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Patterns of Opioid Use for Chronic Non-Cancer Pain in the Veterans Health Administration from 2009 to 2011

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Abstract

Although opioids are frequently prescribed for chronic non-cancer pain (CNCP) among Veterans Health Administration (VHA) patients, little has been reported on national opioid prescribing patterns in the VHA. Our objective was to better characterize the dosing and duration of opioid therapy for CNCP in the VHA. We analyzed national VHA administrative and pharmacy data for fiscal years 2009 to 2011. For individuals with CNCP diagnoses and any opioid use in the fiscal

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Among Veterans Health Administration patients with chronic non-cancer pain, chronic opioid therapy occurs frequently, but the median daily dose is usually modest.

year, we calculated the distribution of individual mean daily opioid dose, individual total days covered with opioids in a year, and individual total opioid dose in a year. We also investigated the factors associated with being in the top 5% of individuals for total opioid dose in a year, which we term receipt of high volume opioids. About half of the patients with CNCP received opioids in a given fiscal year. The median daily dose was 21 milligrams morphine equivalents. Approximately 4.5% had a mean daily dose higher than 120 milligram morphine equivalents. The median days covered in a year was 115 to 120 days in these years for those receiving opioids. Fifty-seven percent had at least 90 days covered with opioids per year. Major depression and post-traumatic stress disorder were positively associated with receiving high volume opioids, but non-opioid substance use disorders were not. Among VHA patients with CNCP, chronic opioid therapy occurs frequently, but for the large majority of patients the average daily dose is modest. Doses and duration of therapy were unchanged 2009–2011.

Keywords

chronic noncancer pain; opioids; Veterans

INTRODUCTION

Chronic non-cancer pain (CNCP) is common in Veterans Health Administration (VHA) patients, with over 50% of VA primary care patients reporting chronic pain [25; 26; 35; 38; 42]. Frequently occurring disorders include neck and back pain, arthritis, headache/migraine, and neuropathic pain [19]. Opioids are commonly prescribed for patients with CNCP, in both VHA [15; 47] and non-VHA populations [9; 40]. Although supported by guidelines [1; 12; 21; 22], this use is controversial. In particular there are concerns over opioid misuse and abuse, opioid overdose deaths, and the association of opioids with emergency room visits and fractures [3–8; 10; 13; 16; 23; 29; 30; 32–34; 40]. Negative outcomes are particularly common among patients receiving high dose opioids [8; 10; 16; 34].

Opioid over-prescribing is a concern in the VHA, and the VHA has been in the vanguard of developing opioid prescribing guidelines. An October 28, 2009 VHA pain management directive stresses the risks associated with opioid use and mandates certain clinical changes, including the adoption of a stepped care approach, based on a biopsychosocial model, with quality of life as the primary outcome [14]. In May 2010 guidelines were released for the management of opioid therapy for chronic pain, along with new patient provider tools, including a sample opioid pain care agreement, opioid drug tables, and a table on urine drug screens [43]. However, despite the high prevalence of CNCP and frequent use of opioids among VHA patients with CNCP, there is little in the literature about opioid prescribing patterns in the VHA at a national level, with most studies utilizing either regional data [15; 27; 31; 36; 37] or national subsamples [11].

Our objective was to characterize in greater detail patterns of opioid use for CNCP in the VHA, using national VHA administrative and pharmacy data from fiscal years 2009 to 2011. In particular we investigated the percentage of VHA patients with CNCP who were

prescribed any opioids in the past year, and among those who were prescribed opioids: (1) the distribution of individual mean daily opioid dose; (2) the distribution of individual total days covered with opioids in a year; (3) the distribution of individual total opioid dose in a year; and (4) the characteristics of individuals with receipt of high volume opioids. So that we could compare and contrast our results with non-VHA populations we patterned our analytical methods after those from the Trends and Risks of Opioid Use for Pain (TROUP) study [40] [17], a study that investigated opioid prescribing trends among patients with CNCP in Arkansas Medicaid and HealthCore, a consortium of five commercial Blue Cross/Blue Shield health plans representing the West, Mid-West, and South-East regions. The TROUP study utilized data from 2000 to 2005.

METHODS

Data

Data came from the Pharmacy Benefits Management (PBM), the MedSAS service utilization data, the Corporate Data Warehouse, and the Operation Enduring Freedom/Operation Iraqi Freedom (OEF/OIF) roster. All analyses were approved by the Institutional Review Boards of The Central Arkansas Veterans Healthcare System and the University of Arkansas for Medical Sciences. A data use agreement was executed with each data repository.

Study Sample

The study sample consisted of VHA patients in years 2009 to 2011 who met the following criteria. Inclusion Criteria: 1) CNCP diagnosis, as defined by two clinical encounters for the same CNCP condition (neck pain, back pain, arthritis, headache/migraine, or neuropathic pain) at least 30 days apart, but no more than 365 days apart. 2) Age 18 or older. Exclusion Criteria: 1) Cancer diagnosis in the year reported other than non-melanoma skin cancer, 2) resident of VHA nursing home or living in VHA domiciliary, 3) enrolled in VHA hospice benefits, 4) incomplete opioid prescription data, or 5) received a parenteral, suppository, or trans mucosal opioid. These criteria allow us to focus on outpatient enrollees likely receiving opioids for the treatment of CNCP.

Opioid Use—Data included all opioid prescriptions (including date, dose, and type of opioid), other than injectable opioids and opioid suppositories (due to lack of conversion factors). We formed separate analytical files for each fiscal year 2009, 2010, and 2011, and included all individuals with one of the CNCP diagnoses in one of those years. We recorded the total number of opioid prescription fills for each patient within the fiscal year and calculated the number of days covered for each patient in the year accounting for overlapping concurrent opioid therapy, as recorded by the dispensing pharmacist. If any two prescriptions overlapped by greater than 20% or greater than ten days, the overlapping portions of the prescription were assumed to be taken concurrently and the overlapping days were only included once in the opioid days calculation. If the overlap was 20% and 10 days the second prescription was shifted and the overlapping days from both the first and second prescription were included in the opioid days calculation. We refer to this variable as the “individual total days covered with opioids in a year.” Total morphine equivalents for

each prescription were calculated by multiplying the quantity of each prescription by the strength of the prescription (milligrams of opioid per unit dispensed). The quantity-strength product was then multiplied by conversion factors derived from published sources to estimate the milligrams of morphine equivalent to the opioids dispensed in the prescription [2; 41; 44]. The total opioid dose for a patient in a year was obtained by summing across all prescriptions, which we refer to as the “individual total opioid dose in a year.” The mean dose in morphine equivalents per day covered for each patient was calculated by summing the morphine equivalents for each prescription filled during the year, and dividing by the number of days covered. We call this variable the “individual mean daily opioid dose.”

Other Variables—We used International Classification of Diseases-9th Revision (ICD-9) codes from the MedSAS data to construct variables for mental health diagnoses (major depression, posttraumatic stress disorder, and schizophrenia) and non-opioid substance use disorder. Demographic information such as age, race, gender and marital status were also extracted from the MedSAS files.

To protect against data entry errors and extreme cases, individuals with average daily dose greater than 1000 mg morphine equivalents were excluded from the analysis. This approach conservatively estimates the morphine equivalents. The total excluded was about 0.03% for each year.

Analyses

Results from a consortium of Blue Cross/Blue Shield plans and Arkansas Medicaid suggest that the distribution of individual mean daily opioid dose, individual total days covered with opioids in a year, and individual total opioid dose in a year are all highly right skewed and thus the means are relatively non-informative [17]. Therefore, we investigated the distribution of these variables. To do this, among individuals with a CNCP diagnosis and any opioid use in 2009 we calculated the 10th, 20th, 30th, 40th, 50th, 60th, 70th, 80th, 90th, 95th and 99th percentiles for (i) individual mean daily dose in year 2009, in morphine equivalents, (ii) individual total days covered with opioids in year 2009, (iii) and individual total opioid dose in 2009, in morphine equivalents. That is, for (i), using the distribution of the variable individual mean daily opioid dose, we determined the individual mean daily dosage for an individual in the 10th percentile, the 20th percentile, etc. We performed analogous calculations for fiscal years 2010 and 2011. That is, each year was analyzed as a separate analytical file. Individuals were not followed across years, but may have contributed repeated observations.

We also calculated the percentage of the total opioid morphine equivalents used by the individuals within percentiles in a given year. For example, to determine what fraction of the total opioid morphine equivalents were consumed by all individuals in the 21st to 30th percentile we first summed the total opioid morphine equivalents across all patients in the 21st to 30th percentile, and divided this by the total opioid morphine equivalents in the entire population. Finally, to investigate the characteristics of individuals with high volume opioid receipt we constructed a dichotomous variable indicating whether or not the individual was in the top 5% of individual total annual dose, and utilized logistic regression to assess the

association of our sociodemographic and clinical variables with high volume opioid receipt, using data from FY 2011.

RESULTS

The number of VHA patients with CNCP increased slightly from 2009 to 2011, from 1.33 million in 2009 to 1.44 million in 2011 (Table 1), reflecting increases in the number of Veterans receiving care in VHA. In each year about 50% of VHA patients with one of the CNCP diagnoses received at least one opioid prescription. The sociodemographic and clinical profiles of CNCP patients who received any opioids, those who did not receive any opioids, and the total CNCP sample, is shown in Table 2 (FY 2011 data). Among those receiving opioids, back pain (52%) and arthritis pain (65%) were the most common CNCP diagnoses. Depression (32%), PTSD (21%), and substance use disorders (15%) were common.

Because of the extremely large sample sizes, sociodemographic and clinical differences between those who received any opioids and those who did not were generally all statistically significant, so we comment only on those where there were substantive differences. Those who received opioids were more likely to be divorced (27.6% vs 20.9%), less likely to be married (51.7% vs 58.0%), less likely to be Veterans of recent conflicts (OEF/OIF Veterans) (8.1% vs 11.9%), more likely to have neck pain (11.4% vs 6.5%) and back pain (52.0% vs 32.1%), and more likely to have psychiatric disorders than those who did not (Table 2). Among OEF/OIF Veterans with CNCP, 41% received any opioids (58,566 out of 143,929) versus 51% (661,721 out of 1,293,463) of non OEF/OIF Veterans.

The distribution of individual mean daily opioid dose (percentiles) for 2009 to 2011 is shown in Figure 1 and Table A1. (The data from which Figures 1 to 3 were constructed are shown in Appendix Tables A1, A2, A3). The median dose (50th percentile) in years 2009, 2010, and 2011 were 21.4, 21.4, and 21.2 mg morphine equivalents respectively. Only about 4.5% received more than 120 mg morphine equivalents, which is sometimes used as a measure of high dose opioid therapy [46]. The mean daily dose for an individual in the 99th percentile was 284.4, 282.4 and 280.7 mg morphine equivalents in years 2009, 2010, and 2011 respectively.

The median of individual days covered with opioids in a year was 115 days, 118 days, and 120 days, in years 2009, 2010, and 2011 respectively (Figure 2 and Table A2). In each year about 57% of those receiving opioids had at least 90 days of opioid use, which is sometimes used as an indicator of chronic opioid therapy (COT) [15; 20; 45]. About 10% of individuals who received opioids had at least 350 days covered with opioids in a year.

The median of individual total opioid dose in a year was 2190, 2190, and 2220 mg morphine equivalents in 2009 to 2011 (Figure 3 and Table A3). The 4% of the patients in the 95th to 99th percentiles of total opioid dose accounted for 27% of the total opioid dose (Figure 4 and Table A4). Individuals in the top 1% (i.e., 99th percentile) accounted for another 17%.

Our multivariate results from the logistic regression indicated that those more likely to have receipt of high volume opioids in terms of total annual dose included those who were middle

aged and white (Table 3). OEF/OIF Veterans were significantly less likely to have high volume opioid receipt (OR=0.38, 95% CI=0.36, 0.41). While PTSD was positively associated with receipt of high volume opioids, the magnitude of the effect was modest (OR=1.10, 95% CI =1.07, 1.13), and smaller than that for depression (OR=1.52, 95% CI=1.49, 1.56). Individuals with non-opioid substance use disorders were less likely to have receipt of high volume opioids, although the effect was small (OR=0.95, 95% CI=0.92, 0.98).

DISCUSSION

To our knowledge, this is the first detailed national report on opioid prescribing for the entire population of VHA patients with CNCP. Our analyses suggest that VHA patients with the identified CNCP diagnoses are frequently prescribed opioids, with about half receiving some opioids during a 12-month period. Among those VHA patients with CNCP who received opioids, COT was common. Using 90 days covered per year as a threshold for COT, 57% of patients who received any opioids had COT. This is generally higher than we found in HealthCore and Arkansas Medicaid.

On the other hand, opioid doses in VHA were generally modest. More than sixty percent had an average daily dose less than 30 mg morphine equivalents. Only 4.5% received an average daily dose of greater than 120 mg morphine equivalents, which is sometimes used as a marker of high dose opioid therapy [46]. While our data do not allow us to assess the appropriateness of the opioid prescribing in VHA, in recent studies high opioid dose has been shown to be associated with adverse drug events, such as opioid drug overdose [10; 16], fractures [34], and opioid misuse [39]. Our results suggest that this type of high dose opioid prescribing occurs much less frequently among VHA patients, compared to the HealthCore and Arkansas Medicaid populations.

Further, in the HealthCore and Arkansas Medicaid populations, individuals with non-opioid substance use disorders and mental health disorders were more likely to have receipt of high volume opioids. This is important, because non-opioid substance use disorders and mental health disorders are the strongest risk factors for opioid abuse and dependence [18; 19; 28]. Thus, in the HealthCore and Arkansas Medicaid populations, individuals most at risk for development of opioid abuse and dependence were also the most likely to be prescribed chronic high doses (i.e., individuals with high volume opioid receipt) [17]. On the other hand, in VHA individuals with substance use disorders were significantly less likely to receive high volume opioids, and the magnitude of the association of high volume opioid receipt with depression and PTSD in our VHA analyses was smaller than those found in HealthCore and Arkansas Medicaid. Thus, it appears that VHA does better than other health care systems previously studied in terms of patient selection for chronic, high dose opioid therapy.

There has been concern about the use of opioids in OEF/OIF Veterans [6; 23; 27; 35]. However, our results give reason for optimism, as OEF/OIF Veterans with CNCP were less likely to receive opioids than non OEF/OIF Veterans with CNCP (41% vs 51%), and much less likely to receive high volume opioids (OR=0.38, 95% CI=0.36, 0.41).

Opioids are unique in the modern pharmacopeia in that there is no absolute limit to dose (due to the development of tolerance). Because of this, a small percentage of patients may account for a large percentage of the opioids prescribed. In this VHA analysis, the top 1% accounted for 18% of total opioid use, and the top 5% accounted for 45% of total opioid use. Unfortunately, we know very little about these individuals with high volume opioid receipt, as studies to date have only utilized administrative data to establish a few of the characteristics of these individuals [17]. Given that this relatively small percentage of individuals use such a large percentage of the total opioids prescribed, we believe a key research priority is to better characterize these users, and the treatment they receive, either through interviews, chart reviews or both. For example, to what extent is there evidence for misuse or diversion among individuals with high volume opioid receipt?

Limitations

Although we utilized conversion factors from published sources to derive morphine equivalents [2; 41; 44] there are no canonical conversion tables, and estimates of conversion factors differ, generally by small amounts. Differences among conversion tables were resolved by consensus among the clinicians on this study, in collaboration with other researchers and clinicians. We relied upon administrative data for diagnoses and for pharmacy records. No independent clinical assessment of patients to confirm diagnoses could be done. Pain diagnoses have high specificity, although sensitivity is likely lower [24]. We did not examine all possible CNCP diagnoses, but focused on those which are most common, which account for a large majority of individuals with CNCP [19]. The entire population of individuals with any possible CNCP diagnosis would be higher. Our results may not be applicable to other CNCP conditions, such as fibromyalgia. We focused on national level estimates, but there is substantial geographical variation [7]. Our study does not reflect opioids received outside of the VHA system. As we analyzed each year's data separately and did not track individual subjects' status from year to year our results represent population trends and not the trends of individual enrollees. We compared VHA data from 2009 to 2011 with HealthCore and Arkansas Medicaid data from 2005; rates of opioid prescribing in HealthCore and Arkansas Medicaid may have changed during this time, or there could have been improvements in the data sources during this time.

Conclusion

There are three important findings from our study. First, half of all opioid recipients in VHA with CNCP receive chronic opioid therapy (>90 days per year). Second, daily opioid doses are generally modest in VHA with a median of 20 mg morphine equivalents. Since many opioid risks are linked with daily dose, this is important. Third, receipt of high volume opioids is not increased in patients with substance use disorders as it is in non-VHA samples. This suggests appropriate vigilance at VHA, which may be facilitated by a transparent and universal electronic medical record.

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Appendix

Table A1

Distribution of individual mean daily dose in milligram morphine equivalents for patients with CNCP and any opioid use.

Variable	Percentile	2009	2010	2011
Days covered				
	10 th	10.0	10.0	10.0
	20 th	14.0	13.8	13.7
	30 th	15.8	15.6	15.4
	40 th	20.0	19.8	19.6
	50 th	21.4	21.4	21.2
	60 th	26.5	26.0	25.6
	70 th	32.1	31.6	31.2
	80 th	42.7	41.5	40.2
	90 th	68.7	65.2	61.7
	95 th	111.5	109.4	107.1
	99 th	284.4	282.4	280.7
	Max	997.5	1000.0	1000.0

Table A2

Distribution of individual total days covered with opioids in a fiscal year for patients with CNCP and any opioid use.

Variable	Percentile	2009	2010	2011
Days covered				
	10 th	12.0	11.0	10.0
	20 th	30.0	30.0	30.0
	30 th	44.0	44.0	45.0
	40 th	72.0	74.0	76.0
	50 th	115.0	118.0	120.0
	60 th	170.0	174.0	180.0

Variable	Percentile	2009	2010	2011
	70 th	240.0	247.0	252.0
	80 th	313.0	318.0	318.0
	90 th	353.0	354.0	353.0
	95 th	361.0	362.0	361.0
	99 th	365.0	365.0	365.0
	Max	365.0	365.0	365.0

Table A3

Distribution of individual total opioid dose for a fiscal year in morphine equivalents (milligrams) for patients with CNCP and any opioid use.

Variable	Percentile	2009	2010	2011
Annual Med				
	10 th	200	200	200
	20 th	450	450	450
	30 th	760	750	750
	40 th	1320	1300	1305
	50 th	2190	2190	2220
	60 th	3600	3600	3610
	70 th	5850	5880	5925
	80 th	9840	9900	9900
	90 th	18340	18210	17790
	95 th	33856	33740	33120
	99 th	95377	94800	94200
	Max	362025	364680	361740

Table A4

Percentage of Total Opioids (Milligrams of Morphine Equivalents) Consumed by Individuals Within a Given Percentile

Variable		FY 09	FY10	FY11
Total Dose	Percentile	%	%	%
	0–10 th	0.15	0.15	0.15
	10–20 th	0.39	0.39	0.38
	20–30 th	0.72	0.71	0.71
	30–40 th	1.26	1.25	1.26
	40–50 th	2.11	2.10	2.14
	50–60 th	3.51	3.53	3.60
	60–70 th	5.74	5.77	5.88

Variable		FY 09	FY10	FY11
Total Dose	Percentile	%	%	%
	70–80 th	9.4	9.50	9.62
	80–90 th	16.5	16.5	16.53
	90–95 th	15.2	15.2	15.01
	95–99 th	27.17	27.2	27.2
	99–100 th	17.82	17.71	17.5

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Figure 1.
Distribution of individual mean daily opioid dose for patients with CNCP and any opioid use.

Figure 2.
Distribution of individual total days covered with opioids in a fiscal year for patients with CNCP and any opioid use.

Figure 3.
Distribution of individual total opioid dose in a fiscal year for patients with CNCP and any opioid use

Figure 4.
Percentage of total opioids consumed by individuals within a given percentile.

Table 1

Number of VHA patients with chronic non-cancer pain who did and did not receive opioids

	2009	2010	2011
Patients received opioids	662,090 (49.7%)	700,140 (49.8%)	720,287 (50.1%)
Patients did not receive opioids	670,720 (50.3%)	705,423 (50.2%)	717,105 (49.9%)
Total	1,332,810	1,405,563	1,437,392

Table 2

Sociodemographic and Clinical Characteristics of Fiscal Year 2011 Sample (Percentages in first row are row percentages, all other are column percentages)

	Opioid Users		Non-Opioid Users		Total	
	N	%	N	%	N	%
Total	720,287	50.1	717,105	49.9	1,437,392	100
Age						
18 to 25	10,178	1.4	12,890	1.8	23,068	1.6
26 to 35	48,027	6.7	56,305	7.9	104,332	7.3
36 to 45	72,463	10.1	66,340	9.2	138,803	9.7
46 to 55	162,515	22.6	114,818	16.0	277,333	19.3
56 to 65	267,259	37.1	224,520	31.3	491,779	34.2
66 to 75	92,162	12.8	120,020	16.7	212,182	14.8
76 +	67,683	9.4	122,212	17.0	189,895	13.2
Race						
White	503,102	69.9	489,743	68.3	992,845	69.1
Non-White	158,591	22.0	142,542	19.9	301,133	20.9
Unknown	58,594	8.1	84,820	11.8	143,414	10.0
Gender						
Male	658,653	91.4	653,231	91.1	1,311,884	91.3
Female	61,634	8.6	63,874	8.9	125,508	8.7
Marital Status						
Married	372,263	51.7	416,050	58.0	788,313	54.8
Divorced	199,159	27.6	149,891	20.9	349,050	24.3
Single	112,351	15.6	108,358	15.1	220,709	15.4
Widowed	32,158	4.5	36,492	5.1	68,650	4.8
Unknown	3,365	0.5	5,990	0.8	9,355	0.6
OEF/OIF	58,566	8.1	85,363	11.9	143,929	10.0
Type of Pain						
Neck	81,857	11.4	48,562	6.5	128,419	8.9

	Opioid Users		Non-Opioid Users		Total	
	N	%	N	%	N	%
Back	374,753	52.0	230,331	32.1	605,084	42.2
Arthritis	466,462	64.8	468,735	65.4	935,197	65.1
Headache	56,569	7.9	57,050	8.0	113,619	7.9
Neuropathic	100,681	14.1	92,267	12.9	193,948	13.5
Psychiatric Disorders						
Anxiety	222,309	30.9	160,369	22.4	382,678	26.6
PTSD	150,902	20.9	110,552	15.4	261,454	18.2
Mood	265,877	36.9	174,243	24.3	440,120	30.6
Major Depression	230,664	32.0	150,547	21.0	381,211	26.5
Schizophrenia	13,617	1.9	10,256	1.4	23,873	1.7
Substance	109,330	15.2	69,902	9.8	179,232	12.5

Table 3

Characteristics associated with high volume opioid receipt

	Odds Ratio	95% Confidence Interval	P value
Age			<0.0001
18 to 25	1.00	–	
26 to 35	1.65	(1.40–1.96)	
36 to 45	2.02	(1.71–2.38)	
46 to 55	2.71	(2.29–3.19)	
56 to 65	2.35	(1.99–2.77)	
66 to 75	1.56	(1.32–1.84)	
76 +	0.76	(0.64–0.91)	
Race			<0.0001
White	1.00	–	
Non-White	0.42	(0.40–0.43)	
Unknown	0.67	(0.65–0.71)	
Gender			<0.0001
Male	1.00	–	
Female	0.68	(0.65–0.71)	
Marital Status			<0.0001
Married	1.00	–	
Divorced	1.01	(0.98–1.03)	
Single	0.92	(0.89–0.96)	
Widowed	1.07	(1.01–1.14)	
Unknown	0.65	(0.52–0.80)	
OEF/OIF	0.38	(0.36–0.41)	<0.0001
Type of Pain			
Neck	1.40	(1.36–1.45)	<0.0001
Back	2.64	(2.57–2.71)	<0.0001
Arthritis	0.94	(0.92–0.96)	<0.0001
Headache	1.00	(0.96–1.04)	0.9106
Neuropathic	1.48	(1.44–1.52)	<0.0001
Psychiatric Disorders			
PTSD	1.10	(1.07–1.13)	<0.0001
Major Depression	1.53	(1.49–1.56)	<0.0001
Schizophrenia	0.83	(0.77–0.91)	<0.0001
Substance	0.95	(0.92–0.99)	0.0137