Deimplementation of Benzodiazepine Prescribing in Posttraumatic Stress Disorder in the Veterans Health Administration

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ABSTRACT

Objective: Our objective was to characterize benzodiazepine prescribing changes among veterans with posttraumatic stress disorder (PTSD) and inform efforts to deimplement low-value prescribing practices.

Methods: This retrospective observational study used national Veterans Health Administration (VHA) administrative databases to examine annual period prevalence and incidence of benzodiazepine prescribing from 2009 through 2019 in veterans with PTSD. *International Classification of Diseases* (*ICD-9/10*) codes were used to identify PTSD. Temporal trends in discontinuation rates, incidence rates, and prevalent prescribing among patients newly engaged in PTSD care were measured.

Results: Benzodiazepine prevalence in veterans with PTSD declined from 31.3% in 2009 to 10.7% in 2019, and incidence decreased from 11.4% to 2.9%, along with a 30% decrease in daily doses. Increasing discontinuation rates accounted for 21.0% of the decline in prevalence, while decreasing incidence among existing patients accounted for 36.8%, and decreased prevalence among new PTSD cohort entrants accounted for 42.2%. Women received benzodiazepines more commonly than men (odds ratio [OR] = 1.67; 95% CI, 1.64–1.70). The proportion of older adults increased over time among both existing (2009: 14.5%; 2019: 46.5%) and new (2009: 8.6%; 2019: 24.3%) benzodiazepine recipients.

Conclusions: Benzodiazepine prescribing in VHA among veterans with PTSD showed changes driven by decreases in prevalence among new PTSD cohort entrants, with smaller changes in discontinuation and decreased incidence among existing patients. Educational initiatives may have curtailed benzodiazepine prescribing through promotion of effective alternative treatment options and supporting discontinuation through various tapering strategies. These initiatives offer resources and lessons to other health care systems to deimplement inappropriate benzodiazepine prescribing and other potentially harmful practices through patient-centered approaches that promote viable treatment alternatives.

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Amid 2-fold growth over the last decade in veterans seeking treatment for posttraumatic stress disorder (PTSD),[1] ensuring delivery of safe and effective treatments has become a growing focal point for the US Veterans Health Administration (VHA). Given concerns about inappropriate prescribing in post-9/11 veterans,[2] a particular emphasis for VHA has centered on developing innovative strategies to deprescribe off-label medications. This will better align prescribing practices and treatment choices with current guideline recommendations that include evidence based psychotherapies for PTSD and co-occurring disorders such as insomnia and anxiety.

The 2017 update of the joint VA (Veterans Affairs)/DoD (Department of Defense) Clinical Practice Guideline for PTSD[3] recommends specific antidepressants as pharmacologic monotherapy and recommends against benzodiazepines due to a lack of efficacy and safety concerns such as falls, hip fractures, and cognitive dysfunction.[4] Previous research noted declining benzodiazepine prescribing in veterans with PTSD, yet the frequency of use at that time remained above 30%.[5] It appeared that focused interventions might be required to achieve benzodiazepine deimplementation in an aging PTSD population.

Soon after that publication, the VHA implemented several initiatives to improve pharmacotherapy with a focus on reducing benzodiazepine prescribing. Strategies included the use of academic detailing, an educational outreach intervention,[6] a national psychopharmacology quality improvement program,[7] and the Opioid Safety Initiative, which focused on reducing concurrent prescribing of benzodiazepines with opioids.[8] The academic detailing program developed dashboards that showed clinicians their prescribing data and gave them online tools such as a benzodiazepine tapering calculator. The national quality improvement program offered monthly didactic talks on subjects such as new findings on the risks of benzodiazepines in the elderly and shared successful tapering practices by clinics. Both programs specifically focused on strategies to decrease benzodiazepine use in PTSD, particularly in those patients at increased risk from side effects such as the elderly and those with a co-occurring substance use disorder.

While prior reports have noted declines in gross measures of benzodiazepine prescribing in VHA,[1,5,9] a detailed examination of changes in individual prescribing practices is lacking, such as rates of discontinuation among existing

Clinical Points

- A detailed examination of changes in benzodiazepine prescribing practices among veterans with PTSD was necessary to inform future deimplementation efforts.
- Through patient-centered discussions, prescribing clinicians can connect patients with PTSD to educational resources concerning the risks of chronic benzodiazepine use and facilitate dose decreases or transition to a safer and more effective alternative.

recipients, declines in incident prescribing, reductions in the duration of therapy, or changes in daily doses. This information is critical in understanding the impact of VHA's initiatives to improve prescribing practices and where to best focus deimplementation efforts. For example, declining benzodiazepine prevalence rates paired with stable incidence rates would suggest a trend toward discontinuation among long-term recipients. In contrast, decreasing incidence followed by lagged decreases in prevalence would suggest a diminished propensity on the part of clinicians to initiate benzodiazepines, but little change among existing long-term recipients. Due to limited resources, we further wanted to determine if VHA provider education should be directed to primary care or mental health clinicians. We also sought to learn if patient education should focus on patients most at risk of adverse effects, such as the elderly, or at decreasing new starts of benzodiazepines.

Therefore, the primary objective was to characterize benzodiazepine prescribing prevalence among veterans with PTSD in VHA from 2009 to 2019; further, to quantify the impact of specific prescribing behaviors that drive prevalence changes, including discontinuation rates among existing recipients, incidence rates of new prescribing among patients engaged in ongoing care, and prevalent prescribing among newly diagnosed patients with PTSD. Secondary objectives were to characterize changes in benzodiazepine dosing and treatment duration over time, contrast patient characteristics by benzodiazepine receipt status, and describe prevalence changes for potential therapeutic alternatives to benzodiazepines for the management of sleep disturbances. A more detailed characterization of decreases in benzodiazepine prescribing in VHA is particularly salient given parallel increases in the community setting during this period.[10]

METHODS

Data Sources

National administrative data from the VA Corporate Data Warehouse were accessed via the VA Informatics and Computing Infrastructure. *International Classification of Diseases* (*ICD*) codes from inpatient hospitalization and outpatient encounter data were used to identify mental health diagnoses. Information concerning dispensed prescriptions was obtained from outpatient pharmacy data. As an operations-supported quality improvement project, this study was determined by the University of Iowa Institutional Review Board to not constitute human subjects research.

Patients

Veterans with PTSD were identified from inpatient hospitalization and outpatient encounter data using an *ICD-9* code of 309.81 for health care encounters prior to the VHA transition to *ICD-10* on October 1, 2015, and an *ICD-10* code of F43.1x for encounters thereafter. Separate cohorts were built for each calendar year from 2009 through 2019 where patients were required to have at least 1 inpatient hospitalization coded for PTSD during the target year, or at least 1 coded outpatient encounter during that year and a second coded outpatient encounter within the prior 730 days.[11] Concurrent diagnoses were defined by at least 1 outpatient encounter during the target calendar year or the prior year and included anxiety disorders, depressive disorders, and psychotic disorders. Anxiety disorders included generalized anxiety disorder (*ICD-9*: 300.02; *ICD-10*: F41.1), panic disorder (*ICD-9*: 300.01, 300.21; *ICD-10*: F40.01, F41.0), social phobia (*ICD-9*: 300.23; *ICD-10*: F40.1x), and obsessive-compulsive disorder (*ICD-9*: 200.3; *ICD-10*: F43.x). Depressive, psychotic, and substance use disorders were defined by Quan et al.[12] Veterans were classified as being urban or rural residents using Rural-Urban Commuting Areas, mapped by the census tract or zip code of the veteran's residence.[13] A primary site of PTSD care was assigned to each veteran based on the most frequent VHA facility where PTSD coded encounters occurred, and each facility was classified as a medical center, urban clinic, or rural clinic. Clinics were classified as urban or rural based on the zip code of their location mapped to Rural-Urban Commuting Areas.

Drug Exposure

Period prevalence was defined as at least 1 dispensed outpatient benzodiazepine prescription during a given calendar year of 2 supply days or greater. Isolated prescriptions of only 1 supply day were most commonly for diazepam and excluded as possible premedication related to a medical procedure. Annual prevalence rates from 2009 to 2019 were calculated using all patients meeting inclusion criteria for PTSD during a given calendar year as the denominator. Incident benzodiazepine prescribing was defined as a new prescription in a given calendar year, with no prescriptions observed in the prior year. Prior-year recipients of benzodiazepines were excluded from the denominator in calculating incidence rates as they were not at risk to become incident recipients. Additional annual benzodiazepine prescribing metrics included the specific benzodiazepine prescribed, the total supply days dispensed, and the estimated mean daily dose expressed in standard daily dosage units.[5] Annual prevalence rates were also calculated for potential therapeutic alternatives to benzodiazepines for the management of sleep disturbances, including prazosin, Z-drug hypnotics (eszopiclone, zaleplon,

Figure 1. Prevalence and Incidence of Benzodiazepine Prescribing Among Veterans With Posttraumatic Stress Disorder in the Veterans Health Administration From 2009 to 2019

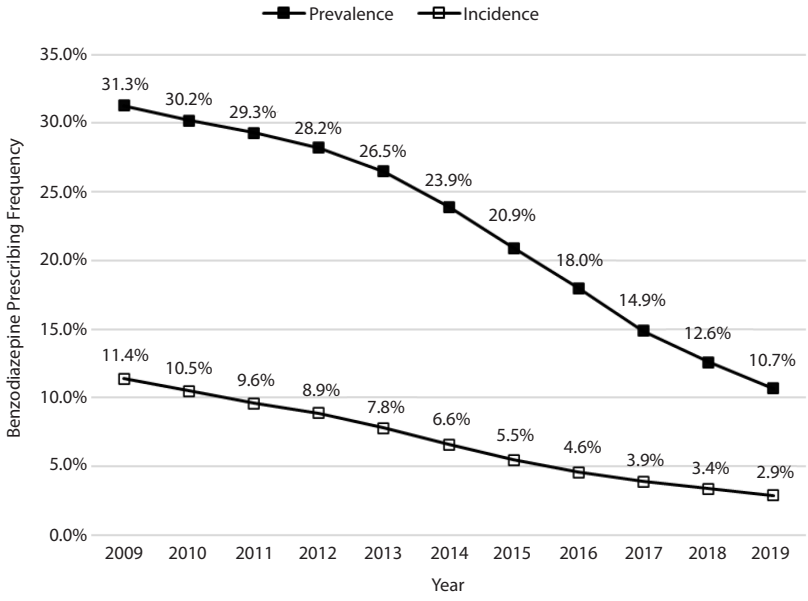


Table 1. Understanding Changes in Prescribing Trends Driving the Decline in Benzodiazepine Prevalence in Veterans With Posttraumatic Stress Disorder (PTSD)

				Disposition of benzodiazepine recipients in transition to the subsequent year			
	PTSD cases,	Benzodiazepine exposure		Recipients exited,	Discontinuation rate among existing cohort,	Incidence rate among existing cohort,	Prevalence among cohort entrants,
Year	N	Recipients, n	Prevalence, %	n	% (n/N)	% (n/N)	% (n/N)
2009	458,620	143,473	31.3	17,937	17.6% (22,072/125,536)	5.8% (21,552/374,052)	20.8% (27,386/131,457)
2010	505,509	152,402	30.2	17,728	17.3% (23,230/134,674)	5.4% (22,302/414,113)	20.4% (28,542/139,804)
2011	553,917	162,288	29.3	19,415	17.8% (25,469/142,873)	5.0% (22,554/450,800)	19.3% (27,713/143,702)
2012	594,502	167,671	28.2	20,162	18.9% (27,943/147,509)	4.5% (21,749/483,529)	17.6% (26,657/151,615)
2013	635,144	167,972	26.5	19,460	20.3% (30,179/148,512)	3.9% (20,381/518,649)	15.1% (24,707/164,007)
2014	682,656	163,421	23.9	19,494	23.3% (33,554/143,927)	3.5% (19,385/552,993)	12.7% (22,214/174,425)
2015	727,418	151,972	20.9	21,784	25.9% (33,661/130,188)	3.1% (17,542/564,576)	10.7% (18,403/172,382)
2016	736,958	132,472	18.0	15,682	28.6% (33,452/116,790)	2.8% (16,462/598,380)	9.0% (16,478/182,790)
2017	781,170	116,278	14.9	13,391	28.7% (29,567/102,887)	2.6% (16,189/635,073)	7.5% (14,449/191,932)
2018	827,005	103,958	12.6	11,658	28.8% (26,535/92,300)	2.3% (15,690/674,006)	6.2% (12,634/203,779)
2019	877,785	94,089	10.7	…	…	…	…

zolpidem), hydroxyzine, low-dose trazodone (< 300 mg/d), and low-dose quetiapine (< 300 mg/d).[14]

Analysis

Changes in benzodiazepine prevalence over time were further examined by characterizing the disposition of individual recipients from one calendar year to the next, classified into 4 categories: prior recipients who no longer met the case definition for PTSD in the subsequent year, prior recipients with no receipt in the subsequent year (ie, discontinued), prior non-recipients with incident use in the subsequent year, and new entrants to the PTSD cohort with prevalent receipt during the subsequent year. The first 2 dispositions represented reductions in the number of benzodiazepine recipients, whereas the second 2 dispositions represented additions. Characterizing these dispositions allowed us to examine changes over time in 3 specific prescribing practices of interest: discontinuation rates among existing recipients, incidence rates among patients engaged in ongoing PTSD care, and prevalence rates among patients newly diagnosed with PTSD or re-engaging with care for PTSD.

Multivariable logistic regression was used to contrast benzodiazepine exposure groups during 2019, including a contrast of prevalent benzodiazepine recipients to non-recipients, as well as incident recipients to existing recipients. Logistic regression was further used to contrast prevalent benzodiazepine prescribing between urban and rural residing veterans in 2009 and 2019, adjusting for demographic characteristics and psychiatric comorbidity. Rural residence was explored in more detail over time because benzodiazepine prevalence was shown to be consistently higher among rural veterans from 1999 through 2009.[15] We hypothesized that national decreases in benzodiazepine prescribing might eliminate this potential disparity in care. All analyses used a significance level of

Table 2. Temporal Changes in Benzodiazepine Prescribing Characteristics Among Prevalent Recipients

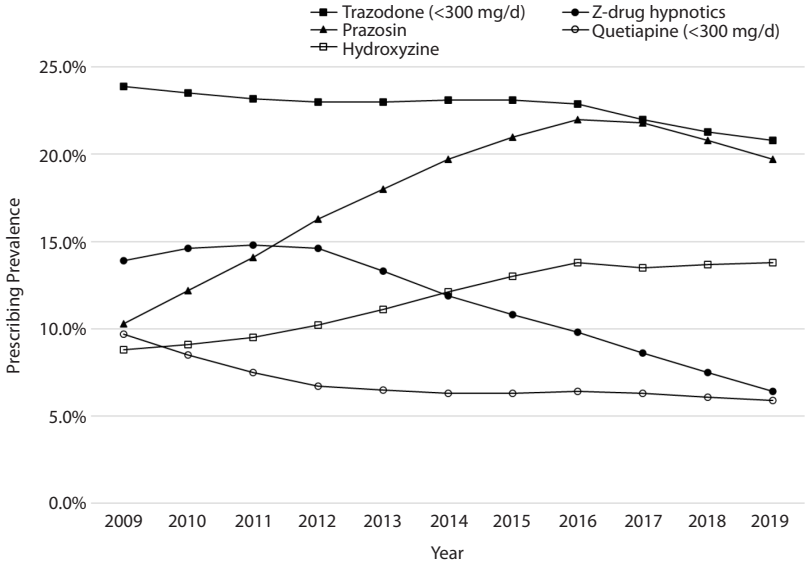
Benzodiazepine characteristic	2009 (N = 143,473[a])	2011 (N = 162,288)	2013 (N = 167,972)	2015 (N = 151,972)	2017 (N = 116,278)	2019 (N = 94,089)
Medication, n (%)						
Clonazepam	48,876 (34.1)	55,551 (34.2)	58,089 (34.6)	52,382 (34.5)	39,849 (34.3)	32,175 (34.2)
Lorazepam	33,025 (23.0)	37,506 (23.1)	39,048 (23.3)	35,781 (23.5)	28,315 (24.4)	23,776 (25.3)
Alprazolam	21,848 (15.2)	26,302 (16.2)	27,862 (16.6)	26,335 (17.3)	21,311 (18.3)	17,620 (18.7)
Diazepam	17,767 (12.4)	19,854 (12.2)	20,282 (12.1)	18,865 (12.4)	14,394 (12.4)	11,470 (12.2)
Temazepam	19,027 (13.3)	20,483 (12.6)	20,352 (12.1)	16,696 (11.0)	10,773 (9.3)	7,740 (8.2)
Other	2,930 (2.0)	2,592 (1.6)	2,339 (1.4)	1,913 (1.3)	1,636 (1.4)	1,308 (1.4)
Dispensed supply days, n (%)						
< 30	6,094 (4.3)	7,288 (4.5)	8,557 (5.1)	9,940 (6.5)	10,202 (8.8)	10,389 (11.0)
30–89	27,118 (18.9)	29,940 (18.5)	30,481 (18.2)	29,489 (19.4)	24,020 (20.7)	19.720 (21.0)
90–179	26,814 (18.7)	30,078 (18.5)	30,725 (18.3)	28,400 (18.7)	21,598 (18.6)	17,020 (18.1)
≥ 180	83,447 (58.2)	94,982 (58.5)	98,209 (58.5)	84,143 (55.4)	60,458 (52.0)	46,960 (49.9)
Primary prescriber, n (%)						
Mental health specialist	104,037 (72.5)	117,424 (72.4)	122,896 (73.2)	113,376 (74.6)	87,346 (75.1)	71,268 (75.8)
Other	39,436 (27.5)	44,864 (27.6)	45,076 (26.8)	38,596 (25.4)	28,932 (24.9)	22,821 (24.2)
Prior exposure, n (%)						
Existing recipient[b]	105,850 (73.8)	123,498 (76.1)	130,952 (78.0)	120,488 (79.3)	91,106 (78.4)	71,268 (75.7)
New recipient	37,623 (26.2)	38,790 (23.9)	37,020 (22.0)	31,484 (20.7)	25,172 (21.6)	22,821 (24.3)
SDDU dose, mean (SD)						
Existing recipient	1.9 (1.3)	1.8 (1.3)	1.7 (1.2)	1.6 (1.1)	1.4 (1.0)	1.3 (1.0)
New recipient	1.4 (1.0)	1.3 (1.0)	1.2 (0.9)	1.1 (0.9)	1.1 (0.9)	1.0 (0.9)
Older adults, n (%)						
Existing recipient	15,310 (14.5)	22,626 (18.3)	40,983 (31.3)	52,945 (43.9)	43,760 (48.0)	33,158 (46.5)
New recipient	3,239 (8.6)	4,752 (12.3)	6,983 (18.9)	7,445 (23.7)	6,305 (25.1)	5,549 (24.3)

[a]The number of prevalent benzodiazepine recipients matches the prevalence numerators from Table 1 for the corresponding year and served as the denominator for frequency calculations for medication type, dispensed supply days, prescriber type, and type of prior exposure.
[b]Among prevalent benzodiazepine recipients during a given year, existing recipients also received at least 1 benzodiazepine prescription in the prior calendar year, whereas new recipients had none. Examination of prior year receipt included all benzodiazepine prescriptions dispensed by Veterans Health Administration regardless of whether patients were included in the posttraumatic stress disorder cohort during that prior year. The number of existing and new recipients served as the denominator groups for assessing SDDU dose estimates and the proportion of older adults.
Abbreviation: SDDU = standard daily dosage units.

Table 3. Clinical Characteristics of Patients Receiving Care for Posttraumatic Stress Disorder (PTSD) in the Veterans Health Administration in 2019, Stratified by Benzodiazepine Prescribing Status, N = 877,785

Characteristic	None (N = 783,696)	New (N = 22,821)	Existing (N = 71,268)	Logistic regression, OR (95% CI)	
				Any vs none	New vs existing
Age in years, mean (SD)	53.3 (16.0)	50.1 (15.1)	58.1 (14.4)		
Age in years, n (%)					
18–34	125,514 (16.0)	4,257 (18.7)	5,429 (7.6)	0.53 (0.52–0.54)	2.45 (2.33–2.58)
35–49	216,338 (27.6)	7,547 (33.1)	15,896 (22.3)	0.79 (0.78–0.81)	1.48 (1.42–1.54)
50–64	169,861 (21.7)	5,468 (24.0)	16,785 (23.6)	Reference	Reference
≥ 65–79	271,983 (34.7)	5,549 (24.3)	33,158 (46.5)	1.17 (1.14–1.19)	0.57 (0.54–0.59)
Sex, n (%)					
Men	682,542 (87.1)	17,642 (77.3)	59,299 (83.2)	Reference	Reference
Women	101,154 (12.9)	5,179 (22.7)	11,969 (16.8)	1.67 (1.64–1.70)	1.03 (0.99–1.07)
Race, n (%)					
White	520,618 (66.4)	16,726 (73.3)	56,569 (79.4)	Reference	Reference
African American	189,705 (24.2)	4,021 (17.6)	9,014 (12.7)	0.47 (0.46–0.47)	1.39 (1.33–1.45)
Other or unknown	73,373 (9.4)	2,074 (9.1)	5,685 (8.0)	0.77 (0.75–0.79)	1.16 (1.10–1.22)
Residence, n (%)					
Urban	639,148 (81.6)	18,930 (82.9)	56,753 (79.6)	Reference	Reference
Rural	144,548 (18.4)	3,891 (17.1)	14,515 (20.4)	0.99 (0.97–1.01)	0.91 (0.87–0.95)
Primary site of PTSD care, n (%)					
Medical center	346,408 (44.2)	11,381 (49.9)	32,014 (44.9)	Reference	Reference
Urban clinic	370,862 (47.3)	9,811 (43.0)	33,278 (46.7)	0.93 (0.91–0.94)	0.87 (0.85–0.90)
Rural clinic	66,426 (8.5)	1,629 (7.1)	5,976 (8.4)	0.84 (0.81–0.86)	0.92 (0.86–0.98)
Psychiatric comorbidity, n (%)					
Depressive disorder	453,332 (57.9)	15,525 (68.0)	44,175 (62.0)	1.18 (1.16–1.20)	1.14 (1.11–1.18)
Substance use disorder	214,892 (27.4)	7,186 (31.5)	15,022 (21.1)	0.83 (0.82–0.84)	1.47 (1.42–1.52)
Anxiety disorder	78,727 (10.1)	4,757 (20.8)	15,455 (21.7)	2.34 (2.30–2.39)	0.81 (0.78–0.84)
Psychotic disorder	29,367 (3.8)	1,310 (5.7)	3,595 (5.0)	1.56 (1.51–1.61)	0.91 (0.85–0.97)

Figure 2. Prescribing Prevalence of Potential Alternatives to Benzodiazepines in Veterans With Posttraumatic Stress Disorder in the Veterans Health Administration From 2009 to 2019



α = .05 and were conducted using SAS version 9.4 (SAS Institute; Cary, NC).

RESULTS

Consistent with reported trends prior to 2009, the prevalence of benzodiazepine prescribing in veterans with PTSD continued a linear decline from 31.3% in 2009 to 28.2% in 2012 (Figure 1). The rate of decline appeared to accelerate around 2013, ultimately falling to 10.7% in 2019. Incident prescribing decreased consistently from 11.4% to 2.9% during this period.

To better understand the downward trend in benzodiazepine prevalence, we further characterized the disposition of recipients in transitioning from one year to the next and individual prescribing trends within disposition groups (Table 1). For example, of 143,473 benzodiazepine recipients in 2009, 17,937 did not meet PTSD selection criteria during 2010 and exited the cohort, while 22,072 remained in the 2010 cohort but did not continue to receive benzodiazepines, resulting in 40,009 recipients from the 2009 cohort being removed in transitioning to 2010. However, 21,552 non-recipients from the 2009 cohort received a new benzodiazepine prescription in 2010, and 27,386 patients entering the PTSD cohort during 2010 received a benzodiazepine during that year, resulting in 48,938 added recipients in transitioning from 2009 to 2010. Thus, the absolute number of benzodiazepine recipients grew by 8,929 individuals from 143,473 in 2009 to 152,402 in 2010. Of note, the absolute number of benzodiazepine recipients did not peak until 2013, despite declining prevalence rates throughout the entire period from 2009 to 2019.

Characterizing these dispositions enabled examination of 3 specific prescribing trends over time: the discontinuation rate among existing benzodiazepine recipients, the incidence rate among existing PTSD patients, and benzodiazepine prevalence among patients entering the PTSD cohort (Table 1). The discontinuation rate was 17.6% in 2009, rose steadily to 28.6% from 2012 to 2016, and remained level thereafter. The benzodiazepine incidence rate among non-recipients in the existing cohort decreased approximately 0.4% per year from 5.8% in 2009 to 2.3% in 2018. Finally, the prevalence rate among new entrants to the PTSD cohort decreased from 20.8% in 2009 to 6.2% in 2019. From these data, we estimated the relative contribution of these individual prescribing trends to the overall change in benzodiazepine recipients, beginning with the transition from 2013 to 2014, when the absolute number of benzodiazepine recipients started to decline (Supplementary Table 1). In contrasting the difference between observed changes in recipient counts within these disposition categories and those predicted by 2009 prescribing rates, increasing discontinuation rates accounted for 21.0% of the decline in benzodiazepine prevalence, while decreasing incidence among existing patients accounted for 36.8%, and decreased prevalence among new PTSD cohort entrants accounted for 42.2%.

Beyond simple frequency, we further examined changes in benzodiazepine prescribing characteristics among prevalent recipients (Table 2). Approximately 60% of patients received clonazepam or lorazepam, and the overall distribution of benzodiazepine agents remained relatively unchanged during the study period. Most patients (90%–95%) received at least 30 supply days within 1 year, and approximately half received 180 days or more. Estimated daily doses were consistently higher among existing recipients than new recipients but declined approximately 30% in both groups from 2009 to 2019. The proportion of older adults (≥65 years) among existing recipients increased over time, from 14.5% in 2009

to 46.5% in 2019, and increased among new recipients, from 8.6% to 24.3%. The benzodiazepine prescriber was a mental health specialist in approximately three-quarters of patients, which was relatively stable over time.

Benzodiazepine recipients in 2019 differed from non-recipients on several important clinical characteristics, as did new recipients relative to existing recipients (Table 3). The mean age of new benzodiazepine recipients was 50.1 years (SD = 15.1) versus 58.1 (SD = 14.4) among existing recipients. In multivariable logistic regression analyses, new recipients were half as likely (OR = 0.57; 95% CI, 0.54–0.59) as existing recipients to be 65 years or older. Benzodiazepine recipients were more likely to be women (OR = 1.67; 95% CI, 1.64–1.70), but there was no gender difference between new and existing recipients after statistical adjustment. Benzodiazepine receipt was less common among African American and other or unknown racial groups, but new recipients were more likely to be in these categories than existing recipients. Recipients were more likely to have any psychiatric comorbidity, particularly anxiety disorders (OR = 2.34; 95% CI, 2.30–2.39), though new recipients were slightly less likely to have an anxiety disorder comorbidity than existing recipients (OR = 0.81; 95% CI, 0.78–0.84). In contrast, patients with substance use disorders were less likely to receive benzodiazepines overall (OR = 0.83; 95% CI, 0.82–0.84), but more likely to be new recipients (1.47; 95% CI, 1.42–1.52). A more detailed analysis of urban versus rural residence revealed that previously noted differences in prescribing had resolved over the study period. In 2009, rural veterans were more likely to receive benzodiazepines (34.1%) than urban veterans (30.5%), which was maintained in adjusted analyses (OR = 1.13; 95% CI, 1.12–1.15). By 2019, rural veterans received benzodiazepines at a numerically higher rate (11.3% versus 10.6%) but this difference was no longer significant in adjusted analyses (OR = 0.99; 95% CI, 0.97–1.01).

Prescribing trends for potential therapeutic alternatives to benzodiazepines for the management of sleep disturbances were assessed from 2009 through 2019 (Figure 2). Low-dose trazodone was the most prescribed alternative agent in 2009 with a prevalence of 23.9% and remained the most prescribed agent over the observation period. Z-drug hypnotics were also commonly prescribed but decreased on a similar trajectory to benzodiazepines, from a peak of approximately 15% to a low of 6.4% in 2019. Prazosin prevalence more than doubled from 10.3% in 2009 to a peak of 22.0% in 2016 but has since incurred a declining trend. Low-dose quetiapine prevalence decreased from 2009 to 2012 and since remained stable at 6%–6.5%. Hydroxyzine prescribing rose from 8.8% in 2009 to 13.8% in 2016 and remained stable through 2019.

DISCUSSION

This inquiry into benzodiazepine prescribing among US veterans receiving care for PTSD led to several encouraging findings. We observed an absolute decrease of 20% in benzodiazepine prevalence between 2009 and 2019 and an absolute decrease of 8.5% in incidence. Importantly, our analysis provided a detailed examination which showed that changes in benzodiazepine prescribing were driven by decreases in prevalence among new PTSD cohort entrants, with smaller changes in discontinuation and decreased incidence among existing patients. The fact that prevalence lags changes in incidence reflects the clinical reality that it is easier to stop initiating benzodiazepines than it is to discontinue existing therapy. These findings suggest that VHA provider and patient education initiatives are reducing the initiation of chronic benzodiazepine prescribing via promotion of effective pharmacologic alternatives and, to a lesser extent, supporting discontinuation strategies with tapering tools and other resources. In addition to decreasing incidence and prevalence, daily benzodiazepine doses decreased by 30% during the observation period; however, therapy duration remained relatively unchanged, with most use being long-term.

There is a growing emphasis on deimplementing long-standing health care practices proven ineffective, unsafe, or low-value.[16] Deprescribing, a strategy intended to reduce harms associated with potentially inappropriate medications, helps contain health care spending and optimizes treatment outcomes through a recommitment to evidence-based options.[17] Innovative strategies to deprescribe opioids and benzodiazepines have been successful in reducing VHA prescription rates. There is recognition, however, that simple restriction is not a patient-centered approach, and without promotion of viable alternatives, the underlying therapeutic problem will not be addressed.[18] First and foremost, patients with PTSD should be offered one of the evidence-based psychotherapies that may target symptoms of anxiety and insomnia, instead of benzodiazepines often prescribed for these symptoms. The positive finding of reduced benzodiazepine prescribing among veterans with PTSD in the VHA stands in contrast to what is now observed among US adults receiving care from community providers. Recent work using a nationally representative sample of non-veteran adults found that the rate of benzodiazepine-associated visit rates doubled from 2003 to 2015.[10] Use among visits to psychiatrists was stable but increased among all other physicians with primary care accounting for almost half of all benzodiazepine visits.[10] Contrary to civilian findings, the benzodiazepine prescriber in this VHA cohort was a mental health specialist in approximately three-quarters of patients, which was stable over time. This suggests that VHA's educational efforts should be primarily directed at mental health clinicians. Substantial increases in benzodiazepine prescribing among civilian outpatients is concerning, particularly as VHA care has expanded into the community to providers outside the VHA. This increases the possibility that veterans are inappropriately prescribed benzodiazepines by community primary care providers less familiar with PTSD clinical guidelines.[19] Outreach to these community providers by VHA programs such as lectures and educational courses offered by the PTSD Consultation Program[20] should help improve knowledge and prescribing practices.

The VHA strategies developed to limit benzodiazepine exposure in PTSD primarily targeted veterans at high risk for side effects, such as the elderly.[21] While new benzodiazepine recipients were significantly younger than existing recipients (mean of 50 vs 58 years), the proportion of existing benzodiazepine recipients over the age of 65 grew from 14.5% in 2009 to 46.5% in 2019, likely reflecting an aging cohort of chronic recipients. While chronic benzodiazepine therapy may have been rational at younger ages, age-related increases in risk shift the risk-to-benefit ratio, rendering continued use more difficult to justify. In addition, the proportion of older veterans also increased among new recipients, from 8.6% in 2009 to 24.3% in 2019. This increase is concerning, and further research is needed to understand this trend.

As previously demonstrated, benzodiazepine recipients were more likely to be women in 2009,[22] which persisted through 2019. Increased rates of benzodiazepines among rural veterans were previously observed,[15] but by 2019 this difference was no longer significant. Increased rates of benzodiazepines among new recipients were also observed among African Americans. This finding differs from previous work that noted decreased prevalence among African American veterans during 2011 compared to rates among Whites and Hispanics.[23] These findings suggest new potential targets such as gender and race for the VHA prescribing programs. Recipients were more likely to have psychiatric comorbidities, particularly anxiety disorders. Among older adults, benzodiazepines are commonly prescribed for insomnia, anxiety disorders, and behavioral/psychological symptoms of dementia.[24] In the civilian sample of Agarwal and Landon,[10] benzodiazepine visit rates increased slightly for anxiety and depression but more so for chronic pain conditions even though pain is not an indication for benzodiazepines.

Prescribing trends for potential therapeutic alternatives to benzodiazepines were also examined from 2009 to 2019. The findings suggest that there is not an obvious answer to the therapeutic challenge of sleep-related medication alternatives. Clinicians do not appear to be replacing benzodiazepines with another hypnotic. Trazodone was the most prescribed alternative agent in 2009, but decreased by approximately 3% after 2016, potentially in response to changes in insomnia guidelines in 2017, whereas trazodone prescribing in the civilian setting increased.[25] Z-drug hypnotic prevalence decreased from 13.9% to 6.4% during the observation period, on a parallel course to benzodiazepines in VA, where decreased prescribing was observed in the civilian setting.[25] The prevalence of prazosin, used to treat PTSD-related nightmares, doubled to a peak of 22.0% in 2016 but has since declined, likely in response to publication of negative clinical trials and resultant diminished support from updated guideline recommendations.[3] Hydroxyzine was suggested as an alternative in VA academic detailing resources during the observation period, where we noted an increase in prevalence from 8.8% to 13.8%. It may be the case that clinicians have recognized that hypnotics are not very helpful for sleep problems and are using less. Nevertheless, these findings point to the need to address chronic sleep trouble in veterans with PTSD.

This work has several limitations. We were only able to access pharmacy records for VHA care and, as such, could not observe diagnosis codes assigned by non-VHA providers or prescriptions dispensed in the community. Therefore, the prevalence rates reported for benzodiazepines in this study are underestimates of rates from all sources. An additional limitation is that we do not know whether dispensed benzodiazepines were specifically prescribed for PTSD or for other indications, or potentially targeting comorbidities. More than half of veterans with PTSD were concurrently diagnosed with a depressive disorder, and anxiety disorders were common. Finally, we were unable to ascertain the role of evidence based psychotherapies in the decline of benzodiazepine prescribing as therapy modalities are not recorded in the outpatient VHA encounter data. We recognize that patients with PTSD should be offered one of the evidence based psychotherapies that effectively target symptoms of anxiety and insomnia as a first-line treatment option.[3]

CONCLUSIONS

When benzodiazepine prevalence among veterans with PTSD dropped from 39% in 1999 to 30% in 2009, the question was raised, which rate is right?[5] This question is particularly important when balancing patient-centered decision-making with guideline recommendations and national policies concerning treatment selection. Our inquiry supports the effectiveness of national VA educational initiatives put into place to improve benzodiazepine prescribing practices. We believe these strategies offer not only lessons but resources to other health care systems, providers, and patients to reduce inappropriate benzodiazepine prescribing and other potentially harmful practices. While prescribing dashboards such as those developed by the academic detailing program are not available to community clinicians, the outstanding patient and provider educational products and materials are able to be accessed by the public on the academic detailing external-facing website.[26] These resources should help support community providers in their deimplementation efforts.

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Supplementary Material

Article Title: Deimplementation of Benzodiazepine Prescribing in Posttraumatic Stress Disorder in the Veterans Health Administration

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List of Supplementary Material for the article

1. Table 1 — Estimating the relative contribution of benzodiazepine prescribing changes over time, beginning with 2013 to 2014, the first two-year transition period where the absolute number of observed benzodiazepine recipients decreased

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Supplementary Table 1. Estimating the relative contribution of benzodiazepine prescribing changes over time, beginning with 2013 to 2014, the first two-year transition period where the absolute number of observed benzodiazepine recipients decreased

Years	Prescribing change	N	Expected	Observed	Gap#	Attribution**
2013-14	Cessation, existing cohort	148,512*	26,138†	30,179	4,041	17.5%
	Incidence, existing cohort	518,649‡	30,082§	20,381	9,701	41.9%
	Prevalence, new entrants	164,007‖	34,113¶	24,707	9,406	40.6%
2014-15	Cessation, existing cohort	143,927	25,331	33,554	8,223	23.5%
	Incidence, existing cohort	552,993	32,074	19,385	12,689	36.3%
	Prevalence, new entrants	174,425	36,280	22,214	14,066	40.2%
2015-16	Cessation, existing cohort	130,188	22,913	33,661	10,748	24.8%
	Incidence, existing cohort	564,576	32,745	17,542	15,203	35.0%
	Prevalence, new entrants	172,382	35,855	18,403	17,452	40.2%
2016-17	Cessation, existing cohort	116,790	20,555	33,452	12,897	24.5%
	Incidence, existing cohort	598,380	34,706	16,462	18,244	34.6%
	Prevalence, new entrants	182,790	38,020	16,478	21,542	40.9%
2017-18	Cessation, existing cohort	102,887	18,108	29,567	11,459	19.9%
	Incidence, existing cohort	635,073	36,834	16,189	20,645	35.9%
	Prevalence, new entrants	191,932	39,922	14,449	25,473	44.2%
2018-19	Cessation, existing cohort	92,300	16,245	26,535	10,290	16.2%
	Incidence, existing cohort	674,006	39,092	15,690	23,402	36.9%
	Prevalence, new entrants	203,779	42,386	12,634	29,752	46.9%
Overall						21.0%
Mean %						36.8%
						42.2%

* Denominator for calculation of expected and observed discontinuation rates, defined as the number of prevalent benzodiazepine recipients in the first year of each two-year transition period

† The number of patients expected to discontinue based on the denominator and the historical discontinuation rate from 2009 to 2010 of 17.6%.

‡ Denominator for calculation of expected and observed incidence rates, defined as the number of patients in the first year of each two-year transition period who did not receive benzodiazepines and thus at risk to become incident recipients during the second year.

§ The number of patients expected to become incident benzodiazepine recipients based on the denominator and the historical incidence rate from 2009 to 2010 of 5.8%.

‖ Denominator for calculation of expected and observed benzodiazepine prevalence among new cohort entrants, defined as the number of patients included in the cohort for the second year of each two-year transition period, but not the first year.

¶ The number of patients expected prevalent benzodiazepine recipients among new cohort entrants based on the denominator and the historical prevalence rate from 2009 to 2010 of 20.8%.

The absolute difference between observed and expected patient counts, all of which contributed to reductions in the number of benzodiazepine recipients during each two-year transition period.

** Among the total gap in observed and expected patient counts from all three prescribing changes, the proportion accounted for by each individual prescribing change. The overall mean values are the arithmetic mean across the 6 two-year transition periods.