American Pain Society
RESEARCH
EDUCATION
TREATMENT
ADVOCACY
PUBLISHED BY ELSEVIER

The Journal of Pain, Vol 14, No 10 (October), 2013: pp 1158-1161
Available online at www.jpain.org and www.sciencedirect.com

Distance Traveled and Frequency of Interstate Opioid Dispensing in Opioid Shoppers and Nonshoppers

M. Soledad Cepeda,* Daniel Fife,* Yingli Yuan,† and Greg Mastrogiovanni†

*Department of Epidemiology, Janssen Research & Development, Titusville, New Jersey.
†IMS Health, Plymouth Meeting, Pennsylvania.

Abstract: **Little is known about how far opioid shoppers travel or how often they cross state lines to fill their opioid prescriptions. This retrospective cohort study evaluated these measures for opioid shoppers and nonshoppers using a large U.S. prescription database. Patients with ≥3 opioid dispensings were followed for 18 months. A subject was considered a shopper when he or she filled overlapping opioid prescriptions written by >1 prescriber at ≥3 pharmacies. A heavy shopper had ≥5 shopping episodes. Outcomes assessed were distance traveled among pharmacies and number of states visited to fill opioid prescriptions. A total of 10,910,451 subjects were included; .7% developed any shopping behavior and their prescriptions accounted for 8.6% of all opioid dispensings. Shoppers and heavy shoppers were younger than the nonshoppers. Shoppers traveled a median of 83.8 miles, heavy shoppers 199.5 miles, and nonshoppers 0 miles. Almost 20% of shoppers or heavy shoppers, but only 4% of nonshoppers, visited >1 state. Shoppers traveled greater distances and more often crossed state borders to fill opioid prescriptions than nonshoppers, and their dispensings accounted for a disproportionate number of opioid dispensings. Sharing of data among prescription-monitoring programs will likely strengthen those programs and may decrease shopping behavior.**

Perspective: ***This study shows that opioid shoppers travel greater distances and more often cross state borders to fill opioid prescriptions than nonshoppers, and their dispensings accounted for a disproportionate number of opioid dispensings. The findings support the need for data sharing among prescription-monitoring programs to deter opioid shopping behavior.***

Key words: *Opioids, opioid abuse, opioid diversion, doctor shopping, prescription-monitoring programs.*

Obtaining opioid prescriptions from multiple prescribers, known as opioid shopping, is an important method of abusing or diverting opioids[2] and is a subject of increased study. Relative to those subjects without shopping behavior, subjects with shopping behavior more often fill prescriptions for schedule II opioids, less often fill prescriptions for opioid combination products, and more often pay in cash.[3] Each shopper obtains prescriptions from a relatively small number of prescribers (typically ≤4 prescribers),[3] and the top quartile of opioid prescribers (those with more than 65 patients in their practice who are receiving opioids) prescribe opioids to 82% of all shoppers.[1] It is also recognized that the risk of opioid shopping varies with age[3,12] and the type of opioid.[4]

At present, 43 states use prescription-monitoring programs to identify and deter or prevent drug abuse and diversion and opioid shopping.[8,10] These programs are based on statewide electronic databases that collect data on opioids and other controlled substances dispensed in the state; although data sharing across states is increasing, it remains far from a common practice.

Little is known about how far opioid shoppers travel or how often they cross state lines to fill their opioid prescriptions. Therefore, the objective of this study was to evaluate these measures for opioid shoppers compared with nonshoppers.

Methods

We conducted a retrospective cohort study using an IMS LRx, a large U.S. retail prescription database. This longitudinal database covers 65% of all retail

Received February 1, 2013; Revised April 23, 2013; Accepted April 24, 2013.
M.S.C. and D.F. are employees of Janssen Research & Development, an affiliate of Janssen Pharmaceuticals, Inc, which markets several analgesic drug products, including opioids. Y.Y. and G.M. have no conflicts of interest.
Address reprint requests to M. Soledad Cepeda, MD, PhD, Director, Epidemiology, Janssen Research & Development, 1125 Trenton Harbourton Rd, Titusville, NJ 08560. E-mail: scepeda@its.jnj.com
1526-5900/$36.00

http://dx.doi.org/10.1016/j.jpain.2013.04.014

dispensing in the United States and includes all types of pharmacies—chains, food stores, mass merchandisers, and independent stores. From each of the pharmacies in the panel, the database captures all prescriptions dispensed, regardless of payment type (including cash transactions). The LRx database contains deidentified data on the subject, the pharmacy and its geographic coordinates, and the prescriber. To uniquely identify a subject who filled prescriptions at multiple pharmacies, a probabilistic multilevel match is performed using a proprietary algorithm–based on encrypted, nonidentifiable data elements that include gender, date of birth, last name, first name, address, city, state, zip code, and payer. The algorithm is designed to allow for matching in an environment where there is potential for typographical data entry error and inconsistencies while at the same time limiting the number of false positives. The matching is probabilistic because it uses algorithms and statistical analysis to determine the likelihood that 2 records match. It is multilevel because it has multiple steps. The first step looks for an exact match on all variables. In subsequent steps, 1 variable at a time is excluded, but the algorithm still requires exact matching on all other variables.

Inclusion Criteria

Subjects with ≥3 opioid dispensings (the minimum number a shopper could have; see definition below) for any type of opioid in 2008 and 18 months of follow-up time in the database were included. Each subject was followed for 18 months from the index dispensing (the first opioid dispensing in 2008). Shopping behavior was defined as a subject filling opioid prescriptions written by >1 prescriber with ≥1 day of overlap at ≥3 pharmacies. Heavy shopping behavior was defined as a subject's having ≥5 shopping episodes in the 18 months of follow-up. Such a number of shopping episodes represents unusually heavy shopping inasmuch as 90% of subjects with shopping behavior had fewer than 5 shopping episodes.[3] This definition of shopping behavior has been used in previous research and distinguishes opioids from diuretics. Subjects exposed to diuretics exhibited lower frequency of shopping behavior (0.03%) than subjects exposed to opioids (0.18%).[1-4]

Distance Calculation

The outcomes assessed were each subject's distance traveled and the number of states visited to fill opioid prescriptions.

Subjects were classified into 3 exclusive categories: nonshopper, shopper, or heavy shopper. Then, all pharmacies the subject visited to fill the opioid prescriptions during the 18 months of follow-up were used to calculate the distances traveled. For this calculation, we used the pharmacies' geographic coordinates. Two distances are reported for the 18-month follow-up period: the total miles traveled among pharmacies during the 18-month period and the maximum miles traveled among pharmacies. To calculate the total miles traveled, the distances among pharmacies were summed, and the chronological order of the pharmacy visits was taken into account. When the visits to the pharmacies occurred on the same day, the distance traveled was calculated simply by sorting the zip codes of the pharmacies from lowest to highest and then calculating the distances in that order. To calculate the maximum distance among a collection of pharmacies, we calculated all of the pairwise distances and selected the largest. If the subject visited the same pharmacy, the distance was set to 0.

In addition, the number of states visited during the follow-up period was determined. Median distances and the 25th and 75th percentiles are reported.

Results

A total of 10,910,451 subjects had ≥3 opioid dispensings; of these subjects, .7% developed any shopping behavior (0.6% developed shopping behavior and .1% developed heavy shopping behavior); see Table 1.

Shoppers and heavy shoppers were younger than the nonshoppers (Table 1). Compared with the

Table 1. Characteristics of Nonshoppers and Shoppers, Distance Traveled and Number of States Involved in Filling Opioid Prescriptions

	Nonshoppers	Shoppers*	Heavy Shoppers†
Subjects with ≥3 opioid dispensings, n (row %)	10,835,236 (99.3)	65,780 (0.6)	9,435 (0.1)
Age (mean ± SD), y	50.6 ± 17.9	45.2 ± 13.4	45.6 ± 12.0
Men (%)	4,046,435 (99.2)	27,456 (0.7)	4,158 (0.08)
Women (%)	6,729,537 (99.4)	38,262 (0.6)	5,265 (0.1)
Number of opioid dispensings (median [25th–75th])	6 (4–13)	39 (24–72)	390 (250–710)
Distance traveled (median [25th–75th]), miles	0 (0–4.3)	83.8 (34.5–287.1)	199.5 (88.2–651.6)
Maximum distance traveled (median [25th–75th]), miles	0 (0–2.6)	12.6 (5.6–47.4)	15 (6.9–77)
Number of states visited, n (column %)			
1	10,380,283 (95.8)	53,071 (80.7)	7,321 (77.6)
2	427,948 (3.9)	10,620 (16.1)	1,612 (17.1)
3	24,419 (0.2)	1,730 (2.6)	375 (4.0)
4	2,166 (0.02)	279 (0.4)	100 (1.1)
≥5	420 (0.0)	80 (0.12)	27 (0.29)

Abbreviation: SD, standard deviation.
*Subjects who filled opioid prescriptions written by >1 prescriber with ≥1 day of overlap at ≥3 pharmacies.
†Subjects with ≥5 shopping episodes in the 18 months of follow-up.

nonshoppers, the numbers of opioid dispensings for shoppers, and especially for heavy shoppers, were much higher (Table 1). Of the 119,852,870 opioid prescriptions dispensed, 91.4% were dispensed to nonshoppers, 3.1% to shoppers, and 5.5% to heavy shoppers.

Shoppers and heavy shoppers traveled greater distances to fill opioid prescriptions than nonshoppers. Shoppers traveled a median of 83.8 miles, heavy shoppers a median of 199.5 miles, and nonshoppers a median of 0 miles. The maximum distance traveled followed a similar pattern (Table 1).

Almost 20% of the shoppers or heavy shoppers visited >1 state to fill opioid prescriptions, but only 4% of nonshoppers visited >1 state (Table 1).

When analyses were restricted to subjects with the same number of dispensings, it remained true that heavy shoppers traveled farther than shoppers, and shoppers traveled farther than nonshoppers. Similarly, shoppers and heavy shoppers had opioid dispensings in more states than nonshoppers. For example, for subjects with 10 dispensings, shoppers traveled a median of 37.6 miles (25th–75th, 16.5–135.4) and nonshoppers traveled a median of 0 miles (25th–75th, 0–6.1).

Discussion

This population-based study included almost 11 million subjects exposed to opioids, and the results indicate that shoppers and heavy shoppers travel greater distances and cross state lines more often than nonshoppers.

The study may underestimate the prevalence of shopping behavior, the distance traveled, and the proportion of subjects who crossed state lines. LRx database does not have 100% coverage of all pharmacy transactions in the United States. Moreover, the probabilistic matching algorithm used to uniquely identify subjects could fail to identify 2 subjects as the same individual if a minimum number of required encrypted attributes do not match or could fail to discern a subject who presented false identification. However, no other data source will permit an assessment in the whole country or will capture cash prescriptions, which are very relevant when evaluating opioid shopping behavior.

We found that those exhibiting any type of shopping behavior filled substantially more opioid prescriptions per subject than nonshoppers. Shoppers obtained a median of 39 dispensings, and heavy shoppers obtained a median of 390 dispensings in the 18 months of observation. Therefore, it is not surprising that shoppers' and heavy shoppers' dispensings account for 8.6% of the total number of opioid dispensings despite the fact that, together, they represent only .7% of the subjects.

Shoppers often filled their opioid prescriptions in multiple states, suggesting that these subjects obtain their opioid prescriptions from prescribers in multiple states. Until 2011, state prescription-monitoring programs did not share data between states.[5,9] Currently, 10 states share prescription-monitoring data, and it is expected that such interstate data sharing will become more widespread,[5,9] which could permit the identification of subjects with shopping behavior. However, there are some states that do not have prescription-monitoring programs in place and may never find the funding to do so, and others in which participation is optional, so for these programs to be truly effective they would need to evolve into a federal program or into shared state–federal prescription-monitoring programs.[6]

Though inconsistent,[7] there is some evidence that prescription-monitoring programs decrease opioid diversion[8,13] and that opioid shopping behavior has been associated with opioid-related death.[11] The findings of the present study suggest that effective data sharing among prescription-monitoring programs may improve these programs' effectiveness in deterring opioid shopping behavior and may even decrease opioid-related deaths.

References

1. Cepeda MS, Fife D, Berlin JA, Mastrogiovanni G, Yuan Y: Characteristics of prescribers whose patients shop for opioids: Results from a cohort study. J Opioid Manag 8:285-291, 2012

2. Cepeda MS, Fife D, Chow W, Mastrogiovanni G, Henderson SC: Assessing opioid shopping behaviour: A large cohort study from a medication dispensing database in the US. Drug Saf 35:325-334, 2012

3. Cepeda MS, Fife D, Chow W, Mastrogiovanni G, Henderson SC: Opioid shopping behavior: How often, how soon, which drugs, and what payment method. J Clin Pharmacol, 2012

4. Cepeda MS, Fife D, Vo L, Mastrogiovanni G, Yuan Y: Comparison of opioid doctor shopping for tapentadol and oxycodone: A cohort study. J Pain 14:158-164, 2013

5. Fass JA, Hardigan PC: Attitudes of Florida pharmacists toward implementing a state prescription drug monitoring program for controlled substances. J Manag Care Pharm 17:430-438, 2011

6. Finklea K, Bagalman E, Sacco L: Prescription drug monitoring programs. Congressional Research Service 2013. Available at: http://www.fas.org/sgp/crs/misc/R42593.pdf

7. Gilson AM, Fishman SM, Wilsey BL, Casamalhuapa C, Baxi H: Time series analysis of California's prescription monitoring program: Impact on prescribing and multiple provider episodes. J Pain 13:103-111, 2012

8. Morgan L, Weaver M, Sayeed Z, Orr R: The use of prescription monitoring programs to reduce opioid diversion and improve patient safety. J Pain Palliat Care Pharmacother 27:4-9, 2013

9. National Association of Boards of Pharmacy: NABP PMP InterConnect. Available at: http://www.nabp.net/programs/pmp-interconnect/nabp-pmp-interconnect. Accessed April 1, 2013

10. Office of Diversion Control: State prescription drug monitoring programs. Available at: http://www.deadiversion.usdoj.gov/faq/rx_monitor.htm

11. Peirce GL, Smith MJ, Abate MA, Halverson J: Doctor and pharmacy shopping for controlled substances. Med Care 50:494-500, 2012

12. Wilsey BL, Fishman SM, Gilson AM, Casamalhuapa C, Baxi H, Zhang H, Li CS: Profiling multiple provider prescribing of opioids, benzodiazepines, stimulants, and anorectics. Drug Alcohol Depend 112:99-106, 2010

13. Worley J: Prescription drug monitoring programs, a response to doctor shopping: Purpose, effectiveness, and directions for future research. Issues Ment Health Nurs 33: 319-328, 2012