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RESEARCH ARTICLE

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# Therapeutic relationships between Veterans and buprenorphine providers and effects on treatment retention

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## Abstract

**Objective:** To examine the extent to which there was any therapeutic relationship between Veterans and their initial buprenorphine provider and whether the presence of this relationship influenced treatment retention.

**Data Sources:** National, secondary administrative data used from the Veterans Health Administration (VHA), 2008–2017.

**Study Design:** Retrospective cohort study. The primary exposure was a therapeutic relationship between the Veteran and buprenorphine provider, defined as the presence of a previous visit or medication prescribed by the provider in the 2 years preceding buprenorphine treatment initiation. The primary outcome was treatment discontinuation, evaluated as 14 days of absence of medication from initiation through 1 year.

**Data Collection/Extraction Methods:** Adult Veterans (age ≥ 18 years) diagnosed with opioid use disorder and treated with buprenorphine or buprenorphine/naloxone within the VHA system were included in this study. We excluded those receiving buprenorphine patches, those with documentation of a metastatic tumor diagnosis within 2 years prior to buprenorphine initiation, and those without geographical information on rurality.

**Principal Findings:** A total of 28,791 Veterans were included in the study. Within the overall study sample, 56.3% ($n = 16{,}206$) of Veterans previously had at least one outpatient encounter with their initial buprenorphine provider, and 24.9% ($n = 7174$) of Veterans previously had at least one prescription from that provider in the 2 years preceding buprenorphine initiation. There was no significant or clinically meaningful association between therapeutic relationship history and treatment retention when defined as visit history (aHR: 0.99; 95% CI: 0.96, 1.02) or medication history (aHR: 1.03; 95% CI: 1.00, 1.07).

**Conclusions:** Veterans initiating buprenorphine frequently did not have a therapeutic history with their initial buprenorphine provider, but this relationship was not associated with treatment retention. Future work should investigate how the quality of Veteran-provider therapeutic relationships influences opioid use dependence management and whether eliminating training requirements for providers might affect access to buprenorphine, and subsequently, treatment initiation and retention.

KEYWORDS
access/demand/utilization of services, mental health, pharmaceuticals: prescribing/use/costs, rural health, substance abuse: alcohol, tobacco, chemical dependency, VA healthcare system

### What is known on this topic

- In chronic disease models, established therapeutic relationships or treatment history between patients and providers may improve treatment compliance, adherence, and retention, but this is unknown for the management of opioid use disorder.

### What this study adds

- Although the therapeutic relationship was not associated with treatment retention, only one-quarter of Veterans had previous prescriptions from their buprenorphine provider within the Veterans Health Administration.
- Most Veterans are still being treated by mental health providers, with only 13% of those with a therapeutic history being treated by general medicine providers.

## 1 | INTRODUCTION

Over the last 20 years, nearly 450,000 individuals have died from an opioid overdose in the United States across three defined waves of increased opioid prescriptions, rising heroin-related overdose deaths, and most recently with synthetic opioid overdoses.[1] US Veterans represent a distinct cohort with increased susceptibility to opioid use dependence (OUD), as well as morbidity and mortality due to overdoses as a result of higher rates of post-traumatic stress disorder, chronic pain, sleep issues, and concurrent use or dependence of other substances such as alcohol or sedatives.[2–4] Rurality is an additional risk factor pertaining to harmful outcomes of OUD, and nearly 25% of Veterans live in rural areas where the shortage of mental health providers and access to timely care are barriers.[5,6]

An effective treatment option for OUD approved by the Food and Drug Administration includes the combination of medication such as buprenorphine with psychological therapies.[7,8] Treatment with buprenorphine is associated with improved short- and long-term benefits, including improved patient survival, decreased illicit opiate use and other criminal activity, increased ability for gaining and maintaining employment, and decreased risk of contraction of HIV or Hepatitis C.[7] However, access and availability to providers credentialed to prescribe buprenorphine remains a barrier, particularly in rural areas.[9–11] In order to increase the capacity and availability of providers for managing OUD with buprenorphine, the Drug Addiction Treatment Act of 2000 was enacted so office-based providers (including primary care providers and general practitioners) could prescribe this medication within their patient population.[12,13]

In a 2018 study focused on addressing the clinical capacity of buprenorphine treatment within the Veterans Health Administration (VHA), Valenstein-Mah et al. found that 2% of VHA providers were credentialed to prescribe buprenorphine, and those credentialed were prescribing buprenorphine well below their defined capacity or maximum patient volume.[14] In an effort to expand or broaden this view of capacity, we sought to examine an alternative definition of clinical capacity that may serve in the spirit of the Drug Addiction Treatment Act 2000 waiver, one that focuses on the therapeutic relationship between a Veteran with OUD and his/her buprenorphine provider. As seen with other chronic disease management models, an established therapeutic relationship or treatment history between patients and providers may improve treatment compliance, adherence, and retention.[15–22] Additionally, one model pertaining to drug treatment proposed by Simpson synthesized evidence from treatment evaluations and large studies into a conceptual framework for how drug treatment may effectively work.[23] Two components within this framework that marked successful or positive post-treatment outcomes included (1) patient-provider relationships, and (2) the idea that treatment retention was a critical outcome, as it "represents a cumulative index for a mixture of patient, therapeutic, and environmental factors that contribute to treatment progress and effectiveness."[23]

In this study, we sought to examine the overall themes of access, clinical capacity, and treatment retention within a cohort of Veterans diagnosed with OUD who initiated treatment with buprenorphine. The primary aim of this study was to examine the extent to which there was any therapeutic relationship, as defined here as a history of previous visits or medications prescribed, between Veterans and their initial buprenorphine provider, and whether the presence of this relationship influenced treatment discontinuation up to 1 year from medication initiation.

## 2 | METHODS

### 2.1 | Study design, setting, and sample

We conducted a retrospective cohort study of adult Veterans (age ≥ 18 years) diagnosed with OUD and treated with buprenorphine or buprenorphine/naloxone within the VHA system between January 1, 2008 and December 31, 2017. Eligible Veterans included those who received an incident prescription for a sublingual, short-acting

buprenorphine product and had a diagnosis code for OUD using the International Classification of Diseases—Clinical Modification Versions 9 and 10 within 6 months of the prescription. We excluded those receiving buprenorphine patches as these suggest pain management,[24] those with documentation of a metastatic tumor diagnosis (as this may influence subsequent medications, treatment retention, and mortality) within 2 years prior to buprenorphine initiation, and those without geographical information on rurality (Appendix A of Supporting information). This study was approved by the University of Iowa Institutional Review Board and Iowa City Veterans Administration Research and Development Committee.

## 2.2 | Measurement of the therapeutic relationship

The primary exposure for this study was the therapeutic relationship between the Veteran and buprenorphine provider. We operationalized the therapeutic relationship in four ways through a combination of interaction type (history of previous encounters or medication prescriptions) and duration (length of time since earliest encounter or medication). First, we identified all unique providers who prescribed buprenorphine for each Veteran to 14 days from treatment initiation as initial buprenorphine providers. We further identified the specialization of providers and characterized them as mental health, general medicine (a broader term capturing family, general, internal medicine or health providers in the general community), and/or addiction specialization.

For all buprenorphine prescriptions occurring within the first 2 weeks of treatment initiation, we linked the providers deterministically to all outpatient encounter records and medications prescribed for each Veteran for 2 years leading up to, but not including, the index buprenorphine date. The first exposure of interest was any prior visit with the initial buprenorphine providers identified within this time frame. Second, we alternatively identified a therapeutic relationship as any prior medication prescribed by the initial provider(s). Aside from documentation of any prior visit or medication, we identified the earliest visit or prescription date with these providers as a means to capture the length of time a provider and the Veteran may have had established contact. Length of time of medication and visit was categorized as no visit, visit occurring ≤1 year before buprenorphine was initiated, or between 1 and 2 years before buprenorphine was initiated.

## 2.3 | Measurement of covariates and confounders

To account for temporal trends in buprenorphine availability and access, we categorized the year the Veteran initiated buprenorphine as 2008–2009, 2010–2011, 2012–2013, 2014–2015, or 2016–2017. Sociodemographic factors assessed at baseline included age, race, ethnicity, gender, and potential homelessness (identified using previous methodologies).[25,26] Geographical measures included driving distance and time to nearest primary or secondary care centers and urban/rural designation status determined by ZIP codes and 2010 Rural–Urban Commuting Area (RUCA) codes.[27] Rural designation included isolated rural, small rural, and large rural areas.

Comorbidities diagnosed up to 2 years prior to buprenorphine initiation were identified from ICD-9 and ICD-10 inpatient and outpatient diagnosis codes. These conditions were classified by use of both the Elixhauser Index, using the approach of Quan et al., as well as Clinical Classifications Software Level 2 coding schema for mental health diagnoses from the Healthcare Cost and Utilization Project.[28,29] We captured past year psychiatric medications in addition to those for OUD. Prior health care utilization was measured as admissions or encounters for inpatient (classified as any, mental health, suicide/self-harm attempts or ideation, or substance use), outpatient, urgent care, and emergency department utilization from VA stop codes up to 2 years before buprenorphine initiation.[30]

In previous work, we demonstrated that health care utilization involving telehealth during the course of treatment was associated with treatment retention. As a result, we identified the initiation of telehealth for a mental health encounter from stop codes to help define outpatient production units and estimate the costs of outpatient VHA work. This covariate was evaluated as a time-varying dichotomous variable for those who had this delivery of care implemented; duration of follow-up until telehealth initiation was treated as unexposed, and once the first telehealth encounter was initiated, the duration until discontinuation or censoring was treated as exposed.

## 2.4 | Outcome assessment

The primary outcome in this study was time to treatment discontinuation (days). The incident buprenorphine date for each Veteran was determined from the first sublingual buprenorphine outpatient prescription filled between January 1, 2008 and December 31, 2017. An episode of treatment was generated by assessing the supply days from the day the buprenorphine outpatient prescription was filled through the number of supply days and accounted for potential oversupply if the next prescription was filled prior to the expected exhaustion of supply. To account for gaps in treatment due to hospitalization, incarceration, or logistical factors, we defined treatment discontinuation as a gap of greater than 14 days.

## 2.5 | Statistical analysis

We evaluated the association between each measure of therapeutic relationship and time until treatment discontinuation. Veterans were censored at a transition to another medication for OUD ($n = 167$), at the end of the study period (December 31, 2017), or end of the maximum follow-up period of 1 year. Deaths occurring during and shortly after treatment discontinuation were handled in one of two ways. Those who died during the treatment episode (i.e., still had an apparent supply of buprenorphine) were followed for the number of days in

treatment until death, at which point they were censored ($n = 95$). Those who died within 14 days of depletion of the buprenorphine supply were classified as having discontinued treatment at the time of death ($n = 44$).

The association between therapeutic relationship and each demographic and clinical covariate was evaluated through logistic regression, while the association between each demographic and clinical covariate and treatment discontinuation was modeled through the Cox proportional hazards regression. Variables identified as associated with the exposure of interest and outcome (with a threshold of $p \leq 0.20$) were considered in developing the final model. Final multivariable models were built after the evaluation of these variables and Akaike Information Criterion values. All analyses were completed using SAS version 9.4 (Cary, NC).

### 2.5.1 | Secondary analyses

We descriptively compared the proportions of all initial providers by specialization and the proportion within each specialization for whom Veterans had a therapeutic relationship. Second, we assessed two potential multiplicative effect modifiers of the association between therapeutic relationship and treatment retention. First was rural–urban designation, which we tested for by fitting models with each dichotomous therapeutic relationship and exposure (any previous visit or medication) and treatment retention with an interaction term of the therapeutic relationship and rural–urban designation. Second, we evaluated whether the association between therapeutic relationship and treatment retention varied by the occurrence of hospitalization at the time of the initial buprenorphine prescription. We identified all

**TABLE 1** Demographic characteristics of Veterans treated for opioid use dependence with buprenorphine in the Veterans Health Administration by therapeutic relationship status with buprenorphine provider, 2008–2017

| Demographic and clinical characteristics | Total ($N = 28,791$) | %[a] | Any previous visits, $N = 16,206$ | | | | Any previous medications, $N = 7174$ | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | *n* | %[b] | uOR | 95% CI | *n* | %[b] | uOR | 95% CI |
| Gender | | | | | | | | | | |
| Female | 2044 | 7.1 | 1183 | 57.9 | Ref | | 564 | 27.6 | Ref | |
| Male | 26,747 | 92.9 | 15,023 | 56.2 | 0.93 | 0.85, 1.02 | 6583 | 24.6 | 0.86 | 0.77, 0.95 |
| Age (years) | | | | | | | | | | |
| 18–24 | 1121 | 3.9 | 575 | 51.3 | 0.67 | 0.57, 0.78 | 237 | 21.1 | 0.75 | 0.63, 0.91 |
| 25–44 | 14,044 | 48.8 | 7696 | 54.8 | 0.77 | 0.69, 0.85 | 3412 | 24.3 | 0.90 | 0.80, 1.02 |
| 45–64 | 12,059 | 41.9 | 6975 | 57.8 | 0.87 | 0.78, 0.97 | 3087 | 25.6 | 0.97 | 0.86, 1.09 |
| ≥65 | 1567 | 5.4 | 960 | 61.3 | Ref | | 411 | 26.2 | Ref | |
| Race | | | | | | | | | | |
| White | 23,389 | 81.2 | 13,154 | 56.2 | Ref | | 5883 | 25.2 | Ref | |
| Black | 3587 | 12.5 | 2042 | 56.9 | 1.03 | 0.96, 1.10 | 844 | 23.5 | 0.92 | 0.84, 0.99 |
| Other | 667 | 2.3 | 379 | 56.8 | 1.02 | 0.88, 1.20 | 162 | 24.3 | 0.96 | 0.80, 1.14 |
| Unknown/missing | 1148 | 4.0 | 631 | 55.0 | 0.95 | 0.84, 1.07 | 258 | 22.5 | 0.86 | 0.75, 0.99 |
| Ethnicity | | | | | | | | | | |
| Hispanic | 1455 | 5.1 | 879 | 60.4 | Ref | | 422 | 29.0 | Ref | |
| NonHispanic | 26,557 | 92.2 | 14,897 | 56.1 | 0.84 | 0.75, 0.93 | 6541 | 24.6 | 0.80 | 0.71, 0.90 |
| Unknown/missing | 779 | 2.7 | 430 | 55.2 | 0.81 | 0.68, 0.96 | 184 | 23.6 | 0.76 | 0.62, 0.93 |
| Indication for homelessness/ unstable housing (Ref = No) | 8323 | 28.9 | 5230 | 62.8 | 1.46 | 1.39, 1.54 | 2647 | 31.8 | 1.66 | 1.56, 1.75 |
| Residential designation | | | | | | | | | | |
| Urban | 25,516 | 88.6 | 14,250 | 55.8 | Ref | | 6253 | 24.5 | Ref | |
| Rural | 3275 | 11.4 | 1956 | 59.7 | 1.17 | 1.09, 1.26 | 894 | 27.3 | 1.16 | 1.07, 1.26 |
| Treatment initiation era | | | | | | | | | | |
| 2008–2009 | 3904 | 13.6 | 1986 | 50.9 | Ref | | 804 | 20.6 | Ref | |
| 2010–2011 | 5303 | 18.4 | 2866 | 54.0 | 1.14 | 1.05, 1.23 | 1256 | 23.7 | 1.20 | 1.08, 1.32 |
| 2012–2013 | 5915 | 20.5 | 3285 | 55.5 | 1.21 | 1.11, 1.31 | 1429 | 24.2 | 1.23 | 1.11, 1.35 |
| 2014–2015 | 6383 | 22.2 | 3812 | 59.7 | 1.43 | 1.32, 1.55 | 1624 | 25.4 | 1.32 | 1.20, 1.49 |
| 2016–2017 | 7286 | 25.3 | 4257 | 58.4 | 1.36 | 1.26, 1.47 | 2034 | 27.9 | 1.49 | 1.36, 1.64 |

Abbreviation: uOR, unadjusted odds ratio.

[a]Percentages represent column percentages of total population.

[b]Percentages represent row percentages within demographic characteristic.

hospitalization discharges that occurred ±48 h of the initial buprenorphine prescription date. We then tested for potential effect modification with an interaction term of the therapeutic relationship and hospitalization status.

### 2.5.2 | Sensitivity analyses

We performed multiple sensitivity analyses to assess whether the association between therapeutic relationship and treatment retention could have yielded variable results due to potential sample or design issues, exposure misclassification, or outcome misclassification. First, we addressed the issue of new or rare users within the VHA having incomplete comorbidity data by excluding those who did not have at least two visits at any VHA facility in the 2 years prior to treatment initiation. Second, we analyzed Veterans who stayed in treatment for at least 28 days to account for those who discontinued treatment early. These first two approaches were intended to account for Veterans who may not have intended to continue care within the VHA system, thereby leading to unintended selection bias and loss to follow-up.

**TABLE 2** Select clinical characteristics of Veterans treated for opioid use dependence with buprenorphine in the Veterans Health Administration by therapeutic relationship status with buprenorphine provider, 2008–2017

| Clinical characteristics | Total ($N = 28,791$) | %[a] | Any previous visits $N = 16,206$ | | | | Any previous medications $N = 7174$ | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | *n* | %[b] | uOR | 95% CI | *n* | %[b] | uOR | 95% CI |
| Clinical comorbidities | | | | | | | | | | |
| Chronic obstructive pulmonary disease | 3917 | 13.6 | 2458 | 62.8 | 1.36 | 1.27, 1.46 | 1139 | 29.1 | 1.27 | 1.20, 1.39 |
| Hypertension (without complications) | 9325 | 32.4 | 5647 | 60.6 | 1.30 | 1.23, 1.36 | 2629 | 28.2 | 1.30 | 1.23, 1.37 |
| Liver disease | 4392 | 15.3 | 2802 | 63.8 | 1.45 | 1.35, 1.55 | 1296 | 29.5 | 1.33 | 1.24, 1.43 |
| Obesity | 3300 | 11.5 | 2061 | 62.5 | 1.33 | 1.24, 1.44 | 1007 | 30.5 | 1.38 | 1.28, 1.50 |
| Psychiatric comorbidities | | | | | | | | | | |
| Adjustment | 4410 | 15.3 | 2752 | 62.4 | 1.35 | 1.26, 1.44 | 1343 | 30.5 | 1.40 | 1.31, 1.50 |
| Anxiety disorder | 17,529 | 60.9 | 10,536 | 60.1 | 1.49 | 1.42, 1.56 | 5145 | 29.4 | 1.92 | 1.81, 2.04 |
| Bipolar disorder | 5317 | 18.5 | 3414 | 64.2 | 1.50 | 1.41, 1.59 | 1728 | 32.5 | 1.60 | 1.50, 1.71 |
| Depression | 21,084 | 73.2 | 12,567 | 59.6 | 1.65 | 1.57, 1.74 | 5991 | 28.4 | 2.25 | 2.10, 2.41 |
| Post-traumatic stress disorder | 11,459 | 39.8 | 6949 | 60.6 | 1.34 | 1.28, 1.41 | 3480 | 30.4 | 1.63 | 1.54, 1.72 |
| Other substance use dependence | | | | | | | | | | |
| Alcohol | 10,475 | 36.4 | 6722 | 64.2 | 1.67 | 1.59, 1.75 | 3423 | 32.7 | 1.90 | 1.80, 2.01 |
| Stimulants | 6103 | 21.2 | 3998 | 65.5 | 1.63 | 1.54, 1.73 | 2049 | 33.6 | 1.74 | 1.64, 1.86 |
| Cocaine | 5436 | 18.9 | 3517 | 64.7 | 1.54 | 1.45, 1.64 | 1785 | 32.8 | 1.64 | 1.54, 1.75 |
| Nicotine | 14,852 | 51.6 | 9041 | 60.9 | 1.47 | 1.40, 1.54 | 4211 | 28.4 | 1.48 | 1.41, 1.57 |
| Recent medication use | | | | | | | | | | |
| Antidepressants | 18,682 | 64.9 | 11,399 | 61.0 | 1.73 | 1.64, 1.81 | 5864 | 31.4 | 3.15 | 2.95, 3.36 |
| Antipsychotics | 6544 | 22.7 | 4135 | 63.2 | 1.45 | 1.37, 1.53 | 2285 | 34.9 | 1.92 | 1.81, 2.04 |
| Anxiolytics | 9683 | 33.6 | 5775 | 59.6 | 1.23 | 1.17, 1.29 | 3054 | 31.5 | 1.69 | 1.60, 1.79 |
| Mood stabilizers | 10,065 | 35.0 | 6341 | 63.0 | 1.53 | 1.46, 1.61 | 3356 | 33.3 | 1.97 | 1.87, 2.08 |
| Opioids | 10,941 | 38.0 | 6420 | 58.7 | 1.17 | 1.12, 1.23 | 3189 | 29.1 | 1.44 | 1.37, 1.52 |
| Health care utilization | | | | | | | | | | |
| Inpatient admission | | | | | | | | | | |
| Recent hospitalization[c] | 4566 | 15.9 | 3095 | 67.8 | 1.78 | 1.67, 1.91 | 1158 | 25.4 | 1.04 | 0.96, 1.11 |
| Mental health | 12,436 | 43.2 | 8082 | 65.0 | 1.88 | 1.79, 1.97 | 3851 | 31.0 | 1.78 | 1.68, 1.88 |
| Suicide or self-harm | 2886 | 10.0 | 2003 | 69.4 | 1.87 | 1.72, 2.03 | 969 | 33.6 | 1.62 | 1.49, 1.75 |
| Substance use | 11,455 | 39.8 | 7503 | 65.5 | 1.88 | 1.79, 1.98 | 3550 | 31.0 | 1.72 | 1.63, 1.81 |
| Emergency department use | | | | | | | | | | |
| Suicide or self-harm | 2242 | 7.8 | 1518 | 67.7 | 1.69 | 1.55, 1.86 | 737 | 32.9 | 1.54 | 1.40, 1.69 |
| Substance use | 8293 | 28.8 | 4949 | 59.7 | 1.22 | 1.15, 1.28 | 2170 | 26.2 | 1.11 | 1.04, 1.17 |

Abbreviation: uOR, unadjusted odds ratio.

[a]Percentages represent column percentages of total population.

[b]Percentages represent row percentages within demographic or clinical characteristic/comorbidity.

[c]For patients who initiated buprenorphine ±48 h of a hospitalization discharge.

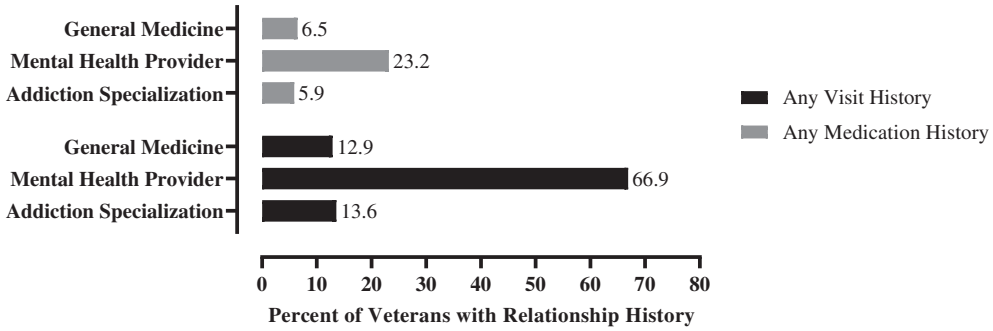


**FIGURE 1** First buprenorphine provider characteristics and previous history with Veterans

We conducted sensitivity analyses that addressed the possibility of misclassification of the exposure and the alternative ways in which the exposure could have been operationalized. First, we changed the therapeutic relationship as having at least three previous visits or three previous prescriptions with the initial buprenorphine providers instead of only one prior visit or medication. Second, there may have been visits or medications leading up to the initial buprenorphine provider as part of counseling or consultation that would have been unintentionally captured as a previous therapeutic relationship in the primary analyses. To account for this potential misclassification, we analyzed the relationship between each exposure and treatment retention after removing all visits and medications in the 14 days preceding the initial buprenorphine. Finally, to address potential outcome misclassification, we examined alternative durations of apparent lapses in treatment to define discontinuation as 7, 28, and 90 days of nontreatment instead of 14 days.

## 3 | RESULTS

### 3.1 | Characteristics of study sample

There were 28,791 Veterans in the final study sample, of which 92.9% were males, 81.2% were White, and 48.8% were between the ages of 25 and 44 years at the time of their initial buprenorphine prescription within the VHA (Table 1). The number of Veterans initiating buprenorphine increased from 3904 in the 2008–2009 cohort to 7286 in the 2016–2017 cohort. Psychiatric comorbidities most frequently identified included depression (73.2%), anxiety disorder (60.9%), and post-traumatic stress disorder (39.8%) (Table 2). Within the 2 years leading up to buprenorphine initiation, 90.4% had at least one prior outpatient prescription within the VHA, 64.9% had an antidepressant prescription, and 45.8% had an inpatient admission. The full list of demographic and clinical characteristics is presented in Appendix B of Supporting information.

### 3.2 | Therapeutic relationship

Within the overall study sample, 56.3% ($n$ = 16,206) of Veterans previously had at least one outpatient encounter with their initial buprenorphine provider, and 24.9% ($n$ = 7174) of Veterans previously had at least one prescription from that provider in the 2 years preceding buprenorphine initiation. When further stratified by timing, only 7.5% of Veterans had a documented visit, and 5.5% of Veterans had a documented medication prescribed by their initial buprenorphine provider between 1 and 2 years before initial buprenorphine prescription.

There was no difference in gender and race with therapeutic relationship using visit history, though the odds of medication history were lower among males compared to females (uOR: 0.86; 95% CI: 0.77, 0.95) and African Americans compared to Whites (uOR: 0.92; 95% CI: 0.84, 0.99) (Table 1). Veterans with an indication of homelessness or unstable housing had higher odds of having any therapeutic relationship with their provider (visits uOR: 1.46, 95% CI: 1.39, 1.54; medications uOR: 1.66, 95% CI: 1.56, 1.75). Rural Veterans had higher odds of having a therapeutic relationship using both visit history (uOR: 1.17; 95% CI: 1.09, 1.26) and medication history (uOR: 1.16; 95% CI: 1.07, 1.26). Nearly all clinical and psychiatric comorbidities and psychiatric medications assessed were associated with having any therapeutic relationship with their initial buprenorphine provider.

Among those with any therapeutic relationship in terms of visits, 66.9% had a previous encounter with a mental health provider, 13.6% with a specialist in addiction medicine, and 12.9% with a general medicine provider (Figure 1). In terms of therapeutic relationships based on medication history, 23.2% had a previous medication prescribed by a mental health provider, 5.9% with a specialist in addiction medicine, and 6.5% with a general medicine provider.

### 3.3 | Treatment discontinuation

In the unadjusted models, therapeutic relationship was associated with a slightly increased risk of treatment discontinuation; however, after adjusting for confounders, there was no significant association between therapeutic relationships based on visit history and treatment retention (Table 3). In those with medication history, there was a slight increase in the risk of treatment discontinuation by 3% (aHR: 1.03; 95% CI: 1.00, 1.07). Compared to those without any medication therapeutic relationship history, Veterans who had a prescription provided by the buprenorphine

**TABLE 3** Association between patient/provider therapeutic relationship and treatment discontinuation

| Exposure type | *N* | % | uHR | 95% CI | aHR[a] | 95% CI |
|---|---|---|---|---|---|---|
| Visit occurrence[b] | | | | | | |
| None | 12,585 | 43.7 | Ref | | Ref | |
| Any | 16,206 | 56.3 | 1.05 | 1.02, 1.08 | 0.99 | 0.96, 1.02 |
| Visit timing[c] | | | | | | |
| None | 12,585 | 43.7 | Ref | | Ref | |
| Within 1 year | 14,057 | 48.8 | 1.05 | 1.02, 1.08 | 0.99 | 0.96, 1.02 |
| 1–2 years | 2149 | 7.5 | 1.08 | 1.02, 1.14 | 0.95 | 0.90, 1.01 |
| Medications[b] | | | | | | |
| None | 21,644 | 75.2 | Ref | | Ref | |
| Any | 7147 | 24.8 | 1.10 | 1.07, 1.14 | 1.03 | 1.00, 1.07 |
| Medication timing[c] | | | | | | |
| None | 21,644 | 75.2 | Ref | | Ref | |
| Within 1 year | 5552 | 19.3 | 1.13 | 1.09, 1.17 | 1.06 | 1.02, 1.10 |
| 1–2 years | 1595 | 5.5 | 1.01 | 0.95, 1.08 | 0.93 | 0.87, 0.99 |

Abbreviations: aHR, adjusted hazard ratio; uHR, unadjusted hazard ratio.
[a]Final model adjusted for: Demographics (Year of buprenorphine treatment initiation, age, race, homelessness, rurality, drive distance to primary care facility), clinical comorbidities (hypertension w/o complications, obesity, adjustment disorders, anxiety, bipolar, post-traumatic stress disorder), concurrent substance dependence (alcohol, stimulants, cannabis, cocaine, hallucinogens, nicotine), medications (antidepressants, mood stabilizers), and health care utilization (any inpatient admission, psychiatric inpatient admission, urgent care use, emergency department visit for overdose, telehealth initiation).
[b]Any visit or medication exposure defined as at least one previous visit or medication with first buprenorphine provider in the 2 years preceding buprenorphine initiation.
[c]Timeframe defined as earliest visit or medication occurring with first buprenorphine provider in the 2 years preceding buprenorphine initiation.

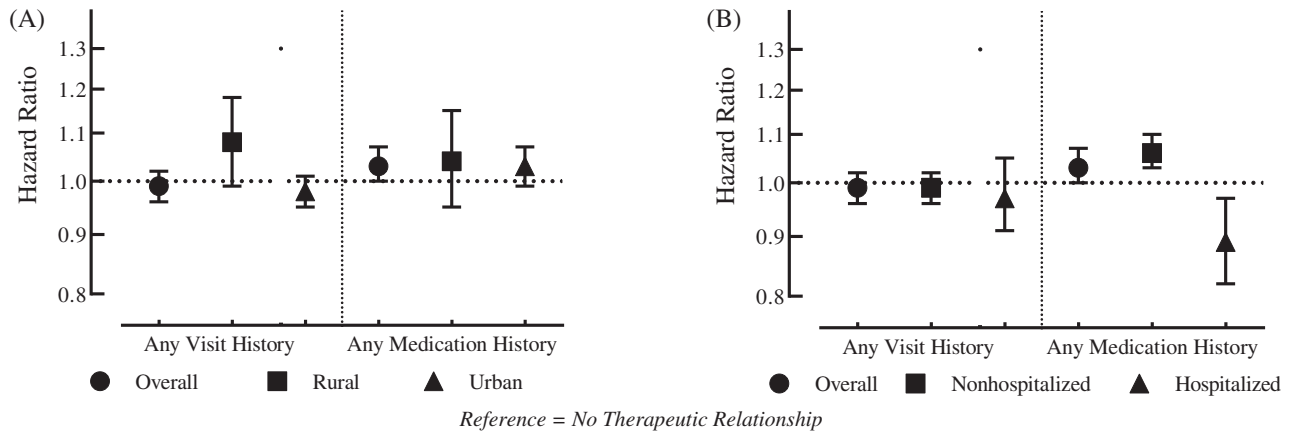


**FIGURE 2** Evaluation of effect modification by urban/rural designation and hospitalization on therapeutic relationship and risk of discontinuation within 1 year from buprenorphine initiation among Veterans treated in the Veterans Health Administration, 2008–2017. (A) Rural–urban designation. (B) Hospitalization at buprenorphine initiation

provider 1–2 years before starting buprenorphine had a lower risk of discontinuation (aHR: 0.93; 95% CI: 0.87, 0.99), while those who had a prescription within 1 year of buprenorphine had an increased risk of treatment discontinuation (aHR: 1.06; 95% CI: 1.02, 1.10).

In sensitivity analyses, there was no change in the association between therapeutic relationship and treatment retention using the visit history definition (Appendix C of Supporting information). For medication history, sensitivity analyses were similar to the main analysis; however, changing the exposure definition to ≥3 medications with the buprenorphine provider and outcome definition to 28 days yielded nonsignificant associations.

## 3.4 | Evaluation of effect modification

There was no evidence that rural–urban designation modified the association between therapeutic relationship and treatment

discontinuation using visit history definition ($p = 0.80$) (Figure 2). For medication history, there was some evidence that the effect of therapeutic relationship was modified by rurality ($p = 0.05$); there was a slight (although not statistically significant) increase in the risk of treatment discontinuation (aHR: 1.08; 95% CI: 0.99, 1.18) in those who had a therapeutic relationship with their buprenorphine provider among rural Veterans while there was no significant difference among urban Veterans (aHR: 0.98; 95% CI: 0.95, 1.01).

In evaluating recent hospitalization at the time of buprenorphine initiation, there was no evidence of effect modification ($p = 0.67$) using the visit history definition (Figure 2). There was some suggestion of effect modification by recent hospitalization for the medication history definition ($p < 0.01$). Those with a therapeutic relationship had an increased risk of discontinuation among nonhospitalized Veterans (aHR: 1.06; 95% CI: 1.03, 1.10) and a lower risk of discontinuation among hospitalized Veterans (aHR: 0.89; 95% CI: 0.82, 0.97).

## 4 | DISCUSSION

To address the increasing burden of OUD among Veterans in recent years, the VHA has taken several initiatives, including but not limited to increasing the number of facilities offering treatment, offering treatment off-site, or expanding capacity through sponsoring of training for credentialing providers to prescribe buprenorphine. Despite these efforts, there are still known barriers in both access and delivery of care, such as availability or capacity within the system that would influence both treatment initiation and retention. As one previous study demonstrated, there is evidence of underutilization of the capacity, as measured by the proportion of Veterans treated given overall provider workload, in treating Veterans for OUD within the VHA. In this study, we sought to examine how capacity defined as accessing treatment through a provider with whom there is already a therapeutic relationship established may influence treatment retention. Through a large, national cohort spanning 10 years, we were able to deterministically link each Veteran who initiated buprenorphine treatment with their providers and then construct a definition of a prior therapeutic relationship. Additionally, due to the use of multiple definitions of the therapeutic relationship as a concept, as well as sensitivity analyses to account for variability in design, definition, or areas for misclassification, we were able to internally test the validity of measures and found consistency in results.

For our first key finding, there was no evidence that a previous therapeutic relationship in terms of visit history influenced treatment retention for Veterans initiating buprenorphine. When considering our definition of therapeutic relationship through medications previously prescribed, we found a statistically significant association suggesting an increase in risk by 3%, but this small effect may either be clinically insignificant be explained away by unmeasured confounding. This was not consistent with the literature of other studies of chronic disease management as several demonstrated increased retention or medication adherence. There may be several reasons for the observed differences that may be due to (1) patient-level attributes, (2) the operationalization of therapeutic relationships, or (3) the unique nature of OUD that renders it different from other disease models. First, while we captured several patient-level attributes, these were limited to demographics, documented comorbidities, and health care utilization. As Simpson discussed in the drug treatment conceptual framework, important patient attributes also included motivation for change, readiness for treatment, and problem severity at intake.[23] While we might speculate that all members may have had some degree of motivation or readiness for treatment given that they initiated treatment, there may have been variability in this concept that may have influenced treatment retention was not captured in our study.

A second explanation for not observing an association between therapeutic relationship and buprenorphine retention may have been due to how this was operationalized in our study compared to other studies investigating this phenomenon. For example, one previous study of HIV medication management assessed each patient's self-reported engagement with his/her health care provider across a scale of items (e.g., the provider "listens to me," "cares about me," "respects my choices," "supports my decisions") and found that increased engagement as a form of therapeutic relationship was associated with increased adherence to a medication regimen.[21] A similar finding of better adherence to medication was observed in another HIV cohort that assessed how well the patient responded to how the provider "knows me as a person."[20] These overall themes of type of relationship, elements of trust, empathy, shared decision making, and support were common modalities in how therapeutic relationships were operationalized in other studies for patients with hypertension,[15] diabetes,[19] Hepatitis C,[17] multiple comorbidity management,[18] and general medicine.[16] Of special note, Schoenthaler et al. similarly operationalized therapeutic relationship by the length of relationship by time (less than 1 year or greater than 1 year) and found that having an established relationship with the provider had a positive impact on medication adherence comparable to relationships with high shared decision making.[15] Considering these different variations in therapeutic relationships, it may be that having *any* prior therapeutic relationship with the buprenorphine provider is not as influential as the quality or depth of this relationship.

The third reason for our primary finding may have been that having a therapeutic relationship that was seen as successful for medication management in other chronic disease models may not apply with OUD management. The decision to discontinue treatment may be driven by many reasons, including but not limited to personal choices, logistics, or satisfaction with the medication.[31,32] One common reason for stopping buprenorphine was to end physical dependence on the medication or the need to regularly take this medication and visit a health care provider. Additional reasons identified for stopping buprenorphine included substantial pressure from external sources (e.g., family, support groups, health care professionals), incarceration, and relapse. Finally, the appropriate time to discontinuation is highly variable and debatable. We chose a timeline of 1 year, although the length of time on buprenorphine is a patient-centered concern and decision. As a result, we might have treated

discontinuation as a "failure" or gap in health care when, in fact, discontinuation within 1 year may have been related to treatment success in some cases.

In general, when we assessed the extent of therapeutic history with the initial buprenorphine provider, only more than half of the Veterans in the sample had previously had a visit to their initial buprenorphine provider, while approximately one-fourth had previously had a prescription filled by the initial buprenorphine provider. These proportions did increase over time, though by only 8% over 10 years. When we excluded the 2 weeks leading up to the incident buprenorphine prescription (to account for counseling or consultation prior to receiving pharmacotherapies such as buprenorphine), these estimates for previous visits and medications were reduced to 31.9% and 18.1%, respectively. Although this did not impact treatment retention, these low proportions demonstrate that a significant portion of Veterans were being prescribed buprenorphine by new providers and not those with whom they had established contact. As previously stated, this alternative view of clinical capacity—access to treatment through regular providers—further demonstrates the underutilization or low threshold of capacity for treating OUD within the VHA. Given that this sample contained a high proportion of individuals within the system based on previous prescriptions or visits, there may still be barriers at the provider level that are preventing treatment from being offered within his/her own practice. Previous work, particularly within the VHA system, has often identified provider-level issues related to stigma towards OUD, insufficient support, knowledge of OUD and medications, and logistical challenges, including lengthy processes for training and obtaining credentialing and prescribing privileges.[33–35] While there were recent short-lived efforts to eliminate credentialing requirements for buprenorphine prescribing, there still exists a need to educate providers on medications for opioid use disorders in specializations outside of mental health, to facilitate treatment earlier and within the provider's patient populations, and to continue focusing on long-term treatment as a critical outcome.

We did not find any clinically meaningful evidence of effect modification by rural–urban designation on therapeutic relationship and treatment retention; any observed associations may have easily been explained away by unmeasured confounding or misclassification. When further investigating these observations, we found that (1) rurality was a protective factor for treatment retention, and (2) the proportions of Veterans in urban and rural locales with a therapeutic relationship were similar in terms of visits (56% and 60%, respectively), as well as medications (25% and 27%, respectively). While this may seem inconsistent with previous works that report rurality as a barrier to access and treatment, our findings may also represent an issue of selection; rural Veterans in our sample represented individuals who were treatment-seeking, had access to providers or systems that offered buprenorphine, and could have benefited from programs or technology adopted by the VHA to increase access and care to target rural Veterans,[36–39] perhaps even representing similar characteristics to the urban Veterans in the sample. In future work, we might consider a potentially unaddressed group, rural Veterans diagnosed with OUD who do not initiate any pharmacotherapy, to fully capture the spectrum of rural Veteran health care access and barriers in OUD management.

The final key finding in this study was how hospitalization status at the time of buprenorphine initiation served as an effect modifier in the therapeutic relationship and treatment retention relationship. Among Veterans who were hospitalized at the time of initiating buprenorphine, those with a therapeutic relationship with their providers had a reduced risk of treatment discontinuation. Furthermore, 68% of those hospitalized compared to 54% of nonhospitalized Veterans who started buprenorphine had any previous therapeutic relationship with their provider. Within this population, hospitalization was due to substance dependence (98% of cases) or general psychiatric reasons (99% of cases), and may represent a marker of severity of OUD. If this is the case, those with more severe OUD may have already established contact with their buprenorphine provider leading up to the event, and the hospitalization could have precipitated buprenorphine initiation for OUD management. There has been some previous work on utilizing the inpatient setting as an opportunity for initiating buprenorphine treatment,[40–42] and we would encourage administrative and clinical efforts to increase treatment through such venues while also continuing research on the treatment courses and long-term health outcomes among those who are hospitalized for OUD.

There are some limitations to this study. All covariates, comorbidities, exposure, and outcome assessments in this study originated from administrative data. This might have led to some unmeasured confounding or potential misclassification of pharmacotherapy status. We attempted to mitigate this by performing multiple sensitivity analyses accounting for sample characteristics and variable retention times and still found consistent results. As previously stated, we are also not able to qualitatively characterize the nature of the relationship between provider or patient. There could be a wide spectrum in the quality of this relationship, which might have also influenced treatment retention. Similarly, changes that occurred later in treatment could have also impacted treatment discontinuation. Future efforts might need to evaluate reasons for treatment discontinuation in order to delineate Veteran-provider-level and/or system-level factors that impact decision making and outcomes during the course of OUD treatment.

In conclusion, we did not find strong evidence that a therapeutic relationship between a Veteran and provider was associated with treatment retention among a cohort of Veterans initiating buprenorphine treatment for OUD when defined by prior visits or medication prescribing. Second, clinical capacity might also be underutilized considering only approximately half of Veterans had previous visit contact with their buprenorphine provider, and only one-quarter previously had a medication prescribed by their provider. Medication retention is a vital component of health outcomes of those with OUD, and future work should further investigate the quality of Veteran-provider therapeutic relationships in decision making for OUD management, increase the clinical capacity of buprenorphine providers within the VHA, and identify novel mechanisms for improving treatment retention.

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## SUPPORTING INFORMATION

Additional supporting information may be found in the online version of the article at the publisher's website.

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