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Characteristics of Veterans Receiving Buprenorphine vs. Methadone for Opioid Use Disorder Nationally in the Veterans Health Administration

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Abstract

BACKGROUND—The advent of buprenorphine as an alternative to methadone has dramatically shifted the landscape of opioid agonist therapy (OAT) for opioid use disorder (OUD). However, there is limited US national level data describing the differences between patients who are prescribed these two OAT options.

METHODS—From veterans with OUD diagnosis who used Veterans Health Administration services in 2012, we identified 3 mutually exclusive groups: those who received (1) buprenorphine only (n=5,670); (2) methadone only (n=6,252); or (3) both buprenorphine and methadone in the same year (n=2513). We calculated the bi-varate effect size differences (risk ratios and Cohen's d) for characteristics that differentiated these groups. Logistic regression analysis was then used to identify factors independently differentiating the groups.

RESULTS—Ten year increment in age (OR 0.67; 95% CI 0.64-0.70), urban residence (OR 0.26; 95% CI 0.25-0.33), and black race (OR 0.39; 95% CI 0.35-0.43) were strongly and negatively associated with odds of receiving buprenorphine compared to methadone, while medical and psychiatric comorbidities or receipt of other psychiatric medications did not demonstrate substantial differences between groups.

CONCLUSIONS—Differences between veterans receiving buprenorphine or methadone based OAT seems to be largely shaped by demographic characteristics rather than medical or psychiatric

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Contributors

Lantie Quinones, Ajay Manhapra and Robert Rosenheck defined the research questions. Lantie Quinones and Ajay Manhapra drafted the manuscript. Robert Rosenheck reviewed and commented on manuscript drafts.

Conflict of interest

There are no conflicts of interests for any of the authors to report.

or service use characteristics. A clearer understanding of the reasons for racial differences could be helpful in assuring that black OUD patients are not denied the opportunity to receive buprenorphine if that is their preference.

Keywords

Opioid Use Disorder; Opioid agonist treatment; buprenorphine; methadone; demographics

1. INTRODUCTION

The wide ranging costs and burdens of opioid use disorder (OUD) in the United States have reached an estimated $56 billion annually and are associated with increased rates of crime, emergency room visits and hospital admissions, lost work productivity and high rates of HIV and Hepatitis B and C which incur additional morbidity, mortality and treatment-related and indirect costs (Birnbaum et al., 2011). Opioid agonist therapy (OAT) has proven to reduce morbidity, mortality and societal costs among OUD patients (Fullerton et al., 2014; Thomas et al., 2014). Until recently, methadone maintenance was the only available OAT option and the regulatory and resource requirements of methadone programs often imposed substantial burdens on patients and providers (Peles et al., 2013). The advent of buprenorphine as an OAT option created the opportunity for a far less burdensome office-based treatment for OUD (Fiellin and O'Connor, 2002; Stanton, 2006).

Buprenorphine was introduced in 2003 as a national non-formulary option with local special approval requirements in the Veterans Health Administration (VHA). In 2006, the VHA approved buprenorphine for formulary status and published national VHA criteria for its use, with several subsequent implementation projects encouraging maintenance and adoption of buprenorphine at VHA facilities and fostering increased numbers of physicians with certification for prescribing buprenorphine. By 2009, VHA had created a nationwide mandate to make buprenorphine and methadone for OUD available to every veteran who might benefit from them. Although implementation has been uneven across VHA facilities, overall access to buprenorphine has substantially increased with these efforts (Gordon et al., 2009, 2011). Paralleling national non-VHA trends (Jones et al., 2015a; Stanton, 2006), the number of buprenorphine prescriptions, number of physicians prescribing buprenorphine and number of facilities providing buprenorphine all increased substantially between 2004 and 2010, while methadone maintenance utilization increased only slightly (Oliva et al., 2013). This differential increase in buprenorphine utilization maintained the overall OAT utilization at 25-27% among all veterans with OUD, despite a 45% increase in number of veterans diagnosed with OUD (30,093 to 43,713) in VHA during the same period.

Prior studies have suggested that office based buprenorphine therapy may be capturing new types of patient, predominantly white, college educated and non-urban residents with OUD in addition to the types of patients that typically enroll in methadone maintenance (Stanton, 2006; Sullivan et al., 2005). Additional differences in clinical, psycho-patholological and sociodemographic characteristics, as well co-morbid medical and psychiatric diagnoses, use of concomitant psychotropic medications, and healthcare service use between these two groups have been noted in previous studies (Barnett, 2009; Baxter et al., 2011; Fingerhood

et al., 2014; Gerra et al., 2004; Hansen et al., 2013; Maremmani et al., 2011, 2007; Oliva et al., 2012, 2013; Proctor et al., 2014; Stein et al., 2012). However, a detailed national level comparative study of the characteristics of patients who receive each of these treatments has yet to be published despite the dramatic change in the nature of OAT utilization in the United States during the past decade.

In this study of veterans who received a diagnosis of opioid use disorder in FY2012 nationally in the VHA, we examine differences in clinical, demographic, and health service and psychotropic medication use characteristics between veterans in each of the following three treatment groups: buprenorphine only, methadone only, or both buprenorphine and methadone during the same year. A greater understanding of the characteristics of patients engaged in different forms of OAT options may allow more effective and more equitable targeting of these treatment options for patients diagnosed with OUD.

2. METHODS

2.1 Sample and Data Source

National VHA administrative records in Fiscal Year (FY) 2012 were used to identify all veterans with the diagnosis of opioid use disorder (ICD-9-CM codes 304.0x, 305.5x, and 304.7x - either opioid abuse or opioid dependence). We then identified patients who filled at least one prescription for buprenorphine or who had at least one visit to a methadone maintenance clinic or both in the VHA nationally during the FY. Patients receiving buprenorphine treatment were identified by prescription fill data which included all patients who received at least one prescription for buprenorphine or buprenorphine/naloxone tablets, and excluded patients receiving buprenorphine transdermal patch as it is designated for pain management rather than OAT. Patients receiving methadone were identified as those who had at least one methadone maintenance clinic stop code (523). Pharmacy records are not available on methadone dispensation in the VHA.

2.2: Measures

We compared the three groups on the following sociodemographic characteristics: age, gender, income, receipt of Veterans Affairs (VA) disability compensation or pension payments, service in the Iraq or Afghanistan theater of war (OIF/OEF), and a designation of urban vs. rural residence based on zip codes and Rural-Urban Commuting Area (RUCA) codes (depts.washington.edu/uwruca). Recent homelessness was identified by participation in a VHA specialized homeless service program or a V-60 code indicating housing problems. Information on ethnicity was obtained and included black, white, Hispanic, and mixed races.

Clinical diagnostic data included psychiatric and medical diagnoses based on International Classification of Diseases, 9th edition [ICD-9] codes that were assigned to each patient at least once during the study year. The Charlson Index (Charlson et al., 1987), an aggregate measure of medical co-morbidity, has been shown to predict the ten-year mortality for patients based on the presence of a broad range of co-morbid medical conditions and was used to assess medical co-morbidity. Individual diagnoses that compose the Charlson index

were also examined. Data on co-morbid psychiatric diagnoses included all ICD-9 codes 290.00 through 319.99 (coded into 11 classes; available on request). VHA inpatient and outpatient service utilization was documented including medical and surgical outpatient visits and emergency room visits. Outpatient mental health specialty care and substance abuse clinic visits were identified by standard VHA clinic stop codes. Pharmacy benefit records documenting all VHA prescriptions filled were used to identify the total number of prescriptions filled by these patients in five psychiatric medication classes: antidepressants, antipsychotics, sedative/hypnotics/anxiolytics, mood stabilizers (anti-epileptics), and lithium. The total number of psychotropic prescriptions filled by each veteran during the year was determined by summing the numbers of prescriptions in each of these classes as well as the total number of classes from which a prescription was filled. Medications in these classes that were not on the VHA formulary were not included in the analysis.

2.3 Analysis

First, we created three mutually exclusive groups; “buprenorphine only”, “methadone only” and “buprenorphine and methadone in the same year” and compared these groups using bivariate analyses of sociodemographic and diagnostic characteristics, health service use, and psychotropic medication fills. Given the large sample size and the fact that it represents the entire population of interest, effect sizes were used rather than p-values to identify meaningful differences (i.e., risk ratios for dichotomous measures and Cohen's d for continuous measures). Risk ratios greater than 2.0 or less than 0.5 were considered to represent substantial differences on dichotomous variables. The difference between means divided by the pooled standard deviation was used to calculate Cohen's d for continuous variables. A value greater than 0.20 was considered to represent more than small differences (Ferguson, 2009).

Logistic regression models were then used to identify variables independently associated with the receipt of buprenorphine compared to methadone (model 1), receipt of both buprenorphine and methadone during the year compared to receipt of methadone alone (model 2), and receipt of buprenorphine alone compared to receipt of both buprenorphine and methadone (model 3). In each of these models, we added covariates found to demonstrate substantial differences on bi-variate analyses in forward inclusion stepwise analysis which excluded variables that did not have significant relationship to the dependent variables of interest at $p<.05$. We report the adjusted odds ratio with 95% confidence interval for the variables that were found to be independently associated with outcomes of interest in the logistic regression models. To compare the magnitude of the effects the independent variables that are measured in different units of measurement, we also report the standardized regression coefficients for each significant variable.

3. RESULTS

In FY 2012 in VHA nationally, 14,435 veterans diagnosed with opiate use disorder received a buprenorphine prescription and/or had a methadone clinic stop code. Among these recipients, 5,670 (39.28%) filled a buprenorphine prescription alone and were categorized as “buprenorphine only” and 6,252 (43.31%) had a methadone clinic stop code only, and were

categorized as “methadone only”. The remainder, totaling 2,513 veterans (17.41% of the total) received at least one buprenorphine prescription and a methadone clinic stop code during the year. Among this group of veterans, 938 (37.3% of this third subgroup) had their first use of both of these services on the same day suggesting that they received buprenorphine in methadone clinics (as allowed by law). Another 785 (31.24%) had methadone clinic stops after a period of buprenorphine prescription receipt, with an average of 43 days between the events suggesting they were first prescribed buprenorphine and then referred to a methadone clinic. The remaining 790 veterans (31.44%) had a methadone clinic stop initially followed by receipt of at least one buprenorphine prescription later in the year, with an average of 76 days between the events. The first two subgroups (n=1,723, 68.5% of those who received both a buprenorphine prescription and a methadone clinic stop) appeared to have received buprenorphine as their first treatment) while in the last group it is impossible to tell which came first. Because of ambiguities in classifying these veterans, we combined all three of them into a single category, “both buprenorphine and methadone” in the same year, although it appears that for the majority buprenorphine was the first or primary treatment.

3.1 Bivariate comparisons

3.1.1 Demographic characteristics—Veterans who received buprenorphine only were younger by nearly a decade, more likely to reside in a rural area, and less likely to receive a VA pension and or to have been homeless, and were more likely to have served in OEF or OIF (consistent with the observed age difference) compared to the other two groups (Table 1). Most strikingly, the proportion of patients of black race was 40% among those who received methadone only, about 3 times more than in the other 2 groups, 12.07% in buprenorphine only groups and 14.80% in both buprenorphine and methadone group (Table 1).

3.1.2 Medical comorbidities—Overall prevalence of chronic medical diseases and Charlson comorbidity index was modestly higher among those who received methadone only, as compared to the other two groups, perhaps reflecting their older age (Table 2).

3.1.3 Psychiatric comorbidities and psychotropic medications—There were no marked differences in prevalence of the other psychiatric disorders or in psychotropic medication prescription fills between the 3 groups with few exceptions (Table 3). Schizophrenia was less common (albeit with relatively low overall treated prevalence) among those who received buprenorphine only. In contrast diagnoses of PTSD, anxiety disorders and dysthymia were slightly more common in the buprenorphine only group.

3.1.4 Healthcare utilization—There were no substantial differences in psychiatric clinic visits across the 3 groups. However, as would be expected, substance abuse clinic visits were higher within the two groups who received methadone compared to those who received buprenorphine only. Mental health inpatient treatment utilization was higher by those who received both buprenorphine and methadone in the same year, and outpatient medical/ surgical clinic visits were slightly higher within the methadone only group.

3.2. Multivariate analysis

In logistic regression analysis, receipt of buprenorphine only versus methadone only was associated with substantially younger age, rural residence and nonblack race (33%, 74%, and 61% lower likelihood respectively than older, urban dwelling or black veterans: Table 5, model 1). These same variables were also associated with lower likelihood of receiving buprenorphine and methadone in the same year as compared to receiving methadone only (33%, 61%, and 50% lower likelihood respectively: Table 5, model 2). These associations were substantial with relatively high absolute values of the standardized coefficients (0.23-0.29 and 0.17-0.33 respectively).

Comparison of the characteristics of veterans receiving buprenorphine versus those receiving both buprenorphine and methadone similarly showed receipt of VA pension benefits and Black race to be independently associated with slightly lower odds of receiving buprenorphine only (Table 5, model 3). Each ten year increment in age was associated slightly with higher odds of receiving buprenorphine only as compared to buprenorphine plus methadone. However, all of these showed weak associations with standardized regression coefficients less than 0.05.

4. DISCUSSION

This study of veterans with Opioid Use Disorder on Opioid Agonist Therapy nationally in VHA, found that those who received buprenorphine showed few substantial differences in psychiatric and medical comorbidities compared to those who received methadone, but these two groups differed markedly regarding several socio-demographic characteristics. Veterans who received buprenorphine were younger, more likely to be from rural areas and less likely to be of black race compared to those who received methadone. Those who received both buprenorphine and methadone in the same year appeared to share similar characteristics as those who received buprenorphine only.

4.1 Demographic differences

Our data is supportive of the earlier suggestions that patients who use buprenorphine appear tend to be representative of new types of OUD patients, people who likely developed problems with opiate use more recently, and were more likely to be younger, white and employed compared to methadone enrolled patients (Stanton, 2006; Sullivan et al., 2005). This demographic pattern of OUD treatment population seems to parallel changes in the characteristics of opioid users in the US in recent decades. Heroin addiction has expanded from largely urban areas to suburban and rural areas, with the proportion of patients of white race steadily increasing from around 50% to 90% in some studies (Cicero et al., 2014; Furst et al., 2004; Jones et al., 2015b). This change is thought to be largely driven by the growing use and availability of prescription opioid drug use/abuse during the late 1990s, and the subsequent migration of such prescription opiate users to heroin in search of lower costs and easier, less risky access (Cicero et al., 2007; Mars et al., 2014; Martins et al., 2015; Unick et al., 2013; Young and Havens, 2012). In addition, an escalation to intravenous heroin use seems to be expanding dramatically among the non-Hispanic whites below 50 years of age while the rates are declining among the blacks, most markedly in younger blacks

(Armstrong, 2007; Broz and Ouellet, 2008; Cooper et al., 2008; SAMHSA, 2007, 2011; Siegal et al., 1994; Unick et al., 2013). It is thus not surprising that veterans receiving buprenorphine, the recently approved OAT treatment, nationally through VHA are significantly younger, and more likely to be white and living in rural areas compared to those receiving the older methadone treatment.

The continued high utilization of methadone and relative low penetration of buprenorphine among black compared to white veterans in our study is also notable and of potential concern, and may have several explanations. The racial enrollment patterns for methadone treatment established during the pre-buprenorphine era (at about 30-40% blacks) represented characteristics of the OUD population *at that time* (D'Aunno and Pollack, 2002; Gearing and Schweitzer, 1974) and has remained relatively unchanged over the years of buprenorphine growth (Jones et al., 2015a; Stanton, 2006) and is mirrored in our study cohort. Despite prior studies showing that use of mental health services among blacks in VHA is generally similar or greater to that of whites (Gamache et al., 2000; Greenberg and Rosenheck, 2003), in this study of OAT, the low utilization of buprenorphine compared to methadone among blacks persisted even after controlling for income, age and rural location. This racial difference in utilization of OAT options may reflect differences in availability at more localized neighborhood levels (Hansen et al., 2013).

A substantial portion of patients entering SUD treatment do so under legal coercion (Farabee et al., 1998), which is not surprisingly higher among blacks who, evidence suggests, experience disproportionate police surveillance (Alexander, 2012). About 70% of those who access legal assistance within VHA system in 2012 (32% black and 59% white) had a SUD diagnosis (Finlay et al., 2014). The rules related to OAT in non-VA settings appear to be tighter for black patients (e.g., lower dose limits, lower daily doses, and likelihood of take-home dosing for black methadone patients (D'Aunno and Vaughn, 1992) and there is higher safety monitoring for black pain clinic patients (Becker et al., 2011)) suggesting that black population may be channeled more often to methadone treatment because of its stricter supervision. We did not have data regarding the prevalence of legal mandates affecting practice at VHA facilities. However, a recent SAMHSA report showed that the reported legal mandates among clients of VHA methadone clinics (about 6%) are substantially lower than the above stated rates (SAMHSA, 2013).

Prior studies of buprenorphine dissemination have suggested that early buprenorphine clinical trials, with their support for staff training, provided the infrastructure for subsequent general adoption in those public hospitals that hosted trials (Rieckmann et al., 2014). We could not address this issue, as we lacked the data on which VHA facilities participated in such clinical trials.

4.2: Supplementary analyses to further understand racial differences in OAT utilization

Although methadone and buprenorphine seem to have similar clinical efficacy, buprenorphine could be a better choice for many including blacks due to the lower level of stigma, fewer administrative restrictions and lower side effects associated with it. It is thus important to better understand the observed racial differences in buprenorphine utilization in

VHA so that equitable access to buprenorphine among black and white veterans can be assured. We report further post-hoc analyses to better understand the data presented above.

One possibility is that the black cohort in our study includes fewer newly enrolled and younger patients who, as new OAT patients, are more likely to receive the newly available OAT buprenorphine. We did not have a way of identifying “new” and “old” black and white treatment users as the data available to us only cover one fiscal year. However, we were able to examine differences between veterans who received their first buprenorphine dose or had their first methadone clinic visit AFTER the first 90 days of the fiscal year (a proxy indicator of “new” OAT recipients), and found that racial proportions in the proportion of “new OAT recipients” treated with buprenorphine or methadone did not differ by more than a few percentage points between blacks and whites. This rough measure of “new users” was thus not informative.

In a further analytic effort to identify racial differences in “new” users we made the tentative assumption that “new OAT recipients” would be younger than existing OAT recipients, and examined the interaction of race (black vs others) and age in predicting buprenorphine use in several models. In no model was there a significant interaction suggesting that black users were significantly older or younger than white users of buprenorphine. This analysis also did not clarify the role of age and new versus existing OUD service use in relationship to racial differences.

Because they require extensive fixed assets, the majority of the VHA methadone clinics are located in large facilities in highly populous metropolitan areas. Such areas typically include larger proportions of blacks in the general population (SAMHSA, 2013). In the overall FY 2012 sample of veterans who used any mental health services, those served at facilities that provide methadone treatment were more likely to be black than those at other facilities (29% Vs. 18.6%; Odds ratio for being black at such facilities = 1.77). As a result there is a greater supply of methadone maintenance services at facilities that treat larger numbers of blacks, and this could explain, at least in part, the lower utilization of buprenorphine relative to methadone among blacks in our study.

The introduction of a dichotomous variable representing receipt of treatment at a VA facility that provided methadone maintenance treatment into our logistic regression model resulted in reduction in the lower odds that blacks would receive buprenorphine compared to methadone (OR 0.64; 95% CI 0.56-0.73 Vs. OR 0.39 without inclusion of this covariate) and a reduction in their lower odds of receiving both buprenorphine and methadone compared to methadone (OR for blacks 0.60; 95% CI 0.52-0.69 Vs. OR 0.50 without inclusion of this covariate). The odds ratio for blacks receiving buprenorphine alone compared to both buprenorphine and methadone was no longer significant after adjustment for being treated at a facility supporting methadone maintenance (OR 1.07, 95% CI 0.91-1.26 Vs. OR 0.76 without inclusion of this covariate). Thus the lower likelihood that black veterans who receive OAT would receive buprenorphine as contrasted with methadone was partially, but not entirely, explained by the location of methadone programs in areas with larger proportions of black veterans in the general population they serve.

4.3. Other clinical factors

Although clinical trials of buprenorphine have tended to focus on patients with lower levels of psychopathology (Weiss et al., 2010), buprenorphine clinic patients appear to have similar burden of psychiatric diseases as methadone patients (Savant et al., 2013). This was also observed in our national VA sample with the exception of veterans diagnosed with schizophrenia who were modestly less likely to fill prescriptions for buprenorphine. Higher utilization of methadone as compared to buprenorphine in veterans diagnosed with schizophrenia may reflect the fact they may be judged to require more intensive treatment and closer monitoring because of their psychotic disorders. Clinicians may feel such disorders require a higher intensity of care, more available in methadone clinics that offer more extensive structure and ancillary support.

It is not surprising that medical comorbidity is higher among VHA methadone patients given their older age compared to those prescribed buprenorphine. It is also likely that older methadone patients started using opioids at a younger age and have used them for longer periods (Cicero et al., 2014). Long term use of opioids, especially methadone has, itself, been observed to be associated with higher prevalence of chronic medical diseases (Darke et al., 2010, 2006; Smyth et al., 2007).

4.4 Limitations

This study carries with it the inherent limitations of an observational study using administrative data. Diagnoses are based on those of treating clinicians rather than formal research assessments. In addition, we did not have actual pharmacy records of receipt of methadone, only evidence of methadone clinic visit and supplementary data on buprenorphine prescription fills. We also lacked more details on OUD history such as number of years of addiction, intravenous drug use rates, and rates of prescription opioid versus illicit heroin use which might also impact the decisions related to utilization of the specific type of OAT.

4.5 Conclusion

In this national study of VHA patients with OUD, receipt of buprenorphine or methadone based OAT seems to be largely associated with demographic characteristics: age, urban/rural residence, race, rather than medical or psychiatric co-morbidities or service use characteristics. The lower likelihood that black veterans receiving buprenorphine as contrasted with methadone was largely, but not entirely, explained by the location of methadone programs in areas with larger medical centers in cities with higher proportions of black veterans in the general VHA service user population.

These data may have policy and clinical implications. Equitable provision of treatment to those who need it is a goal for all demographic groups. Focusing further buprenorphine dissemination efforts in large urban areas with existing methadone clinics may improve the access of black veterans to buprenorphine. Given the similar clinical efficacy associated with buprenorphine and methadone in OUD, further attention to patient choice through shared decision making at the clinical level may assure equitable access to preferred treatments for all patients.

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Highlights

- ✓ Limited knowledge about agonist treatment choice for opioid use disorder in practice
- ✓ Compared characteristics of veterans on buprenorphine Vs. methadone nationally
- ✓ The choice was shaped by demographic characteristics rather than clinical factors
- ✓ We also found significant race based variations in choice of agonist therapy

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Table 1

Comparison of baseline demographic factors of Veterans with Opioid Use Disorder receiving opioid Agonist Therapy options

	(A) Methadone Only	(B) Buprenorphine only	(C) Buprenorphine and Methadone*	Statistics		
				(B) Vs (A)	(C) Vs (A)	(B) Vs (C)
	N= 6252	N=5670	N= 2513			
	Mean (SD)	Mean (SD)	Mean (SD)	Cohens d	Cohens d	Cohens d
Age in years	54.46 (11.21)	44.93 (13.53)	44.79 (13.52)	−0.76	−0.77	0.01
Income ($)	14684.35 (22165.85)	16795.58 (23341.13)	15980.43 (23446.39)	0.09	0.06	0.04

	Percent	Percent	Percent	Risk Ratio	Risk Ratio	Risk Ratio
Male	96.71	93.74	94.19	0.97	0.97	1.00
Area of residence						
Rural	5.40	24.64	20.52	4.60	3.80	1.21
Urban	94.61	75.16	79.47	0.79	0.84	0.95
OEF/OIF Era Veterans	7.57	24.64	25.55	3.26	3.38	0.96
VA Pension receipt	14.88	5.57	7.08	0.37	0.48	0.79
VA Service Connection ≥50%	19.98	26.95	23.36	1.35	1.17	1.15
VA Service Connection <50%	14.19	17.50	18.90	1.23	1.33	0.93
Homeless	36.01	26.26	30.44	0.73	0.85	0.86
Race/Ethnicity						
Black	40.06	12.07	14.80	0.30	0.37	0.82
White	55.67	85.49	81.92	1.54	1.47	1.04
Hispanic	11.58	11.81	14.56	1.02	1.26	0.81
Other	7.79	8.11	7.00	1.04	0.90	0.86

*Received buprenorphine and had methadone clinic visit in the same year

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Table 2

Comparison of Medical Comorbidity of Veterans with Opioid Use Disorder receiving Opioid Agonist Therapy options

	(A) Methadone Only	(B) Buprenorphine only	(C) Buprenorphine and Methadone *	Statistics		
				(B) Vs (A)	(C) Vs (A)	(B) Vs (C)
	N= 6252	N=5670	N= 2513			
	Mean (SD)	Mean (SD)	Mean (SD)	Risk Ratio	Risk Ratio	Risk Ratio
Seizures	1.10	1.29	1.16	1.17	1.05	1.12
Insomnia	6.00	9.82	9.75	1.64	1.63	1.01
Diabetes Mellitus	18.76	9.82	10.51	0.52	0.56	0.94
Congestive Heart Failure	56.03	44.27	43.97	0.79	0.78	1.01
Cerebrovascular Accident	2.75	1.67	1.95	0.61	0.71	0.86
Myocardial Infarction	0.83	0.67	0.60	0.81	0.72	1.12
Peripheral Vascular Disease	4.53	2.13	2.19	0.47	0.48	0.98
Chronic Obstructive Airway Disease	18.54	12.98	13.25	0.70	0.71	0.98
Paraplegia	0.82	0.51	0.16	0.63	0.20	3.21
Hepatic Disease	21.19	11.11	14.48	0.52	0.68	0.77
Peptic Ulcer Disease	1.18	0.76	0.72	0.64	0.61	1.06
Renal Disease	4.38	13.76	1.59	0.31	0.36	0.86
HIV	2.86	1.00	1.03	0.35	0.36	0.97
Cancer	5.68	3.10	3.30	0.55	0.58	0.94
Any Pain	60.80	64.90	64.19	1.07	1.06	1.01

	Mean (SD)	Mean (SD)	Mean (SD)	Cohens d	Cohens d	Cohens d
Charlson Comorbidity Index	1.79 (2.05)	1.07 (1.48)	1.13 (1.62)	−0.41	−0.37	−0.04

* Received buprenorphine and had methadone clinic visit in the same year

Table 3

Comparison of psychiatric diagnosis and psychotropic medication use among Veterans with Opioid Use Disorder receiving Opioid Agonist Therapy options

	(A) Methadone Only	(B) Buprenorphine only	(C) Buprenorphine and Methadone *	Statistics		
				(B) Vs (A)	(C) Vs (A)	(B) Vs (C)
	N= 6252	N=5670	N= 2513			
Psychiatric Diagnoses						
	Percent	Percent	Percent	Risk Ratio	Risk Ratio	Risk Ratio
Alcohol Dependence	40.77	38.68	41.78	0.95	1.02	0.93
Major Depression	19.64	23.16	19.98	1.18	1.02	1.16
Other depression (dysthymia)	40.77	50.80	49.10	1.25	1.20	1.03
Bipolar Disorder	8.19	11.02	10.82	1.35	1.32	1.02
Any Anxiety Disorder	22.84	35.64	34.14	1.56	1.49	1.04
Post-traumatic Stress Disorder	28.06	39.24	37.13	1.40	1.32	1.06
Schizophrenia	5.33	2.43	2.87	0.46	0.54	0.85
Personality disorders	6.54	7.51	7.88	1.15	1.20	0.95
Adjustment disorders	8.85	10.23	10.63	1.16	1.20	0.96
Other Psychiatric Diagnosis	25.00	26.61	27.66	1.06	1.11	0.96
Received any psychotropic medications	72.68	83.21	82.69	1.14	1.14	1.01

Psychotropic Prescriptions/year						
	Mean (SD)	Mean (SD)	Mean (SD)	Cohens d	Cohens d	Cohens d
Antidepressants	7.41 (16.68)	9.72 (18.31)	8.90 (14.10)	0.14	0.09	0.05
Antipsychotics	3.33 (16.88)	3.46 (10.47)	3.61 (9.79)	0.01	0.02	−0.01
Anxiolytics/Sedatives/Hypnotics	2.25 (6.66)	3.54 (8.52)	3.14 (7.01)	0.17	0.12	0.05
Stimulants	0.07 (0.96)	0.38 (2.84)	0.36 (2.50)	0.14	0.13	0.01
Anticonvulsants or Mood Stabilizers	2.94 (11.39)	3.54 (11.62)	2.87 (7.55)	0.05	−0.01	0.06
Lithium	0.21 (2.73)	0.32 (3.25)	0.25 (2.3:1)	0.04	0.01	0.02
Any	17.05 (39.06)	20.96 (37.21)	19.14 (28.09)	0.11	0.06	0.05

* Received buprenorphine and had methadone clinic visit in the same year

Table 4

Comparison of healthcare resource utilization of Veterans with Opioid Use Disorder receiving opioid Agonist Therapy options

	(A) Methadone Only	(B) Buprenorphine only	(C) Buprenorphine and Methadone*	Statistics		
				(B) Vs (A)	(C) Vs (A)	(B) Vs (C)
	N= 6252	N=5670	N= 2513			
	Percent	Percent	Percent	Risk Ratio	Risk Ratio	Risk Ratio
Any Mental Health Inpatient Treatment	15.63	18.61	20.61	1.19	1.32	0.90

	Mean (SD)	Mean (SD)	Mean (SD)	Cohens d	Cohens d	Cohens d
Emergency Department Visits	2.04 (3.79)	1.66 (3.14)	1.79 (3.27)	−0.11	−0.07	−0.04
Medical Surgical Visits	11.69 (13.79)	9.19 (11.21)	9.02 (10.80)	−0.20	−0.22	0.01
All Outpatient Visits	92.20 (94.31)	48.12 (50.70)	60.52 (60.47)	−0.59	−0.43	−0.17
General Psychiatry clinic visits	13.47 (27.50)	14.43 (26.90)	13.27 (23.18)	0.04	−0.01	0.04
Substance abuse clinic visits	67.03 (84.85)	24.49 (32.84)	38.23 (47.02)	−0.68	−0.46	−0.22

* Received buprenorphine and had methadone clinic visit in the same year

Table 5

Odds Ratios with 95% CI for logistic regression analysis for different comparisons of receipt of Opioid agonist therapy modalities

	Odds Ratio (95% CI)	p-value	Standardized Coefficient*
Model 1: Odds of receipt of Buprenorphine only compared to Methadone only			
Age (10 year increments)	0.67 (0.64-0.70)	<.0001	−0.29
Urban Residence	0.74 (0.25-0.33)	<.0001	−0.26
Black Race	0.39 (0.35-0.43)	<.0001	−0.23
VA Pension Receipt	0.69 (0.59-0.80)	<.0001	−0.06
Charlson Comorbidity Index	0.92 (0.90-0.95)	<.0001	−0.08
Schizophrenia Diagnosis	0.65 (0.52-0.81)	0.0002	−0.05
Model 2: Odds of receipt of Both Buprenorphine and Methadone in same year Vs Methadone only			
Age (10 year increments)	0.63 (0.60-0.66)	<0.0001	0.33
Urban Residence	0.35 (0.30-0.42)	<0.0001	0.17
Black Race	0.50 (0.44-0.57)	<0.0001	0.18
Charlson comorbidity Index	0.96 (0.93-0.99)	0.0064	0.05
Schizophrenia Diagnosis	0.60 (0.44-0.81)	0.0007	0.06
Model 3: Odds of receipt of Buprenorphine only compared to Buprenorphine and Methadone in same year			
Age (10 year increments)	1.06 (1.02-1.10)	0.003	0.05
Urban Residence	0.81 (0.71-0.91)	0.004	−0.05
VA Pension Receipt	0.78 (0.64-0.96)	0.0183	−0.03
Black Race	0.76 (0.65-0.88)	0.0004	−0.05

*The greater the absolute value of the standardized coefficient, the greater the predicted change in the probability of the outcome given a 1 - standard deviation change in the corresponding predictor variable, holding constant the other predictors in the model.