



HHS Public Access

Author manuscript

Am J Prev Med. Author manuscript; available in PMC 2023 November 01.

Published in final edited form as:

Am J Prev Med. 2022 November ; 63(5): 717–725. doi:10.1016/j.amepre.2022.05.006.

Racial–Ethnic Disparities of Buprenorphine and Vivitrol Receipt in Medicaid

Christopher C. Dunphy, PhD,

Kun Zhang, PhD,

Likang Xu, MD, MS,

Gery P. Guy Jr., PhD, MPH

National Center for Injury Prevention and Control, Centers for Disease Control and Prevention, Atlanta, Georgia

Abstract

Introduction: Expanding access to medications for opioid use disorder is a cornerstone to addressing the opioid overdose epidemic. However, recent research suggests that the distribution of medications for opioid use disorder has been inequitable. This study analyzes the racial–ethnic disparities in the receipt of medications for opioid use disorder among Medicaid patients diagnosed with opioid use disorder.

Methods: Medicaid claims data from the Transformed Medicaid Statistical Information System for the years 2017–2019 were used for the analysis. Logistic regression models estimated the odds of receiving buprenorphine and Vivitrol within 180 days after initial opioid use disorder diagnosis on the basis of race–ethnicity. Analysis was conducted in 2022.

Results: Non-Hispanic Black people, non-Hispanic American Indian or Alaskan Native/Asian/Hawaiian/Pacific Islander people, and Hispanic people had 42%, 12%, and 22% lower odds of buprenorphine receipt and 47%, 12%, and 20% lower odds of Vivitrol receipt, respectively, than non-Hispanic White people, controlling for clinical and demographic patient variables.

Conclusions: This study suggests that there are racial–ethnic disparities in the receipt of buprenorphine and Vivitrol among Medicaid patients diagnosed with opioid use disorder after adjusting for demographic, geographic, and clinical characteristics. The potential strategies to address these disparities include expanding the workforce of providers who can prescribe medications for opioid use disorder in low-income communities and communities of color and allocating resources to address the stigma in medications for opioid use disorder treatment.

Address correspondence to: Christopher Dunphy, PhD, National Center for Injury Prevention and Control, Centers for Disease Control and Prevention, Mail Stop 106-8, 4770 Buford Highway, Atlanta GA 30341. ppz1@cdc.gov.

No financial disclosures were reported by the authors of this paper.

CREDIT AUTHOR STATEMENT

Christopher C. Dunphy: Conceptualization, Formal analysis, Methodology, Writing - original draft. Kun Zhang: Conceptualization, Resources, Software, Writing - review and editing. Likang Xu: Formal analysis, Methodology, Writing - review and editing. Gery P. Guy Jr.: Conceptualization, Resources, Supervision, Writing - review and editing.

SUPPLEMENTAL MATERIAL

Supplemental materials associated with this article can be found in the online version at <https://doi.org/10.1016/j.amepre.2022.05.006>.

INTRODUCTION

The opioid overdose epidemic remains a major public health concern in the U.S. The number of drug overdose deaths has quadrupled since 1999, with 70% of those deaths in 2019 involving an opioid.¹ This trend has been further exacerbated by the coronavirus disease 2019 (COVID-19) pandemic, with preliminary data suggesting that mortality involving opioids is at an all-time high.^{2,3} Expanding access to medications for opioid use disorder (MOUDs) is a cornerstone to addressing this ongoing overdose epidemic.

MOUDs are medications that are primarily used for the treatment of addiction to opioids such as heroin and prescription pain relievers that contain opiates. The prescribed medications operate to normalize brain chemistry, block the euphoric effects of opioids, relieve cravings, and normalize body functions without the negative and euphoric effects often associated with opiates.⁴ Common formulations of MOUD include buprenorphine (partial agonist) and methadone (full agonist).⁵ In addition, specific formulations of naltrexone (i.e., Vivitrol) (antagonist) can be used as MOUD, which has been shown to work well when a patient is concurrently misusing other substances.

MOUDs are provided in various healthcare settings, including outpatient facilities, inpatient facilities, substance use disorder treatment facilities, and physicians' offices. In recent years, policymakers have sought to reduce supply-side barriers to MOUD, particularly office-based buprenorphine, in several ways, including expanding the types of providers (e.g., nurse practitioners and physician assistants) who can prescribe buprenorphine through waivers in 2016,⁶ improving training around obtaining buprenorphine waivers and prescribing MOUD by primary care providers, and increasing the prescribing capacity of buprenorphine-waivered providers.⁷ Additional efforts have been taken to expand access in nonoffice-based settings, including the rise of mobile narcotic treatment programs (i.e., vans that travel to multiple locations to deliver methadone treatment).⁸ Annual MOUD treatment rates have increased from 1.97 to 4.43 per 1,000 people between 2009 and 2018.⁹ Despite this progress, access to MOUD treatment remains racially inequitable, with minority individuals less likely to receive treatment across a range of healthcare settings and payers.^{10,11}

Thus far, a comprehensive analysis of disparities in receipt of MOUD among the Medicaid population has been limited to certain geographic areas or subsamples of the Medicaid population.^{12,13} Important in the context of MOUD, as the nation's public health insurance program for people with low income, Medicaid covers almost 40% of nonelderly adults with opioid use disorder (OUD)¹⁴; thus, understanding the disparities among this population is important when organizing efforts to expand MOUD access. Furthermore, understanding how disparities differ across various healthcare settings is important to inform more targeted efforts on improving health equity. This study analyzes racial/ethnic disparities in receipt of buprenorphine and Vivitrol among Medicaid patients diagnosed with OUD, the first examination of such disparities among the entire Medicaid population. In addition, this study also explores the heterogeneity of these disparities on the basis of the setting in which the initial OUD diagnosis occurred.

METHODS

Study Sample

This study used administrative data from the Centers for Medicare and Medicaid Services (CMS) Transformed Medicaid Statistical Information System (T-MSIS). T-MSIS is a deidentified Medicaid claims data set that includes annual files containing demographic and eligibility information for all Medicaid beneficiaries, claims files containing service use and payment records, and annual files containing information on Medicaid-managed care plans and providers.¹⁵ Data from 2017 to 2019 were used for the analysis.

Patients aged 18–64 years were included in this analysis if they (1) had 1 outpatient or inpatient claim with OUD diagnosis identified by ICD-10-CM diagnoses codes with the first 4 characters being *F11.1* or *F11.2* from April 1, 2017 to June 30, 2019 (a starting date of April 1, 2017 was used to ensure that a 90-day look-back period would not roll over into the 2016 calendar year); (2) did not receive buprenorphine or Vivitrol within 90 days before the first observed OUD diagnosis; and (3) had continuous Medicaid enrollment from 90 days before and 180 days after their first observed OUD diagnosis.

Measures

The outcome measures were receipt of buprenorphine or Vivitrol prescriptions, identified in the prescription claim files by the National Drug Code, within 180 days of an individual's first observed OUD diagnosis. Buprenorphine products indicated for pain management, for example, Butrans and Belbuca, were excluded. Receipt of methadone was unable to be observed within the T-MSIS outpatient prescription claims files and was thus excluded from the analysis. The covariate of interest was the patients' reported race/ethnicity, which was coded into 1 of 5 categorizations for the analysis: (1) non-Hispanic White, (2) non-Hispanic Black, (3) non-Hispanic American Indian/Alaskan Native/Asian/Hawaiian/Pacific Islander, (4) Hispanic, and (5) other/unknown (which included patients with missing race/ethnicity data). Data on race/ethnicity was collected through self-reporting from the patient because CMS follows guidance from the Office of Management and Budget, which established self-reporting as the preferred means for collecting information on patients' race and ethnicity.

Other patient characteristics used for the analysis included sex, age, primary language spoken, state of residence, urban/rural status of the ZIP code of residence, and any comorbid diagnoses (substance use disorder other than OUD, psychiatric disorders, pain) during the 90 days before the first OUD diagnosis. Receipt of antidepressants, benzodiazepines, stimulants, and opioid analgesics during the 90 days before the first OUD diagnosis were also identified as a patient characteristic to further confirm the comorbid diagnosis. All diagnoses were identified using ICD-10-CM codes (Appendix Table 1, available online). All prescription drugs received during the baseline period were identified by National Drug Code.

In addition, the setting of the first observed OUD diagnosis was identified within the claims data and categorized under 1 of 5 groups: (1) hospitalizations, (2) physician and advanced practitioner service, (3) substance use and mental health treatment services, (4) hospital outpatient and emergency department (ED) service, and (5) other settings (predominately

comprising laboratory services in which the setting was not identifiable within the data). The complete grouping for these settings is outlined in Appendix Table 2 (available online).

Statistical Analysis

Bivariate analyses examined the differences in buprenorphine and Vivitrol receipt rates by each covariate, using chi-square tests to determine statistical significance. Logistic regression models estimated the association between patient race/ethnicity and the receipt of buprenorphine or Vivitrol, controlling for other patient characteristics. In addition, to examine the potential differences in disparities by the setting of first contact with the healthcare system, 5 separate logistic regression models were estimated with samples stratified by the setting of the first observed OUD diagnosis. All analyses were conducted in 2022 using SAS software, version 9.4. This study was reviewed by the Centers for Disease Control and Prevention and determined to meet the definition of research as defined in 46.102(1) but did not involve human subjects as defined in 46.103(e)(1). The study was conducted consistent with applicable federal law and Centers for Disease Control and Prevention policy (see e.g., 45 C.F.R. part 46; 21 C.F.R. part 56; 42 U.S.C. §241(d), 5 U.S.C. §552a, 44 U.S.C. §3,501 et seq).

RESULTS

A total of 996,641 individuals met the inclusion criteria for the analysis. Among these individuals, 135,941 (13.6%) received buprenorphine within 180 days of their first OUD diagnosis, 21,161 (2.1%) received Vivitrol, and 842,697 (84.6%) did not receive buprenorphine or Vivitrol. Statistically significant differences ($p<0.05$) in the receipt of buprenorphine and Vivitrol by race/ethnicity were observed, with buprenorphine receipt rates of 16.1% for non-Hispanic White persons, 7.2% for non-Hispanic Black persons, 13.4% for American Indian/Alaskan Native/Asian/Hawaiian/Pacific Islanders, 9.9% for Hispanic persons, and 12.7% for other/unknown race/ethnicity (Table 1). Receipt rates of Vivitrol were 2.5% for non-Hispanic White persons, 1.1% for non-Hispanic Black persons, 1.5% for American Indian/Alaskan Native/Asian/Hawaiian/Pacific Islanders, 1.1% for Hispanic persons, and 2.3% for other/unknown race/ethnicity (Table 1).

In multivariable analyses, race/ethnicity of non-Hispanic Black, non-Hispanic American Indian/Alaska Native (AIAN)/Asian/Hawaiian/Pacific Islander, Hispanic, and other/unknown race/ethnicity was associated with a 42%, 12%, 22%, and 14% ($p<0.001$ for all) reduction in the odds of buprenorphine receipt compared with that of non-Hispanic White persons, respectively (Table 2). Race/ethnicity of non-Hispanic Black, non-Hispanic AIAN/Asian/Hawaiian/Pacific Islander, Hispanic, and other/unknown race/ethnicity was associated with a 47%, 12%, 20%, and 10% ($p<0.001$ for all) reduction in the odds of Vivitrol receipt compared with that of non-Hispanic White persons, respectively (Table 2).

Furthermore, males had 10% and 6% higher odds of receiving both buprenorphine and Vivitrol, respectively, than females. English speakers had 79% and 98% higher odds of receiving buprenorphine and Vivitrol, respectively, than non-English speakers. Holding every other thing constant, individuals with a psychiatric disorder or pain diagnosis had lower odds of receiving buprenorphine or Vivitrol than individuals who did not have a

psychiatric disorder or pain diagnosis except for post-traumatic stress disorder and other mood disorders (Table 2).

Restricting the multivariable analysis to just individuals who received the index OUD diagnosis through an inpatient hospitalization, reported race/ethnicity of non-Hispanic Black, non-Hispanic AIAN/Asian/Hawaiian/Pacific Islander, Hispanic, and other/unknown race/ethnicity was associated with a 36%, 24%, 20%, and 13% ($p<0.001$ for all) reduction in the odds of buprenorphine receipt, respectively, compared with the report of non-Hispanic White (Table 3). For those who received the index OUD diagnosis by physician and advanced practitioner services, race/ethnicity of non-Hispanic Black, non-Hispanic AIAN/Asian/Hawaiian/Pacific Islander, Hispanic, and other/unknown race/ethnicity was associated with a 40% ($p<0.001$), 9% ($p=0.003$), 11% ($p<0.001$), and 10% ($p<0.001$) reduction in the odds of buprenorphine receipt, respectively, compared with that of non-Hispanic White (Table 3). In addition, reported race/ethnicity of non-Hispanic Black, non-Hispanic AIAN/Asian/Hawaiian/Pacific Islander, Hispanic, and other/unknown race/ethnicity for those who received their index OUD diagnosis at a substance use or mental health treatment facility was associated with a 23% ($p<0.001$), 8% ($p=0.109$), 14% ($p<0.001$), and 6% ($p=0.025$) reduction in the odds of buprenorphine receipt, respectively, compared with that of non-Hispanic White (Table 3). Finally, for those who received their index OUD diagnosis from a hospital outpatient or ED setting, reported race/ethnicity of non-Hispanic Black, non-Hispanic AIAN/Asian/Hawaiian/Pacific Islander, Hispanic, and other/unknown race/ethnicity was associated with a 37% ($p<0.001$), 19% ($p=0.006$), 33% ($p<0.001$), and 11% ($p=0.003$) reduction in the odds of buprenorphine receipt, respectively, compared with that of non-Hispanic White (Table 3).

DISCUSSION

Using a national CMS Medicaid claims data, this study's results show that receipt rates of buprenorphine and Vivitrol remain low and that racial/ethnic disparities exist among Medicaid patients diagnosed with OUD after adjusting for demographic, geographic, and clinical characteristics. To the best of the authors' knowledge, this study is one of the first to examine this association across the entire Medicaid population. In addition, this study accounts for racial/ethnic differences in the prevalence of OUD by limiting the cohort to individuals diagnosed with OUD. These disparities may be the result of several complex factors, including disparities in access to pharmacies in Black and Hispanic neighborhoods¹⁶; disparities in access to buprenorphine-waivered prescribers in low-income communities, communities of color, non-English speaking communities; and disparities in follow-up treatment among OUD-related ED visits.¹⁷ Another potential source of disparities could arise from systemic racism, leading to mistrust and hesitancy toward the U.S. healthcare system among racial/ethnic minorities.¹⁸

Furthermore, the analysis shows some heterogeneity in the magnitude of these disparities on the basis of the patients' initial contact with the healthcare system related to OUD. Specifically, disparities in buprenorphine receipt are smaller when the initial OUD diagnosis occurred in a substance use or mental health treatment setting, suggesting that treatment initiation or provision may have been more consistent across racial/ethnic groups within this

setting and underlining the importance of ensuring access to such treatment to improve distal outcomes. Another important implication from this analysis is that even though some heterogeneity is observed, the disparities persist across all the 5 settings examined, suggesting that health equity of OUD treatment should be prioritized across multiple healthcare settings.

Policymakers might consider addressing these public health challenges in a multifaceted approach. Potential strategies include continuing to expand the workforce of providers who can prescribe MOUD in communities of low income or color while emphasizing the importance of health equity through training and educational campaigns.¹¹ It would also be important to take advantage of the new Department of Health and Human Service's guidelines for prescribing buprenorphine, which exempts eligible clinicians from federal certification requirements related to training, counseling, and other services that are part of the process for obtaining a waiver to treat up to 30 patients with buprenorphine.¹⁹ In addition, encouraging clinicians to offer patients the full range of MOUD treatment is another strategy that may improve the health equity of MOUD access.^{11,17} Furthermore, policymakers may consider allocating resources to address stigma in MOUD, such as harm reduction training for providers who consider becoming buprenorphine waived. Finally, public health interventions seeking to rebuild trust among racial/ethnic minorities toward the healthcare system, such as efforts to eliminate systemic racism, may be an important component of efforts to overcome MOUD rejection rates among racial/ethnic minorities.

Limitations

This study is subject to a few limitations. First, the study could not examine methadone receipt in the data, which is only dispensed through treatment facilities (methadone clinics) and is used more commonly among racial/ethnic minorities.²⁰ This limitation should be taken into account when interpreting the results of this analysis because the full spectrum of MOUD is not analyzed. However, clinical research does not suggest that methadone should be prioritized on the basis of an individual's race and ethnicity.²¹ Furthermore, methadone treatment is often considered more restrictive than buprenorphine, making treatment retention more difficult.²² With equitable access to MOUD, there would be an expectation to see similar initiation rates across racial/ethnic groups within each medication category. Second, 13% of individuals who met the inclusion criteria for the sample were missing data on race/ethnicity and were categorized into the other/unknown group for the analysis. Third, only filled prescriptions are documented in claims data; thus, the analysis does not account for any underlying differences in the likelihood of filling a prescription between racial/ethnic groups. Fourth, the study only examines treatment initiation and does not explore the potential disparities in treatment retention. Fifth, the study does not account for potential underlying differences in the demand for MOUD across racial/ethnic groups. Finally, the findings do not explore the variability of these racial/ethnic disparities across other demographics or geography and may not be generalizable to populations with insurance types other than Medicaid.

CONCLUSIONS

This study highlights the racial/ethnic disparities in receiving MOUD among Medicaid patients diagnosed with OUD. Future research could further explore the mechanisms and consequences of these observed disparities. With the ongoing opioid overdose epidemic, it is crucial that all policy levers are considered to achieve health equity in MOUD treatment access.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

ACKNOWLEDGMENTS

The research presented in this paper is that of the authors and does not reflect the official policy of the Centers for Disease Control and Prevention.

REFERENCES

- Mattson CL, Tanz LJ, Quinn K, Kariisa M, Patel P, Davis NL. Trends and geographic patterns in drug and synthetic opioid overdose deaths – United States, 2013–2019. *MMWR Morb Mortal Wkly Rep.* 2021;70(6):202–207. 10.15585/mmwr.mm7006a4. [PubMed: 33571180]
- Hulsey J, Mellis A, Kelly B. COVID-19 pandemic impact on patients, families and individuals in recovery from substance use disorders. Bethesda, MD: Addiction Policy Forum; May 2020. <https://www.addictionpolicy.org/covid19-report>.
- Stephenson J. Drug overdose deaths head toward record number in 2020, CDC warns. *JAMA Health Forum.* 2020;1(10):e201318. 10.1001/jamahealthforum.2020.1318. [PubMed: 36218556]
- Medication assisted treatment. Substance Abuse and Mental Health Services Administration. <https://www.samhsa.gov/medication-assisted-treatment>. Updated March 1, 2022. Accessed April 5, 2022.
- Medications for opioid use disorder: for healthcare and addiction professionals, policymakers, patients, and families. Substance Abuse and Mental Health Services Administration. 2021. https://store.samhsa.gov/sites/default/files/SAMHSA_Digital_Download/PEP21-02-01-002.pdf.
- Spetz J, Toretsky C, Chapman S, Phoenix B, Tierney M. Nurse practitioner and physician assistant waivers to prescribe buprenorphine and state scope of practice restrictions. *JAMA.* 2019;321(14):1407–1408. 10.1001/jama.2019.0834. [PubMed: 30964519]
- Haffajee RL, Bohnert ASB, Lagisetty PA. Policy pathways to address provider workforce barriers to buprenorphine treatment. *Am J Prev Med.* 2018;54(6):S230–S242 (suppl 3). 10.1016/j.amepre.2017.12.022. [PubMed: 29779547]
- El-Sabawi T, Baney M, Canzater SL, Weizman SR. The new mobile methadone rules and what they mean for treatment access. Bethesda, MD: HealthAffairs; 2021. <https://www.healthaffairs.org/doi/10.1377/forefront.20210727.942168/>. Published August 4. Accessed March 4, 2022.
- Olfson M, Zhang VS, Schoenbaum M, King M. Trends in buprenorphine treatment in the United States, 2009–2018. *JAMA.* 2020;323(3):276–277. 10.1001/jama.2019.18913. [PubMed: 31961408]
- Lagisetty PA, Ross R, Bohnert A, Clay M, Maust DT. Buprenorphine treatment divide by race/ethnicity and payment. *JAMA Psychiatry.* 2019;76(9):979–981. 10.1001/jamapsychiatry2019.0876. [PubMed: 31066881]
- Nguemeni Tiako MJ. Addressing racial & socioeconomic disparities in access to medications for opioid use disorder amid COVID-19. *J Subst Abuse Treat.* 2021;122:108214. 10.1016/j.jsat.2020.108214. [PubMed: 33248862]
- Hollander MAG, Chang CH, Douaihy AB, Hulsey E, Donohue JM. Racial inequity in medication treatment for opioid use disorder: exploring potential facilitators and barriers to use. *Drug Alcohol Depend.* 2021;227:108927. 10.1016/j.drugalcdep.2021.108927. [PubMed: 34358766]

13. Hochstatter KR, Akhtar WZ, El-Bassel N, Westergaard RP, Burns ME. Racial disparities in use of non-emergency outpatient care by Medicaid-eligible adults after release from prison: Wisconsin, 2015–2017. *J Subst Abuse Treat.* 2021;126:108484. 10.1016/j.jsat.2021.108484. [PubMed: 34052054]
14. Orgera K, Tolbert J. The opioid epidemic and Medicaid's role in facilitating access to treatment. San Francisco, CA: Kaiser Family Foundation; 2019. <https://www.kff.org/medicaid/issue-brief/the-opioid-epidemic-and-medicaids-role-in-facilitating-access-to-treatment/>.
15. Transformed Medicaid Statistical Information System (T-MSIS). [Medicaid.gov. https://www.medicare.gov/medicaid/data-systems/macbis/transformed-medicare-statistical-information-system-t-msis/index.html](https://www.medicare.gov/medicaid/data-systems/macbis/transformed-medicare-statistical-information-system-t-msis/index.html). Updated April 1, 2021. Accessed April 14, 2021
16. Guadamuz JS, Wilder JR, Mouslim MC, Zenk SN, Alexander GC, Qato DM. Fewer pharmacies in Black and Hispanic/latino neighborhoods compared with White or diverse neighborhoods, 2007–15. *Health Aff (Millwood).* 2021;40(5):802–811. 10.1377/hlthaff.2020.01699. [PubMed: 33939507]
17. Andraka-Christou B Addressing racial and ethnic disparities in the use of medications for opioid use disorder. *Health Aff (Millwood).* 2021;40(6):920–927. 10.1377/hlthaff.2020.02261. [PubMed: 34097509]
18. Boyd RW, Lindo EG, Weeks LD, McLemore MR. On racism: a new standard for publishing on racial health inequities. Bethesda, MD: HealthAffairs; 2020. <https://www.healthaffairs.org/doi/10.1377/forefront.20200630.939347/>. Published July 2. Accessed March 7, 2022.
19. HHS. Practice guidelines for the administration of buprenorphine for treating opioid use disorder. Filed April, 27, 2021. <https://www.federalregister.gov/documents/2021/04/28/2021-08961/practice-guidelines-for-the-administration-of-buprenorphine-for-treating-opioid-use-disorder>. Accessed April 28, 2021.
20. Goedel WC, Shapiro A, Cerdá M, Tsai JW, Hadland SE, Marshall BDL. Association of racial/ethnic segregation with treatment capacity for opioid use disorder in counties in the United States. *JAMA Netw Open.* 2020;3(4):e203711. 10.1001/jamanetworkopen.2020.3711. [PubMed: 32320038]
21. Blanco C, Volkow ND. Management of opioid use disorder in the USA: present status and future directions. *Lancet.* 2019;393 (10182):1760–1772. 10.1016/S0140-6736(18)33078-2. [PubMed: 30878228]
22. Harris J, McElrath K. Methadone as social control: institutionalized stigma and the prospect of recovery. *Qual Health Res.* 2012;22(6):810–824. 10.1177/1049732311432718. [PubMed: 22232295]

Table 1. Receipt of Buprenorphine and Vivitrol Among Medicaid Patients Diagnosed With Opioid Use Disorder in the U.S., 2017–2019

Covariates	Patients with opioid use disorder		Buprenorphine ^a		Vivitrol		Neither	
	n	n (%)	Overall p-value	n (%)	Overall p-value	n (%)	Overall p-value	
Total	996,641	135,941 (13.6)	<0.001	21,161 (2.1)	<0.001	842,697 (84.6)	<0.001	
Race/ethnicity								
White, non-Hispanic	591,962	95,405 (16.1)	<0.001	15,075 (2.5)	<0.001	483,866 (81.7)	<0.001	
Black, non-Hispanic	156,636	11,350 (7.2)		1,690 (1.1)		143,816 (91.8)		
AIAN/Asian/Hawaiian/Pacific Islander, non-Hispanic	27,489	3,686 (13.4)		422 (1.5)		23,433 (85.2)		
Hispanic, all races	90,422	8,973 (9.9)		1,004 (1.1)		80,577 (89.1)		
Other/unknown	130,132	16,527 (12.7)		2,970 (2.3)		111,005 (85.3)		
Sex			<0.001		<0.001		<0.001	
Male	492,619	69,357 (14.1)		11,336 (2.3)		413,666 (84.0)		
Female	504,022	66,584 (13.2)		9,825 (1.9)		429,031 (85.1)		
Age group, years			<0.001		<0.001		<0.001	
18–24	70,370	11,474 (16.3)		2,216 (3.1)		57,080 (81.1)		
25–34	299,352	56,933 (19.0)		9,751 (3.3)		234,281 (78.3)		
35–44	244,770	38,434 (15.7)		5,641 (2.3)		201,486 (82.3)		
45–54	205,681	19,530 (9.5)		2,588 (1.3)		183,835 (89.4)		
55–64	176,468	9,570 (5.4)		965 (0.5)		166,015 (94.1)		
Primary language spoken			<0.001		<0.001		<0.001	
English	760,801	107,112 (14.1)		15,849 (2.1)		640,334 (84.2)		
Non-English	15,320	1,235 (8.1)		83 (0.5)		14,013 (91.5)		
Unknown language	220,520	27,594 (12.5)		5,229 (2.4)		188,350 (85.4)		
Substance use disorders								
Alcohol	129,734	11,071 (8.5)	<0.001	5,568 (4.3)	<0.001	113,475 (87.5)	<0.001	
Cannabis	88,416	9,536 (10.8)	<0.001	2,261 (2.6)	<0.001	76,922 (87.0)	<0.001	
Sedative	32,571	4,646 (14.3)	<0.001	996 (3.1)	<0.001	27,097 (83.2)	<0.001	
Cocaine	69,670	7,664 (11.0)	<0.001	2,097 (3.0)	<0.001	60,191 (86.4)	<0.001	
Nicotine	186,242	25,609 (13.8)	0.123	4,329 (2.3)	<0.001	156,975 (84.3)	<0.001	
Other	104,068	14,550 (14.0)	<0.001	2,788 (2.7)	<0.001	87,158 (83.8)	<0.001	

Covariates	Patients with opioid use disorder		Buprenorphine ^a		Vivitrol		Neither	
	n	n (%)	n (%)	Overall p-value	n (%)	Overall p-value	n (%)	Overall p-value
Psychiatric diagnosis								
Anxiety	187,812	22,860 (12.2)	3,983 (2.1)	<0.001	161,470 (86.0)	0.934	161,470 (86.0)	<0.001
Bipolar disorder	90,370	8,664 (9.6)	1,933 (2.1)	<0.001	80,015 (88.5)	0.730	80,015 (88.5)	<0.001
Major depression	184,802	20,715 (11.2)	4,524 (2.4)	<0.001	160,118 (86.6)	<0.001	160,118 (86.6)	<0.001
Other mood disorder	24,421	2,704 (11.1)	581 (2.4)	<0.001	21,202 (86.8)	0.005	21,202 (86.8)	<0.001
ADHD	23,819	3,143 (13.2)	518 (2.2)	0.043	20,243 (85.0)	0.577	20,243 (85.0)	0.061
PTSD	50,336	5,682 (11.3)	1,164 (2.3)	<0.001	43,634 (86.7)	0.003	43,634 (86.7)	<0.001
Schizophrenia	51,125	3,324 (6.5)	636 (1.2)	<0.001	47,231 (92.4)	<0.001	47,231 (92.4)	<0.001
Pain diagnosis								
Back pain	224,218	18,151 (8.1)	1,653 (0.7)	<0.001	204,658 (91.3)	<0.001	204,658 (91.3)	<0.001
Neck pain	73,762	5,450 (7.4)	561 (0.8)	<0.001	67,825 (92.0)	<0.001	67,825 (92.0)	<0.001
Migraine	26,515	2,339 (8.8)	296 (1.1)	<0.001	23,927 (90.2)	<0.001	23,927 (90.2)	<0.001
Fibromyalgia	16,805	1,119 (6.7)	88 (0.5)	<0.001	15,609 (92.9)	<0.001	15,609 (92.9)	<0.001
Osteoarthritis	59,743	3,560 (6.0)	362 (0.6)	<0.001	55,857 (93.5)	<0.001	55,857 (93.5)	<0.001
Inflammatory joint disorder	129,837	10,894 (8.4)	1,281 (1.0)	<0.001	117,850 (90.8)	<0.001	117,850 (90.8)	<0.001
Other medications								
Opioid analgesics	253,404	25,268 (10.0)	2,314 (0.9)	<0.001	226,208 (89.3)	<0.001	226,208 (89.3)	<0.001
Benzodiazepines	127,461	15,069 (11.8)	2,145 (1.7)	<0.001	110,540 (86.7)	<0.001	110,540 (86.7)	<0.001
Antidepressants	243,812	32,166 (13.2)	6,361 (2.6)	<0.001	206,076 (84.5)	<0.001	206,076 (84.5)	0.624
Stimulants	24,788	3,819 (15.4)	514 (2.1)	<0.001	20,537 (82.9)	0.583	20,537 (82.9)	<0.001

Source: T-MSIS.

ADHD, attention-deficit hyperactivity disorder; AIAN, American Indian/Alaskan Native; PTSD, post-traumatic stress disorder; T-MSIS, Transformed Medicaid Statistical Information System.

^aBuprenorphine formulations for pain treatment (Butrans and Belbuca) were excluded from the analysis.

Table 2. AORs for Receipt of Buprenorphine and Vivitrol Within 180 Days After OUD Diagnosis Among Medicaid Patients in the U.S., 2017–2019

Covariates	Buprenorphine			Vivitrol		
	AOR (95% CI)	p-value	AOR (95% CI)	p-value	AOR (95% CI)	p-value
Race/ethnicity						
White, non-Hispanic	1.0 (ref)		1.0 (ref)		1.0 (ref)	
Black, non-Hispanic	0.58 (0.57, 0.59)	<0.001	0.53 (0.50, 0.56)	<0.001	0.53 (0.50, 0.56)	<0.001
AIAN/Asian/Hawaiian/Pacific Islander, non-Hispanic	0.88 (0.84, 0.91)	<0.001	0.88 (0.80, 0.98)	0.018	0.88 (0.80, 0.98)	0.018
Hispanic, all races	0.78 (0.76, 0.80)	<0.001	0.80 (0.75, 0.86)	<0.001	0.80 (0.75, 0.86)	<0.001
Other/unknown	0.86 (0.84, 0.88)	<0.001	0.90 (0.86, 0.94)	<0.001	0.90 (0.86, 0.94)	<0.001
Sex						
Male	1.10 (1.09, 1.12)	<0.001	1.06 (1.03, 1.09)	<0.001	1.06 (1.03, 1.09)	<0.001
Female	1.0 (ref)	1.0 (ref)	1.0 (ref)		1.0 (ref)	
Age group, years						
18–24	1.0 (ref)		1.0 (ref)		1.0 (ref)	
25–34	1.21 (1.18, 1.24)	<0.001	1.05 (1.00, 1.10)	0.067	1.05 (1.00, 1.10)	0.067
35–44	1.02 (1.00, 1.05)	0.070	0.77 (0.73, 0.81)	<0.001	0.77 (0.73, 0.81)	<0.001
45–54	0.68 (0.66, 0.70)	<0.001	0.48 (0.45, 0.51)	<0.001	0.48 (0.45, 0.51)	<0.001
55–64	0.41 (0.40, 0.42)	<0.001	0.26 (0.24, 0.28)	<0.001	0.26 (0.24, 0.28)	<0.001
Language spoken						
English	1.79 (1.65, 1.94)	<0.001	1.98 (1.59, 2.47)	<0.001	1.98 (1.59, 2.47)	<0.001
Non-English	1.0 (ref)		1.0 (ref)		1.0 (ref)	
Unknown language	1.77 (1.63, 1.93)	<0.001	2.31 (1.83, 2.90)	<0.001	2.31 (1.83, 2.90)	<0.001
Substance use disorders ^a						
Alcohol	0.55 (0.54, 0.56)	<0.001	2.29 (2.21, 2.37)	<0.001	2.29 (2.21, 2.37)	<0.001
Cannabis	0.68 (0.66, 0.69)	<0.001	0.80 (0.76, 0.84)	<0.001	0.80 (0.76, 0.84)	<0.001
Sedative	1.09 (1.06, 1.13)	<0.001	1.21 (1.13, 1.29)	<0.001	1.21 (1.13, 1.29)	<0.001
Cocaine	0.93 (0.90, 0.95)	<0.001	1.13 (1.07, 1.18)	<0.001	1.13 (1.07, 1.18)	<0.001
Nicotine	1.16 (1.14, 1.18)	<0.001	1.03 (0.99, 1.07)	0.112	1.03 (0.99, 1.07)	0.112
Other	1.05 (1.03, 1.07)	<0.001	1.04 (1.00, 1.09)	0.065	1.04 (1.00, 1.09)	0.065
Psychiatric diagnosis ^a						

Covariates	Buprenorphine		Vivitrol	
	AOR (95% CI)	p-value	AOR (95% CI)	p-value
Anxiety	0.97 (0.95, 0.99)	<0.001	0.92 (0.88, 0.95)	<0.001
Bipolar disorder	0.79 (0.77, 0.80)	<0.001	0.92 (0.87, 0.97)	0.001
Major depression	0.87 (0.86, 0.89)	<0.001	1.06 (1.02, 1.10)	0.002
Other mood disorder	0.91 (0.87, 0.94)	<0.001	0.94 (0.86, 1.03)	0.166
ADHD	0.88 (0.84, 0.92)	<0.001	0.83 (0.76, 0.92)	<0.001
PTSD	0.92 (0.89, 0.95)	<0.001	0.97 (0.91, 1.04)	0.378
Schizophrenia	0.57 (0.55, 0.60)	<0.001	0.55 (0.50, 0.59)	<0.001
Pain diagnosis ^a				
Back pain	0.70 (0.69, 0.72)	<0.001	0.56 (0.53, 0.59)	<0.001
Neck pain	0.77 (0.74, 0.79)	<0.001	0.71 (0.65, 0.78)	<0.001
Migraine	0.74 (0.71, 0.78)	<0.001	0.72 (0.64, 0.81)	<0.001
Fibromyalgia	0.69 (0.65, 0.74)	<0.001	0.53 (0.42, 0.65)	<0.001
Osteoarthritis	0.73 (0.71, 0.76)	<0.001	0.70 (0.62, 0.78)	<0.001
Inflammatory joint disorder	0.83 (0.81, 0.85)	<0.001	0.79 (0.74, 0.83)	<0.001
Other medications ^a				
Opioid analgesics	0.91 (0.90, 0.93)	<0.001	0.63 (0.60, 0.66)	<0.001
Benzodiazepines	1.06 (1.04, 1.08)	<0.001	0.98 (0.93, 1.03)	0.519
Antidepressants	1.22 (1.20, 1.24)	<0.001	1.62 (1.56, 1.67)	<0.001
Stimulants	1.04 (1.00, 1.09)	0.037	0.76 (0.69, 0.84)	<0.001

Source: T-MSIS.

Logistic regression models produced the AORs and 95% CIs. Individuals in the cohort were continuously enrolled in Medicaid for at least the duration of 90 days before the index OUD diagnosis and 180 days after the index OUD diagnosis. The logistic regression models also controlled for state of residence (not reported in the table).

ADHD, attention-deficit/hyperactivity disorder; AIAN, American Indian/Alaskan Native; OUD, opioid use disorder; PTSD, post-traumatic stress disorder; T-MSIS, Transformed Medicaid Statistical Information System.

^aThe ref group for each OR under the comorbidity categories is those without the given comorbidity (e.g., the OR for alcohol use disorder measures the odds of buprenorphine/Vivitrol receipt for those with alcohol use disorder compared with that for those without alcohol use disorder).

Table 3. AORs for Receipt of Buprenorphine Within 180 Days After OUD Diagnosis Among Medicaid Patients in the U.S., Stratified by OUD Diagnosis Setting, 2017–2019

Settings	Patients with OUD	Buprenorphine n (%)	AOR (95% CI)	p-value
Hospitalizations				
Race/ethnicity				
White, non-Hispanic	97,481	10,558 (10.8)	1.0 (ref)	
Black, non-Hispanic	26,663	1,549 (5.8)	0.64 (0.60, 0.68)	<0.001
AIAN/Asian/Hawaiian/Pacific Islander, non-Hispanic	4,355	330 (7.6)	0.76 (0.67, 0.85)	<0.001
Hispanic, all races	15,182	1,064 (7.0)	0.80 (0.74, 0.86)	<0.001
Other/unknown	20,022	1,826 (9.1)	0.87 (0.82, 0.92)	<0.001
Physician and advanced practitioner				
Race/ethnicity				
White, non-Hispanic	171,509	35,999 (21.0)	1.0 (ref)	
Black, non-Hispanic	40,130	3,732 (9.3)	0.60 (0.58, 0.62)	<0.001
AIAN/Asian/Hawaiian/Pacific Islander, non-Hispanic	8,303	1,571 (18.9)	0.91 (0.86, 0.97)	0.003
Hispanic, all races	26,819	4,049 (15.1)	0.89 (0.85, 0.92)	<0.001
Other/unknown	46,692	7,430 (15.9)	0.90 (0.87, 0.93)	<0.001
Substance use and mental health treatment				
Race/ethnicity				
White, non-Hispanic	116,677	18,039 (15.5)	1.0 (ref)	
Black, non-Hispanic	27,819	2,497 (9.0)	0.77 (0.73, 0.80)	<0.001
AIAN/Asian/Hawaiian/Pacific Islander, non-Hispanic	3,971	433 (10.9)	0.92 (0.82, 1.02)	0.109
Hispanic, all races	18,619	1,509 (8.1)	0.86 (0.81, 0.92)	<0.001
Other/unknown	17,604	2,423 (13.4)	0.94 (0.90, 0.99)	0.025
Hospital outpatient and emergency department service				
Race/ethnicity				
White, non-Hispanic	36,226	5,025 (13.9)	1.0 (ref)	
Black, non-Hispanic	9,049	707 (7.8)	0.63 (0.58, 0.69)	<0.001
AIAN/Asian/Hawaiian/Pacific Islander, non-Hispanic	2,312	262 (11.3)	0.81 (0.70, 0.94)	0.006
Hispanic, all races	7,349	610 (8.3)	0.67 (0.61, 0.74)	<0.001

Settings	Patients with OUD	Buprenorphine n (%)	AOR (95% CI)	p-value
Other/unknown	11,468	1,157 (10.1)	0.89 (0.82, 0.96)	0.003
Other				
Race/ethnicity				
White, non-Hispanic	170,069	25,784 (15.2)	1.0 (ref)	
Black, non-Hispanic	52,975	2,865 (5.4)	0.46 (0.44, 0.48)	<0.001
AIAN/Asian/Hawaiian/Pacific Islander, non-Hispanic	8,548	1,090 (12.8)	0.87 (0.81, 0.94)	<0.001
Hispanic, all races	22,453	1,741 (7.8)	0.64 (0.61, 0.68)	<0.001
Other/unknown	34,346	3,691 (10.7)	0.78 (0.75, 0.81)	<0.001

Source: T-MSIS.

AORs are only reported for race/ethnicity, with non-Hispanic White as the reference group. Logistic regression models controlled for patients' demographic characteristics (age, sex, state of residence, urban/rural status, and primary language spoken), substance use disorder diagnoses (alcohol, cannabis, cocaine, stimulant, sedative, nicotine, other), psychiatric diagnoses (anxiety, bipolar disorder, major depression, other mood disorders, attention-deficit hyperactivity disorder, post-traumatic stress disorder, and schizophrenia), pain diagnosis (back pain, neck pain, migraine, fibromyalgia, osteoarthritis, inflammatory joint disorder, and peritarticular), and other prescriptions during the baseline period (opioids, benzodiazepines, antidepressants, and stimulants). Individuals in the cohort were continuously enrolled in Medicaid for at least the duration of 90 days before the index OUD diagnosis and 180 days after the index OUD diagnosis.

AIAN, American Indian/Alaskan Native; OUD, opioid use disorder; T-MSIS, Transformed Medicaid Statistical Information System.