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Trends in prescribing of sedative-hypnotic medications in the United States: 1993–2010

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Abstract

PURPOSE—Non-benzodiazepine receptor agonists (nBZRAs) were developed as an alternative to benzodiazepines (BZDs) to treat insomnia. Little is known how the introduction of nBZRAs influenced trends in BZD prescribing. We examined BZD and nBZRA prescribing trends from 1993 to 2010.

METHODS—We used the National Ambulatory Medical Care Survey to examine 516,118 patient visits between 1993 and 2010. We categorized visits as BZD, nBZRA, or BZD+nBZRA visits based on medications prescribed each visit and applied linear probability regression models to assess trends in visits.

RESULTS—Increases were observed in proportions of visits that were BZD (2.6% in 1993 to 4.4% in 2010, $p<0.001$) and nBZRA (0% to 1.4%, $p<0.001$). Increases in BZD visits were primarily after 2002, with prescribing in the preceding years remaining relatively stable. We also found increases in BZD+nBZRA visits (0% to 0.4%, $p<0.001$). Among patients with sleep disorders, there was an increase in nBZRA visits (2.3% to 13.7%, $p<0.001$), and decline in BZD visits (23.5% to 10.8%, $p=0.015$). Just under a third (30.8%) of any-sedative hypnotic visits were for adults aged 65+, among whom increases in BZD, nBZRA, and BZD+nBZRA visits were observed across the study period.

CONCLUSIONS—There were increases in prescribing of nBZRAs between 1993 and 2010. Increases in prescribing of BZDs were also observed, especially after 2002. The introduction of nBZRAs likely resulted in declines in BZD prescribing among those with a sleep disorder, but not

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Disclosures

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other groups. Delivery of behavioral treatments should be encouraged to avert adverse outcomes associated with sedative-hypnotic use.

Keywords

sedative-hypnotics; prescribing trends; sleep; anxiety

INTRODUCTION

As of 2013, it is estimated that 9 million adults in the United States use prescription medication to help them sleep.¹ The most common medications used to treat sleep disorders include benzodiazepines (BZDs) and non-benzodiazepine receptor agonists (nBZRAs).² Both are sedative-hypnotics that act on the GABA-A neurotransmitter receptor to promote sleep.² Discovered in the early 1950s, BZDs are approved by the U.S. Food and Drug Administration (FDA) for treatment of a range of conditions including anxiety and seizure disorders, as well as insomnia.³ nBZRAs were introduced in the 1990s, and are approved for short-term treatment of insomnia.^{4–6}

The development of nBZRAs was prompted by concerns about the safety of BZDs—which have been shown to be associated with a number of negative side effects when used by older adults, including falls,^{7,8} hip fractures,^{9,10} cognitive impairment,¹¹ and disability.^{12–14} Approved by the FDA in December 1992, zolpidem was the first nBZRA that entered the U.S. market.⁴ Since then, other nBZRAs have been introduced, including zaleplon (approved August 1999)⁵ and eszopiclone (approved December 2004).⁶ nBZRAs were marketed as safer alternatives to BZDs,^{15–17} but evidence suggests that nBZRAs may be associated with similar harmful side effects.^{18–20}

Prior to the introduction of nBZRAs, BZDs were among the most common sedative-hypnotic medications prescribed.²¹ Since their introduction in the 1950s, prescribing of BZDs increased exponentially.²² Wysowski et al. found that prescriptions dispensed for BZDs increased from 0.7 million prescriptions in 1970 to 17.9 million in 1989.²² Little is known about changes in prescription of BZDs after the introduction of nBZRAs. The extent to which BZDs and nBZRAs are prescribed together also has not been examined. Co-administration of these medications could be dangerous due to the potential for adverse drug interactions.²³

We examined national prescribing trends for BZDs and nBZRAs from 1993–2010. We hypothesized that overall, there was an increase in prescribing of nBZRAs during the study period, coinciding with a decline in prescribing of BZDs among patients with a sleep disorder.

METHODS

Data source

We used the 1993–2010 waves of the National Ambulatory Medical Care Survey (NAMCS).²⁴ NAMCS is an annual cross-sectional survey conducted by the National Center for Health Statistics (NCHS) that examines use and delivery of health services in U.S.

ambulatory healthcare settings.²⁵ Each year, a nationally representative sample of physicians is asked to report on a random selection of patient visits in a random week. From 1993–2010, the number of visits each year included in our analysis ranged from 20,760 to 36,875, resulting in a total study sample of 516,118 patient visits. Over the past 20 years, response rates for NAMCS ranged from 60–70%.

Measures

Prescription medications—Physicians listed all prescriptions and over-the-counter drugs that were “ordered, supplied, administered or continued” at a given patient visit based on medical records. For the NAMCS 1993–2002 waves, up to 6 medications were recorded. Starting in 2003, the maximum number recorded was increased to 8. To make years comparable, we only considered the first 6 medications listed across all years. We defined nBZRAs as zolpidem, zaleplon, and eszopiclone, and BZDs as alprazolam, clonazepam, clorazepate, chlordiazepoxide, diazepam, estazolam, flurazepam, lorazepam, oxazepam, temazepam, and triazolam. We categorized each visit into one of the following four mutually exclusive groups: no BZD or nBZRA; BZD; nBZRA; and BZD+nBZRA. In this paper we refer to the last three groups as “any sedative-hypnotic visits.” Of note, medications other than BZDs and nBZRAs could have been prescribed at any of the visits. Other sedative-hypnotic medications were not examined in this study.

Patient characteristics—NAMCS records patients’ demographic characteristics, including age, gender, and race/ethnicity. NAMCS also records diagnoses related to visits including the presence of “chronic conditions,” identifying one “primary diagnosis,” as well as two “other” diagnoses if applicable. NCHS staff code diagnoses using ICD-9 codes. We identified patients as having either a sleep (307.40–307.49, 327.00–327.8, 780.50–780.59), anxiety (300.00–300.9), or mood disorder (296.00–296.99).

Visit characteristics—NAMCS records whether a visit was by a new patient or an established patient, and whether a follow-up appointment was scheduled. The expected source(s) of payment are also recorded, which we categorized as private insurance, Medicare, Medicaid, self-pay, or other (including worker compensation, no pay, other, and unknown). Physician’s specialty was ascertained from the American Medical Association Master File, and was confirmed with physicians at study enrollment. We categorized physicians as primary care physicians (including general/family practice and internal medicine), psychiatrists, and other (e.g., pediatricians, general surgeons, urologists, etc.).

Analyses

We first compared the characteristics of any sedative-hypnotic visit to visits where no sedative-hypnotic was prescribed using bivariate logistic regression. The dependent variable in these analyses was visit type (i.e., any sedative-hypnotic visit vs. no sedative-hypnotic visit), and the independent variables were the characteristics of the visit (e.g., patient age, physician specialty). To ascertain differences among various types of sedative-hypnotic visit types (i.e., BZD, nBZRA, BZD+nBZRA), we compared both nBZRA visits and BZD +nBZRA visits to BZD visits using multinomial logistic regression. These latter analyses were limited to any sedative-hypnotic visits.

We then examined trends in the prevalence of different visit types across time (BZD, nBZRA, and BZD+nBZRA) using logistic regression models. To improve the reliability of our estimates,²⁶ we binned years into 2-year windows and assigned a number ranging from 1–9 based on these binned groups (e.g., 1 = “1993–1994,” 2 = “1995–1996,” etc.). To better describe prescribing trends across the entire study period, we transformed the time indicator variable by subtracting 1 and dividing by 8 (the range of values for the time variable), resulting in values ranging from 0–1.²⁷ This enabled us to interpret the corresponding regression coefficients as changes in the odds of each type of visit from 1993 to 2010.

Because the prevalence of nBZRA prescriptions in the 1993–1994 period was very low, logistic regression models produced very large odds ratios for the trends in prescriptions of these medications, limiting our ability to compare trends across medication classes. To represent more comparable trends across medication classes, we estimated the absolute change in prescription of these medications over time using linear probability regression models.²⁸ The outcome for these analyses was the dichotomous variable for the prescription of each medication type and the predictor was the transformed time variable. The regression coefficients in the linear probability models represent change in prevalence of prescriptions for each medication type. Because results of statistical tests for the logistic regressions and linear probability models were similar, we report results from linear probability models only.

The analyses were repeated after stratifying the sample based on patient and visit characteristics described above. Finally, we statistically tested whether the trends in prescribing differed across strata by testing interaction terms of time with indicator variables identifying each stratum compared to all other strata. A statistically significant interaction term suggests that trends differ across strata. These tests adjusted for all patient and visit characteristics examined in our study.

RESULTS

Prevalence and characteristics of BZD and nBZRA visits

Sample characteristics—Among all patient visits from 1993 to 2010, there were 17,972 (3.5%, unweighted) BZD visits, 3,042 (0.6%, unweighted) nBZRA visits, and 884 (0.2%, unweighted) BZD+nBZRA visits. Among any visit for which a sedative hypnotic was prescribed (n=21,898), the majority were for patients aged 45 years or older (45–64 years old: 40.5%; 65+ years old: 30.8%), two-thirds involved women, and over four-fifths involved non-Hispanic white patients (Table 1). Over one-fifth of all sedative-hypnotic visits were for patients diagnosed with an anxiety disorder, 11.0% for patients with a mood disorder, and 5.3% for those with a sleep disorder. The majority of any sedative-hypnotic visits were for established patients (92.8%) and including scheduled follow-up visit (96.6%). The most common payment sources for these visits were private insurance (48.0%) and Medicare (32.1%). Over half of the visits were with primary care doctors, and 19.1% were with psychiatrists. Compared to visits where no sedative-hypnotic was prescribed, visits where any sedative-hypnotic was prescribed were more likely to involve patients who were older than age 45; female; non-Hispanic white; diagnosed with a sleep, anxiety, or mood disorder; to involve established patients; to include scheduling of a follow-up appointment; to be paid for by Medicare or to be self-pay; and to involve a primary care physician or

psychiatrist. Compared to visits where no sedative-hypnotic was prescribed, visits where any sedative-hypnotics were prescribed were less likely to involve physicians with other specialties (all p 's<0.001) (Table 1).

Comparisons across any sedative-hypnotic visits—Compared to BZD visits, nBZRA visits were more likely to be for patients older than age 45; male; of Hispanic ethnicity or other race; and diagnosed with a sleep disorder (Table 2). They were less likely to be for patients diagnosed with an anxiety or mood disorder; reimbursed by Medicare, Medicaid, to be self pay, or reimbursed by another payment source; and to involve a psychiatrist (all p 's <0.05) (Table 2). Compared to BZD visits, BZD+nBZRA visits were more likely to be with patients between age 25–64; diagnosed with a sleep, anxiety, or a mood disorder; and to involve a psychiatrist. They were less likely to be reimbursed by Medicare (all p 's<0.008).

Temporal trends in prescriptions

Overall trends—The percentage of visits involving BZDs rose from 2.6% in 1993 to 4.4% in 2010 ($B=0.019$, 95% Confidence Interval [CI]=0.015–0.024) (Figure 1). Similarly, the percentage of visits involving nBZRAs increased from 0% in 1993 to 1.4% in 2010 ($B=0.015$, 95% CI=0.013–0.016). The percentage of visits involving BZDs+nBZRAs increased from 0% in 1993 to 0.3% in 2010 ($B=0.004$, 95% CI=0.003–0.004).

BZD prescribing—There were statistically significant increases in BZD visits across most patient and visit characteristics in stratified analyses (Supplemental Table 1). However, there was a statistically significant decrease in BZD visits for patients diagnosed with a sleep disorder ($B=-0.071$, 95% CI=-0.128–0.014) (Figure 2), and no statistically significant change in BZD visits among patients from the heterogeneous “other” race/ethnicity, visits to psychiatrists, or in visits by patients diagnosed with an anxiety or mood disorder. There were significant interactions with the time variable for age, gender, race/ethnicity, and new patient status. The trend was less pronounced for visits by patients <25 years old compared to other age groups ($F[1, 4624]=28.45$; $p<0.001$). In contrast, the trend was more pronounced in visits by patients in the 45–64 years age range compared to other age groups ($F[1, 4624]=13.46$; $p<0.001$), for females compared to males ($F[1, 4624]=6.56$; $p=0.011$), non-Hispanic blacks compared to all other race/ethnicities ($F[1, 4624]=7.99$; $p=0.005$), and for established patients compared to new patients ($F[1, 4624]=4.45$; $p=0.035$).

nBZRA prescribing—There were increases in nBZRA visits across all patient and visit characteristics, with particularly large increases among visits with patients diagnosed with sleep disorders ($B=0.099$, 95% CI=0.045–0.153) (Figure 2, Supplemental Table 2). There were significant interactions with the time variable for age, race/ethnicity, main payment source, physician specialty, and mood disorders. The trend was less pronounced for visits with patients <25 years old compared to other age groups ($F[1, 4624]=107.16$; $p<0.001$), Medicaid reimbursement compared to other forms of reimbursement ($F[1, 4624]=5.55$; $p=0.019$), and other physician specialty compared to primary care physicians and psychiatrists combined ($F[1, 4624]=28.24$; $p<0.001$). The trend was more pronounced for visits with patients aged 45–64 compared to other age groups ($F[1, 4624]=20.88$; $p<0.001$),

for non-Hispanic whites compared to other race and ethnicities ($F[1, 4624]=6.67$; $p=0.010$), for physicians with a primary care ($F[1, 4624]=17.81$; $p<0.001$) and psychiatry specialty ($F[1, 4624]=7.20$; $p=0.007$) compared to other specialties, and for visits of patients with a mood disorder compared to all other visits ($F[1, 4624]=9.38$; $p=0.002$).

BZD+nBZRA prescribing—Finally, there were increases in BZD+nBZRA visits across all patient and visit characteristics, except for visits with patients aged <25 years, those with unscheduled follow-ups and those reimbursed by Medicaid (Supplemental Table 3). Significant interactions with time were found for age, gender, race, follow-up, main payment source, physician specialty, and all diagnoses. Trends were significantly less pronounced for visits with patients <25 years compared to all other age groups ($F[1, 4624]=42.30$; $p<0.001$), for males compared to females ($F[1, 4624]=4.13$; $p=0.042$), for the “other” racial group compared to all Hispanic and non-Hispanic whites and blacks ($F[1, 4624]=3.93$; $p=0.047$), for visits reimbursed by Medicaid ($F[1, 4624]=4.35$; $p=0.037$), and for other physician specialty versus psychiatry and primary care specialties combined ($F[1, 4624]=21.51$; $p<0.001$). The trend was more pronounced for visits with patients aged 45–64 compared to all other age groups ($F[1, 4624]=5.38$; $p=0.020$), for non-Hispanic whites compared to all other racial/ethnic groups ($F[1, 4624]=7.74$; $p=0.005$), for visits with a scheduled compared to unscheduled follow-up ($F[1, 4624]=5.18$; $p=0.023$), for visits with psychiatrists compared to all other physician specialties ($F[1, 4624]=20.82$; $p<0.001$), for visits by patients with an anxiety disorder ($F[1, 4624]=19.46$; $p<0.001$) or mood disorder diagnoses ($F[1, 4624]=13.79$; $p<0.001$) compared to visits without those diagnoses.

Sensitivity Analyses—To check for autocorrelation in prescribing rates of medications across the years, we conducted time series analyses with observations being the percent of visits each year that the respective medication was prescribed (i.e., BZD, nBZRA, and BZD +nBZRA visits). We conducted linear regression models with Newey-West corrected standard errors²⁹ accounting for lags of 1, 3 and 5 time points. The significance levels for all analyses remained highly significant (p 's <0.001) suggesting that the results are robust to correlations across the years.

DISCUSSION

We characterized trends in prescription of BZD and nBZRA agents overall and in different patient groups between 1993 and 2010. We found increases in prescribing of nBZRAs across the entire study period, and increases in BZD prescribing especially after 2002. We also found a decline in BZD prescribing among patients with sleep disorders, coinciding with an increase in nBZRA prescribing in visits involving these patients, suggesting that nBZRAs have partly replaced BZDs in treatment of sleep disorders in this period. These findings highlight prescribing practices did not substantially change as expected in response to the growing body of research on the potential adverse effects of sedative-hypnotics.

The introduction of nBZRAs does not appear to have impacted overall BZD prescribing trends during our study period; rather, after 2002 we observed a large increase in prescribing of BZDs. nBZRAs are only indicated for short-term treatment of insomnia and thus unlikely to influence prescription of BZDs for other indications. However, our finding of increased

prescribing of BZDs is perplexing in light of growing concerns about adverse outcomes of sedative-hypnotics overall⁷⁻¹⁴ and expanding indications of selective serotonin reuptake inhibitors for treatment of anxiety in addition to mood disorders.^{30,31} Our findings are consistent with past studies in the U.S. and other countries which show no change or a decline in prescriptions for BZDs between the 1990s and early 2000s.³²⁻³⁴ Our findings of increased BZD prescribing in recent years are consistent with those in a recent study by Olfson et al.³⁵ The increase observed in prescribing of BZDs after 2002 is puzzling, but one possible explanation is the growth in prescribing in primary care practices. Our analyses showed particularly pronounced increases in prescribing of BZDs in visits to primary care doctors (especially after 2002), which is in line with increased prescribing of other psychiatric medications in this setting and may indicate greater recognition or diagnosis of mental health problems.³⁶ Better understanding of these physicians' prescribing practices would help inform initiatives to improve the prescription of BZDs in this setting.

We found a growing trend of co-prescribing of BZDs and nBZRAs, especially among visits to psychiatrists and those for patients diagnosed with sleep, anxiety, and/or mood disorders. This finding is disconcerting, but consistent with research indicating growing polypharmacy in outpatient psychiatry.²⁷ Use of BZDs and nBZRAs together in healthier populations has been shown to modestly increase the medications' sedative properties;³⁷ few studies have examined drug interactions in vulnerable populations including older adults. It is plausible that prescriptions for these medications were for different indications (e.g., BZDs for anxiety disorders and nBZRAs for insomnia), which would not be surprising given that anxiety disorders, like many other psychiatric conditions, are often associated with sleep problems.² However, given the risk associated with the use of these medications individually, and the lack of information about their possible interactions, combining them should be done with caution, especially in vulnerable populations.

Our study also found prescription of BZDs and nBZRAs was common among older patients, with just under one-third of visits for those aged 65+ years. This confirms previous studies, which show a high prevalence of sedative-hypnotic use among older adults.³⁸⁻⁴² Our study adds to this by showing this pattern was consistent across BZD, nBZRA, and BZD+nBZRA visits.

Non-pharmacological treatments for anxiety and insomnia have become available.^{43,44} Among these, cognitive behavioral therapy has proven effective in minimizing anxiety.⁴⁵ Additionally, cognitive behavioral therapy for insomnia has been shown as more effective than the use of sedative-hypnotics in treating insomnia in the long term.⁴⁶ Efforts should be made to replace sedative-hypnotic prescribing with non-pharmacological treatments in usual treatment settings.

This study had several limitations. First, data for the NAMCS are based on a single office visit. Many individuals see multiple providers, and our estimates of BZD and nBZRA prescribing may thus be conservative. Second, all data on patient visits (including medication data) were reported by physicians or their office staff based on medical records, possibly resulting in reporting and recording errors. Data from busier offices with more patients may also be less detailed or have more missing data than smaller offices. Third,

NAMCS limits the number of medications reported to six, but many individuals, especially older adults, are known to use a greater number of medications.⁴⁷ Fourth, NAMCS physicians did not report indications for prescribing of individual medication.

In the context of these limitations, findings from this study provide a description of trends in prescription of BZDs and nBZRAs over the past two decades. Prescriptions for these medications have been increasing despite concerns about their safety. While the introduction of nBZRAs coincided with fewer prescriptions for BZDs to those with sleep disorders, prescribing of BZDs to other patient groups increased during the study period. Furthermore, the study recorded a concerning trend of co-prescription of these medications. As safer behavioral treatment alternatives are available for many of the target conditions of these medications, efforts should be made to better educate providers and patients regarding these alternatives.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Take Home Messages

- Prescribing of benzodiazepines (BZDs; e.g., alprazolam) and non-BZD receptor agonists (nBZRAs; e.g., zolpidem) increased from 1993 to 2010
- Growing trend observed for co-prescribing of BZDs and nBZRAs over same time period
- Prescribing of nBZRAs to patients with sleep disorders increased over this period while prescribing of BZDs to these patients declined

Fig. 1.

Fig. 2.

Table 1

Patient and visit characteristics of ambulatory healthcare office visits in which any sedative-hypnotic medications were prescribed.

	No BZD ^a nor nBZRA ^b visits n=494,220	Any sedative-hypnotic visits n=21,898	Comparison
Patient and Visit Characteristic	n (%) ^c	n (%) ^c	OR (95% CI)
Age			
<25 years	113,595 (25.8)	1,011 (3.6)	Ref.
25–44	114,405 (22.7)	5,864 (25.1)	7.83 (7.05, 8.69)
45–64	135,242 (26.4)	8,872 (40.5)	10.89 (9.81, 12.09)
65+	130,978 (25.0)	6,151 (30.8)	8.73 (7.83, 9.73)
Gender			
Female	282,846 (58.9)	14,331 (66.6)	Ref.
Male	211,374 (41.1)	7,567 (33.4)	0.72 (0.69, 0.75)
Race			
Non-Hispanic White	382,100 (76.2)	18,430 (83.5)	Ref.
Non-Hispanic Black	45,667 (9.6)	1,418 (7.0)	0.66 (0.60, 0.73)
Hispanic	46,417 (10.0)	1,495 (7.3)	0.66 (0.59, 0.74)
Other	20,036 (4.2)	555 (2.3)	0.50 (0.42, 0.58)
Diagnosis ^d			
Sleep	3,150 (0.6)	923 (5.3)	9.21 (8.09, 10.48)
Anxiety	8,540 (1.3)	4,773 (20.3)	19.05 (17.69, 20.51)
Mood	8,270 (1.0)	3,525 (11.0)	11.82 (10.86, 12.88)
Patient status			
Established	412,100 (86.7)	19,851 (92.8)	Ref.
New	79,959 (13.3)	1,994 (7.3)	0.51 (0.47, 0.55)
Follow-up ^e			
Scheduled	361,704 (92.3)	15,868 (96.6)	Ref.
Unscheduled	26,563 (7.7)	419 (3.4)	0.42 (0.36, 0.50)
Main payment source ^f			
Private insurance	188,546 (57.3)	7,950 (48.0)	Ref.
Medicare	83,253 (22.5)	5,170 (32.1)	1.70 (1.59, 1.81)
Medicaid	38,348 (10.5)	1,811 (9.0)	1.03 (0.92, 1.15)
Self-pay	19,834 (4.8)	1,651 (7.1)	1.77 (1.57, 1.99)
Other ^g	18,489 (4.9)	760 (3.8)	0.92 (0.79, 1.06)
Physician specialty			
Other specialty	347,896 (59.3)	7,955 (27.7)	Ref.
Primary care	125,835 (38.4)	7,152 (53.2)	2.97 (2.73, 3.24)
Psychiatry	20,489 (2.3)	6,791 (19.1)	18.01 (16.18, 20.04)

Source: National Ambulatory Medical Care Survey, 1993–2010.

Note: All analyses account for the complex sampling design of the NAMCS, and are nationally representative.

Missing observations: Patient status=2,214, follow-up=111,564, main payment source=150,306. All other variables had no missing observations.

^aBenzodiazepines include: alprazolam, clonazepam, clorazepate, chlordiazepoxide, diazepam, estazolam, flurazepam, lorazepam, oxazepam, temazepam, and triazolam.

^bNon-benzodiazepine receptor agonists include: zolpidem, zaleplon, and eszopiclone.

^cAll percentages are weighted to make results nationally representative.

^dPercentages do not total 100%; each diagnosis was compared to all other visits.

^eThis item was not assessed in 1997–1998, and 2009–2010.

^fThis item was not assessed in 1993–1996.

^gOther payment source include workers compensation, no pay, other, and unknown.

Table 2

Comparison of patient and visit characteristics of ambulatory healthcare office visits involving benzodiazepines (BZD), non-benzodiazepine receptor agonists (nBZRA), and both classes (BZD+nBZRA).

Patient and Visit Characteristic	BZD ^a visits n=17,972		nBZRA ^b visits n=3,042		Comparison nBZRA vs. BZD visits		BZD+nBZRA visits n=884		Comparison BZD+nBZRA vs. BZD visits	
	n (%)	n (%)	n (%)	n (%)	OR (95% CI)	OR (95% CI)	n (%)	n (%)	OR (95% CI)	OR (95% CI)
Age										
<25 years	889 (4.0)	108 (2.4)			Ref.		14 (1.6)		Ref.	
25–44	4,923 (25.9)	672 (20.0)			1.31 (0.96, 1.79)		269 (29.4)		2.87 (1.33, 6.19)	
45–64	7,072 (39.0)	1,363 (46.5)			2.03 (1.50, 2.75)		437 (48.3)		3.14 (1.47, 6.71)	
65+	5,088 (31.2)	899 (31.2)			1.71 (1.24, 2.35)		164 (20.7)		1.68 (0.76, 3.70)	
Gender										
Female	11,783 (66.9)	1,931 (64.3)			Ref.		617 (69.1)		Ref.	
Male	6,189 (33.1)	1,111 (35.7)			1.12 (1.00, 1.26)		267 (30.9)		0.90 (0.71, 1.15)	
Race										
Non-Hispanic White	15,202 (84.1)	2,471 (80.6)			Ref.		757 (83.1)		Ref.	
Non-Hispanic Black	1,148 (6.9)	215 (7.3)			1.11 (0.91, 1.34)		55 (6.9)		1.01 (0.68, 1.52)	
Hispanic	1,190 (7.0)	248 (8.6)			1.28 (1.03, 1.61)		57 (8.0)		1.15 (0.76, 1.75)	
Other	432 (2.1)	108 (3.5)			1.77 (1.24, 2.52)		15 (2.1)		1.01 (0.51, 1.98)	
Diagnosis ^d										
Sleep	455 (3.1)	408 (15.3)			5.62 (4.66, 6.79)		60 (8.3)		2.83 (1.87, 4.29)	
Anxiety	4,263 (22.6)	248 (6.1)			0.22 (0.19, 0.26)		262 (31.0)		1.54 (1.24, 1.91)	
Mood	2,877 (11.2)	388 (7.6)			0.65 (0.55, 0.78)		260 (22.0)		2.24 (1.80, 2.80)	
Patient status										
Established	16,283 (92.8)	2,750 (92.2)			Ref.		818 (93.2)		Ref.	
New	1,638 (7.2)	290 (7.8)			1.09 (0.90, 1.32)		66 (6.8)		0.94 (0.66, 1.35)	
Follow-up ^e										
Scheduled	13,251 (96.5)	2,024 (97.1)			Ref.		593 (96.6)		Ref.	
Unscheduled	355 (3.5)	55 (2.9)			0.83 (0.57, 1.21)		9 (3.4)		0.99 (0.45, 2.15)	
Main payment source ^f										
Private insurance	6,083 (46.2)	1,440 (54.5)			Ref.		427 (53.6)		Ref.	

Patient and Visit Characteristic	BZD ^a visits n=17,972		nBZRA ^b visits n=3,042		Comparison nBZRA vs. BZD visits		BZD+nBZRA visits n=884		Comparison BZD+nBZRA vs. BZD visits	
	n (%)	n (%)	n (%)	n (%)	OR (95% CI)	OR (95% CI)	n (%)	n (%)	OR (95% CI)	OR (95% CI)
Medicare	4,148 (32.7)	842 (31.3)			0.81 (0.70, 0.94)		180 (23.9)		0.63 (0.48, 0.83)	
Medicaid	1,480 (9.4)	231 (7.1)			0.64 (0.50, 0.82)		100 (11.6)		1.07 (0.74, 1.54)	
Self-pay	1,373 (7.7)	192 (4.3)			0.47 (0.37, 0.60)		86 (7.6)		0.85 (0.57, 1.25)	
Other ^g	621 (4.0)	104 (2.9)			0.60 (0.41, 0.88)		35 (3.3)		0.71 (0.44, 1.14)	
Physician specialty										
Other specialty	6,519 (27.3)	1,220 (31.3)			Ref.		216 (20.3)		Ref.	
Primary care	5,756 (52.8)	1,168 (57.5)			0.95 (0.80, 1.12)		228 (44.3)		1.13 (0.87, 1.46)	
Psychiatry	5,697 (19.9)	654 (11.2)			0.49 (0.40, 0.60)		440 (35.5)		2.41 (1.82, 3.17)	

Source: National Ambulatory Medical Care Survey, 1993–2010.

Note: All analyses account for the complex sampling design of the NAMCS, and are nationally representative.

Missing observations: Patient status=53, follow-up=5,611, main payment source=4,556. All other variables had no missing observations.

^a Benzodiazepines include: alprazolam, clonazepam, clorazepate, chlorthalidopoxide, diazepam, estazolam, flurazepam, lorazepam, temazepam, and triazolam.

^b Non-benzodiazepine receptor agonists include: zolpidem, zaleplon, and eszopiclone.

^c All percentages are weighted to make results nationally representative.

^d Percentages do not total 100%; each diagnosis was compared to all other visits.

^e This item was not assessed in 1997–1998, and 2009–2010.

^f This item was not assessed in 1993–1996.

^g Other payment source include workers compensation, no pay, other, and unknown.