

## Doctor shopping for medications used in the treatment of attention deficit hyperactivity disorder: shoppers often pay in cash and cross state lines

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### Abstract

**Background:** Doctor shopping, defined by filling overlapping prescriptions from more than one prescriber at more than two pharmacies, is a way to obtain scheduled medications for diversion or abuse. Little is known about how far attention deficit hyperactivity disorder (ADHD) medication shoppers travel, how often they cross state lines to fill their ADHD prescriptions and how often they pay for their medication in cash, i.e. entirely out of pocket. **Objective:** We sought to describe the pattern of doctor shopping for ADHD medications: how far shoppers travel, how often they cross state lines to fill their prescriptions, and how often they pay in cash. **Methods:** Retrospective cohort study using LRx, a large US retail prescription database. We included subjects with any ADHD medication dispensed between 2011 and 2012. Subjects were followed for 18 months. **Results:** Of a total of 4402464 subjects exposed to ADHD medications, 0.4% developed shopping behavior. Women were more likely to become shoppers. Shoppers travelled a median of 91.9 miles and non-shoppers 0.2 miles to fill their ADHD prescriptions. Almost 28% of the shoppers filled prescriptions in >1 state compared with 4.3% of non-shoppers. Of the shoppers, 27.3% paid at least one prescription in cash compared to 14.4% of the non-shoppers. **Conclusions:** Shoppers travelled larger distances, visited more states and paid in cash for ADHD medications more often than non-shoppers. Data sharing among prescriptions monitoring programs can improve their effectiveness and drug utilization studies should take account of cash purchases.

### Keywords

Abuse, ADHD medications, diversion, shopping behavior

### History

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### Introduction

Obtaining medications with potential for abuse such as attention deficit hyperactivity disorder (ADHD) drugs or opioids from multiple prescribers, is a way to obtain scheduled medications for diversion or abuse (1,2). This behavior is called doctor shopping.

ADHD shopping behavior has been previously defined as overlapping prescriptions by different prescribers and filled at more than two pharmacies (2). This definition differentiates subjects exposed to ADHD medications from subjects exposed to asthma medications (the behavior is four times more frequent in subjects on ADHD medications than in subjects on asthma medications) and is identical to a definition for opioid shopping behavior, which differentiates subjects exposed to opioids (0.18% meet the definition) from subjects exposed to diuretics (0.03% meet the definition) (1). This definition has also been associated with a diagnosis of opioid abuse and can distinguish between opioids with

different risks of abuse (3,4). An inference from these findings would be that the above definition of shopping behavior is a marker for abuse or diversion of ADHD medications.

Information about the patterns of shopping behavior may be useful for the design or improvement of programs to prevent abuse and diversion. For example, prescription monitoring programs collect data on controlled substances such as ADHD medications and opioids dispensed in the state in order to identify and deter drug abuse and shopping behavior (5,6), but these programs are based on statewide electronic databases. Examination of patterns of shopping for opioids indicate that 20% of opioid shoppers in the US cross state lines (7) to purchase opioids, and this has obvious implications for the need to link such registries. In contrast, little is known about how far ADHD medication shoppers travel, how often they cross state lines to fill their ADHD prescriptions and how often they pay for their medication in cash. Establishing that, like shopping for opioids, shopping for ADHD medications frequently crosses state lines would provide further support for sharing prescription monitoring program data across states and thus would increase the effectiveness of these programs for identifying and deterring

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doctor shopping and abuse of ADHD medications. The objective of this study was to evaluate these features of ADHD medication shoppers compared with non-shoppers.

## Methods

We conducted a retrospective cohort study using an IMS LRx, a large US retail prescription database. This longitudinal database covers 65% of all retail dispensing of prescription medications in the United States and includes all types of pharmacies – chains, food stores, mass merchandisers, and independent stores. The database captures all prescriptions dispensed, regardless of payment type (including cash transactions) from each of the participating pharmacies.

The LRx database contains de-identified data on the subject (i.e. the patient prescribed the medication), the pharmacy and its geographic coordinates, and the prescriber. To uniquely identify a subject who filled prescriptions at multiple pharmacies, a probabilistic multi-level match is performed using a proprietary IMS algorithm based on encrypted, non-identifiable data elements that include gender, date of birth, last name, first name, address, city, state, zip code, and payer.

## Inclusion criteria

We included all subjects with dispensing of at least one ADHD medication between 1 February 2011 and 31 January 2012 who had data available for at least 4 months prior to the first dispensing (index date), and whose pharmacies consistently supplied data to the LRx database during the entire study period. The medications included were the ones currently approved by the FDA for the treatment of ADHD: amphetamine, atomoxetine, clonidine, dexamethylphenidate, dextroamphetamine, guanfacine, lisdexamfetamine, methamphetamine, and methylphenidate.

Shopping behavior was defined as a subject filling ADHD prescriptions written by more than one prescriber with at least one day of overlap day of overlap at more than two pharmacies. We also defined heavy shopping behavior as a subject having  $\geq 5$  shopping episodes in the 18 months of follow-up. Such a number of shopping behavior episodes represents unusually heavy shopping in that as many as 88% of subjects with ADHD shopping behavior had fewer than 5 shopping episodes (2). We therefore defined three mutually exclusive categories: Non-shoppers, shoppers with 1–4 shopping episodes, and heavy shoppers (with  $\geq 5$  shopping episodes). Outcomes assessed in this study were each subject's distance travelled, the number of states visited to fill ADHD medication prescriptions, and the type of payment. The sex and age of subjects, and the total number of ADHD-medication dispensings over an 18-month period were also tabulated.

## Distance calculation

All pharmacies a given subject visited to fill the ADHD prescriptions during the 18 months of follow-up were used to calculate the distance travelled. Using the pharmacies' geographic coordinates, we calculated the total miles travelled by summing the distances between pharmacies. In doing this, we respected the chronological order of the pharmacy visits.

When the visits to more than one pharmacy occurred on the same day, the distance travelled was calculated by sorting the zip codes of the pharmacies from lowest to highest and then calculating the distances in that order. When the same pharmacy was visited twice in a row, the distance travelled for these two visits was zero. Median distances and the 25th and 75th percentiles are reported. In addition, the number of states visited during the follow-up period was determined.

## Cash payment

To ascertain type of payment, we identified all shoppers (shopper or heavy shopper) and non-shoppers and determined the proportion of subjects who paid the full price of the prescription, not just a copayment, entirely out of pocket

## Statistical tests

To compare the non-shoppers with shoppers and the non-shoppers with heavy shoppers, we used Chi-squared tests for differences in gender and cash payment, and Kruskal-Wallis tests, a non-parametric test, for differences in distance traveled and number of states visited.

## Results

A total of 4 402 464 subjects were dispensed at least one ADHD medication, 0.45% developed any type of shopping behavior (0.4% developed shopping behavior, and 0.05% developed heavy shopping behavior). Women were more likely than men to become shoppers or heavy shoppers, see Table 1.

Either type of shoppers travelled greater distances to fill ADHD prescriptions than non-shoppers. Shoppers travelled a median of 91.9 miles, heavy shoppers a median of 333.2 miles, and non-shoppers a median of 0.2 miles (Table 1).

ADHD medication shoppers were more likely to visit  $>1$  state to fill the ADHD prescriptions. Almost 28% of the shoppers and almost 43% of heavy shoppers visited  $>1$  state to fill ADHD prescriptions compared with only 4.3% of non-shoppers (Table 1).

Of the 18 130 subjects who exhibited ADHD shopping or heavy shopping behavior, 27.3% paid in cash for at least one ADHD medication prescription compared to 14.4% of the non-shoppers ( $p < 0.0001$ ).

## Discussion

This population-based study included more than 4 million subjects exposed to ADHD medications. It found that subjects who exhibited shopping behavior more often paid in cash than non-shoppers, travelled greater distances and crossed state lines to obtain ADHD prescriptions more often than non-shoppers. These differences were even more pronounced in heavy shoppers who travelled further and were more likely to visit two or more states to fill their prescriptions.

Because shoppers often filled their opioid prescriptions in multiple states, the effectiveness of prescription monitoring programs would be improved if state programs consistently shared data. Data sharing across states' prescription monitoring programs, although increasing, remains far from a common practice. In 2011, 11 states exchanged prescription

Table 1. Characteristics of non-shoppers and ADHD medication shoppers, distance travelled and number of states involved in filling opioid prescriptions.

	Non-shoppers	Shoppers <sup>a</sup>	Heavy shoppers <sup>b</sup>
Subjects, <i>n</i> (row %)	4 384 334 (99.6)	15 996 (0.4)	2134 (0.05)
Age (mean ± SD), <i>y</i>	24.1 ± 16.2	26.4 ± 14.7	32.8 ± 13.6
Men (%) <sup>#</sup>	2 458 312 (56.1)	8364 (52.3)	959 (44.9)
Women (%)	1 926 022 (43.9)	7632 (47.7)	1175 (55.1)
Number of ADHD medication dispensings (median [25th–75th])	11 (6–17)	24 (18–32)	36 (29–44)
Distance travelled (median [25th–75th]), miles <sup>#</sup>	0.2 (0–12.5)	91.9 (36.2–482.3)	333.2 (118.9–4146)
Number of states visited <sup>#</sup> , <i>n</i> (column %)			
1	4 197 667 (95.7)	11 616 (72.6)	1220 (57.2)
2	174 055 (4.0)	3624 (22.7)	622 (29.1)
3	11 353 (0.3)	641 (4.0)	241 (11.3)
4	1052 (0.0)	91 (0.6)	45 (2.1)
≥5	207(0.0)	24 (0.1)	6 (0.3)

SD, standard deviation; <sup>a</sup>Subjects who filled opioid prescriptions written by more than one prescriber with at least one day of overlap at more than two pharmacies; <sup>b</sup>Subjects with ≥5 shopping episodes in the 18 months of follow-up; <sup>#</sup>The difference between shoppers and non-shoppers, and the difference between heavy shoppers and non-shoppers is significant,  $p \leq 0.0001$ .

data. Three years later, 21 states do so. (8,9). However, some states do not have prescription monitoring programs in place or they are not operational (10) and may never find the funding to do so. For prescription monitoring programs to be truly effective, they may need to evolve into a federal program or into shared state-federal prescription monitoring programs (11).

We found that women were more likely to become shoppers for ADHD medications than men. This finding is in opposition to findings for other drugs prone to abuse such as opioids. Opioid shoppers are more likely to be men than women (3). The effect of gender on the risk of misuse or abuse of ADHD medications is not clear (12). Other researchers have found that women are more likely to overuse and abuse ADHD medications (13,14). A potential reason for this gender difference could be that many ADHD medications are believed to cause weight loss.

ADHD medication shopping behavior is not common, the prevalence observed in the present study was <1%. This finding is also supported by the results from the 2012 National Survey on Drug Use and Health, which indicate more than one half of the nonmedical users of pain relievers and stimulants, aged 12 or older got the prescription drugs they most recently used “from a friend or relative for free.” About 4 in 5 of these nonmedical users who obtained prescription drugs from a friend or relative for free indicated that their friend or relative had obtained the drugs from one doctor (15).

The limitations of the present study include the fact that it is likely to underestimate the prevalence of ADHD medication shopping behavior, the distance travelled and the proportion of subjects who cross state lines to obtain ADHD medications. Reasons for this include: First, the study’s definition of shopping sought to avoid false positives, at the risk of not capturing all the behavior of interest. Second, the LRx database does not have 100% coverage of all pharmacy transactions in the United States. Third, the study included all ADHD medications, stimulants or not, and, non-stimulants may be less desired by subjects on these medications. And, fourth, the probabilistic matching algorithm used to uniquely identify subjects could have failed to identify two

subjects as the same individual if a minimum number of required encrypted attributes did not match or could have failed to discern a subject who presented false identification.

The strengths include first, the fact that the study used a definition of shopping that was validated in the context of opioid abuse and diversion. Second, this definition has been shown to differentiate ADHD medications, which are known to be subject to substantial abuse from asthma medications, which are not subject to abuse. Third, the study used a large database that was not limited by state or local boundaries (and thus could better assess travel patterns), and captured payment in cash, which represents a substantial proportion of the transactions of interest.

In summary, all shoppers travel larger distances and cross state lines more often than non-shoppers. All shoppers also often pay for the medication in cash. Data sharing among prescriptions monitoring programs can improve their effectiveness and drug utilization studies should take account of cash purchases.

## Declaration of interest

MSC, DF, JB and AF are employees of Janssen Research and Development, LLC, which is an affiliate of Janssen Pharmaceuticals, Inc., which markets CONCERTA<sup>®</sup> brand methylphenidate HCl, an ADHD medication. The other authors report no conflicts of interest. The authors alone are responsible for the content and writing of this paper.

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