0.73
Inhalation	1.09***	1.06, 1.12	1.57***	1.53, 1.61

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Table 2 (*continued*)

	Adjusted OR	95% CI	Unadjusted OR	95%CI
Other	0.77***	0.71, 0.85	0.89***	0.82, 0.96
Service Setting				
Ambulatory (reference)				
Residential	0.18***	0.18, 0.19	0.20***	0.19, 0.20
Detoxification	0.13***	0.13, 0.14	0.18**	0.17, 0.19
Referral source				
Self (reference)				
Community/Healthcare	0.54***	0.53, 0.56	0.58***	0.56, 0.59
Criminal justice	0.16***	0.16, 0.17	0.20***	0.19, 0.20

4. Discussion

While pregnant women were more likely to receive MOUD compared to women who were not pregnant, only half of women without prior treatment episodes who were pregnant received any MOUD. This estimate is unchanged from an analysis of 1996—2014 TEDS data where approximately 50% of pregnant admissions with OUD received pharmacotherapy (Short et al., 2018), and women with prior treatment episodes were not excluded from analysis. While clinicians who treat people in the preconception period may not consider the benefits of MOUD, clinician awareness has the potential to influence both access and uptake of MOUD. For example, clinicians' knowledge of guidelines recommending MOUD during pregnancy influences pregnant women's access to MOUD (Tran et al., 2017). Initiating MOUD before pregnancy is especially important given the association between illicit drug use and delayed identification of pregnancy, making each interaction with a clinician an opportunity to provide treatment that has the potential to improve maternal and pregnancy outcomes (McCarthy et al., 2018).

It is concerning that despite significant changes in policies to increase MOUD access over the past 20 years, uptake by people who are pregnant has remained unchanged. Many regions continue to lack a buprenorphine prescribing provider; 42.3% of US counties had no prescriber in 2017 (Andrilla et al., 2019). There are also disparities in prescribing patterns by funding type with publicly funded programs prescribing 28.2% less MOUD than privately funded programs (Abraham et al., 2013). In addition, buprenorphine treatment rates of people 15–24 years old significantly declined from 2010 to 2018 (Olfson et al., 2020) representing a concerning trend for reproductive-age people. Finally, the recent removal of the federal requirement for practitioners to apply for a buprenorphine waiver to treat OUD will likely increase opportunities for MOUD receipt (Substance Abuse and Mental Health Services Administration, 2023b). However, significant barriers including overcoming stigma, lack of practitioner comfort in treating OUD, and clinical complexity need to be addressed to increase treatment access equitably (Haffajee et al., 2018; Winograd et al., 2023)

Comprehensive preconception health services should be offered to women with OUD of reproductive age in the settings where they present for care. While women with OUD may be less likely to seek out primary care services due to fear that they might lose custody of their children (Curet and Hsi, 2002), patients who participate in prenatal MOUD have an increased likelihood of retaining custody post-discharge (Singleton et al., 2022). However, addressing the preconception benefits of MOUD in SUD treatment settings is lacking, with providers often focusing on ways to increase contraceptive uptake to avoid pregnancy (Jones et al., 2021) and offering treatment for OUD after a pregnancy is already established (Collier et al., 2019). Bello et al. (2021) suggest integration of patient-centered preconception services, including screening for pregnancy wishes, identifying desired sexual and reproductive health needs, and offering education, services, and/or referrals, in every sector

that women interface with health professionals such as OUD treatment programs, primary care, and carceral settings (Bello et al., 2021). Importantly, the unique barriers that women with OUD experience, including mistrust of providers and hierarchies that stigmatize people who have engaged in sex work and experienced incarceration must be taken into account by clinicians (Fiddian-Green et al., 2022).

In contrast to studies of women in other types of treatment settings, the odds of receiving MOUD were higher for all racial and ethnic minorities compared to non-Hispanic white women, suggesting racial disparities that may be setting dependent. For example, in an analysis of Medicaid claims data, minoritized racial and ethnic groups had significantly lower odds of receiving MOUD compared to non-Hispanic whites (Dunphy et al., 2022). More research is needed to understand context-specific racial disparities in MOUD treatment. Finally, disparities in MOUD were identified by treatment setting and referral source with MOUD less likely to be offered in residential treatment and opioid withdrawal management programs as well as to patients referred from carceral settings. Reasons for these disparities could partially be explained by stigma in MOUD prescribing practices that vary by setting. For example, many programs do not prescribe MOUD following inpatient opioid withdrawal management despite a patient's desire to continue treatment, known reduction in relapse, and increase in treatment retention when MOUD is started while inpatient (Knudsen et al., 2011; Smyth et al., 2010; Tuten et al., 2007). Patients experience an increase in the likelihood of early return to use and recurrent in-patient admissions due to these ineffective transitions at discharge (Amato et al., 2004).

The finding that referrals from jail-based settings were less likely to receive MOUD may partially be explained by the historic stigma around MOUD use in carceral settings (Grella et al., 2020). For example, while it is well established that MOUD delivered in prisons and jails increases community treatment engagement and reduces illicit opioid and injection drug use (Malta et al., 2019; Moore et al., 2019), a patient or their clinician may feel MOUD is not indicated following a period of abstinence during incarceration if it was not already started prior to referral to treatment. Moreover, while it is recommended that all forms of MOUD be made available in carceral settings, naltrexone may be preferred by criminal-legal officials because it has no risk for misuse or diversion. However, the evidence supporting opioid antagonist therapy is not as strong as for opioid agonist therapy raising ethical questions about treatment availability for people who are incarcerated (Wakeman, 2017).

4.1. Limitations

This study has several limitations. First, TEDS-A records document unique admissions rather than unique clients; however, we attempted to restrict the sample to those cases with no prior treatment. Although this approach is consistent with other studies using TEDS data, clients with histories of multiple treatment episodes could differ from those with no prior episodes (Kitstantas et al., 2023). Second, the cross-sectional design prevents making causal inferences. Third, data reflect publicly funded treatment admissions and are not necessarily representative of the general US population, especially as the number of participating states varied by year. Fourth, while we adjusted for potential confounders in the multivariate models, a full rendering of potentially meaningful covariates is not possible with the TEDS, meaning patient-, provider-, and health systems-level factors could influence the prescription of MOUD for pregnant women. Finally, because MOUD type is not captured in the data set it is not possible to determine if associations differ by MOUD type. Future studies could use other data sources, such as insurance claims or patient-reported nationally representative data that also capture the type of MOUD used to complement and extend these findings.

5. Conclusions

We identified a significant unmet need among pregnant and non-pregnant women with OUD receiving publicly funded treatment. Although pregnant women are significantly more likely to receive MOUD, nearly half of pregnant women did not receive MOUD. Despite recent policy changes designed to increase MOUD access, the estimate of treatment-seeking pregnant women not receiving MOUD is unchanged from prior analyses (Short et al., 2018). The disparities in receipt of MOUD by socio-demographic factors and referral sources need further exploration to inform policies and education initiatives that will increase both access and uptake of MOUD for people capable of pregnancy as well as those who are already pregnant.

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CRediT authorship contribution statement

Aaron M. Laxton: Writing – review & editing, Conceptualization. **Mary Conte:** Writing – original draft. **Jennifer K. Bello:** Writing – review & editing, Writing – original draft, Supervision, Conceptualization. **Nathaniel Dell:** Writing – review & editing, Writing – original draft, Methodology, Formal analysis, Data curation. **Lynn Chen:** Writing – review & editing.

Declaration of Competing Interest

The authors have no conflicts to declare.

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Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at doi:10.1016/j.dadr.2024.100239.

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