Availability and Variation of Publicly Reported Prescription Drug Prices

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s Americans are asked to pay a larger portion of their healthcare costs,¹ there are mounting calls to make healthcare prices more transparent to consumers.² In response, many state governments now publicly report prices for healthcare services, such as prescription drugs, to consumers.³-5 Prescription drugs are a particularly good candidate for such consumer reporting because they can be expensive, represent recurring out-of-pocket (OOP) costs,6 and are equivalent across pharmacies, unlike other medical services in which prices could vary based on quality. Consumers who are enrolled in high-deductible health plans (HDHPs) or who are uninsured often pay retail prices for prescription drugs.6 Therefore, providing price information could help them reduce their OOP expenditures.78 and enhance their access and adherence to needed medications.9-11

Although at least 9 states now publicly report prescription drug prices, 3 little is known about the information that is being reported on these states' websites. The objectives of this study were to: 1) determine how often prices for commonly prescribed medications are available on state public reporting websites, 2) quantify the variability of retail prices for selected medications on these websites, and 3) identify zip code-level factors associated with greater price variability.

METHODS

Data Collection

We conducted a systematic search of state government prescription drug price websites in Michigan, Missouri, New York, and Pennsylvania (available in the **eAppendix** [eAppendices available at **ajmc.com**]). Each of these state reporting websites obtained retail prices¹² for commonly prescribed drugs from Medicaid claims and permitted searches for retail prices for a 30-day supply of these drugs within a 5-mile radius of the centroid of each zip code in that state.

The criteria we used to identify medications for which we searched retail prices on these 4 state websites included: 1) the

ABSTRACT

OBJECTIVES: To examine how often retail prices for prescription drugs are available on state public reporting websites, the variability of these reported prices, and zip code characteristics associated with greater price variation.

STUDY DESIGN: Searches of state government-operated websites in Michigan, Missouri, New York, and Pennsylvania for retail prices for Advair Diskus (250/50 fluticasone propionate/salmeterol), Lyrica (pregabalin 50 mg), Nasonex (mometasone 50 mcg nasal spray), Spiriva (tiotropium 18 mcg cp-handihaler), Zetia (ezetimibe 10 mg), atorvastatin 20 mg, and metoprolol 50 mg.

METHODS: Data were collected for a 25% random sample of 1330 zip codes. For zip codes with at least 1 pharmacy, we used χ^2 tests to compare how often prices were reported. For zip codes with at least 2 reported prices, we used Kruskal-Wallis tests to compare the median difference between the highest and lowest prices and a generalized linear model to identify zip code characteristics associated with greater price variation.

RESULTS: Price availability varied significantly (P < .001) across states and drugs, ranging from 52% for metoprolol in Michigan to 1% for atorvastatin in Michigan. Price variation also varied significantly (P < .001) across states and drugs, ranging from a median of \$159 for atorvastatin in Pennsylvania to a median of \$24 for Nasonex in Missouri. The mean price variation was \$52 greater (P < .001) for densely populated zip codes and \$60 greater (P < .001) for zip codes with mostly nonwhite residents.

CONCLUSIONS: Publicly reported information on state prescription drug price websites is often deficient. When prices are reported, there can be significant variation in the prices of prescriptions, which could translate into substantial savings for consumers who pay out-of-pocket for prescription drugs.

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medications had to be listed on the drugs.com list of the 100 most commonly prescribed medications in the United States, ¹³ 2) retail prices for a 30-day supply of a typical dose of the most common form of the medications had to be listed on all 4 websites, and 3) the medications had to be recognized as generally used for chronic, rather than acute, conditions. Seven prescription medications met these criteria at the time of our study: 5 as brand name only—Advair, Lyrica, Nasonex,

Spiriva, and Zetia—and 2 generics, atorvastatin and metoprolol (see "Study Design" section for dosage and delivery).

We used both brand and generic names to search for retail prices for a 30-day supply of each medication at pharmacies within 5 miles of the centroids of a random sample of 25% of the zip codes in each state. For each medication search conducted within a specific zip code, we recorded: 1) the number of pharmacies listed, 2) whether retail prices for the medication were reported, and 3) the highest and lowest prices quoted when prices were reported for a specific medication. All data were collected between July 2014 and March 2015.

Data Analysis

For searches in which at least 1 pharmacy was listed, we used χ^2 tests to compare how often the listed pharmacies reported prices, both across medications within each state and across the states included in the study, for each medication. For this analysis, we examined data from only Michigan and Missouri, which reported the number of pharmacies within 5 miles of each zip code centroid, regardless of whether any prices for a medication were reported. We excluded data from New York and Pennsylvania, which reported the number of pharmacies within 5 miles of each zip code centroid only when prices for a medication were reported.

To evaluate price variation among searches in which at least 2 prices for each drug were reported, we used Kruskal-Wallis tests to compare the median difference in US dollars between the highest and lowest reported prices, and the median percent variation in price, which we defined as ([highest price – lowest price]/[lowest price]) × 100. To determine which zip code-level factors were associated with greater variation in reported prices, we merged 2010 US Census zip code tabulation-area data on population density, median household income, median age, and the proportion of residents identified as minorities.14 For zip codes in which at least 2 prices for a drug were reported, we estimated a generalized linear model with a log link in which the dependent variable was the difference between the highest and lowest reported prices. The key independent variables were zip code population density, percentage of nonwhite residents, median age, and median household income. We also controlled for medication type, state, and number of reporting pharmacies.

TAKEAWAY POINTS

Across state government websites reporting retail prices for medications commonly prescribed for chronic conditions, price information is often deficient. However, when retail prices for prescription medications are publicly reported, these prices vary significantly.

- > This is the first study to document variation in publicly reported retail prices for prescription medications across different classes and different states.
- ➤ More consistent reporting of such prices could potentially yield substantial savings for consumers who face high out-of-pocket expenditures.
- Policy makers should work to ensure retail prices for prescription drugs are reported consistently and strive to develop new strategies to facilitate consumers' use of this information.

RESULTS

Availability of Prices

We found substantial variation in the availability of retail prices for zip codes with at least 1 pharmacy (P < .001) across medications within each state and across states for each medication), ranging from 52% of zip codes reporting at least 1 retail price for metoprolol in Michigan to 1% for atorvastatin in Michigan (data not shown).

Variation in Prices

For zip codes in which at least 2 pharmacies reported retail prices for a drug, there was significant variation in the median difference between the highest and lowest reported retail prices, as well as the median percent variation in price (P < .001 both across medications within each state and across states for each medication). The median price variation ranged from \$159 (interquartile range [IQR] = \$113-\$186) for atorvastatin in Pennsylvania to \$24 (IQR = \$15-\$54) for Nasonex in Missouri. The median percent variation ranged from 974% (IQR = 355%-1419%) for metoprolol in New York to 11% (IQR = 6%-36%) for Advair in Missouri (Table 1).

Factors Associated with Greater Price Variation

When at least 2 prices were reported for a drug in a zip code, the mean differences between the highest and lowest reported retail prices were \$52 greater (95% CI, \$39-\$66; P <.001) for more densely populated zip codes, \$60 greater (95% CI, \$37-\$83; (P <.001) for zip codes with mostly nonwhite residents, and \$1 less for each 1-year increase in zip code median age (95% CI, -\$1.70 to -\$0.08; P = .03) (**Table 2**). The full model coefficients are shown in the **eAppendix Table**.

DISCUSSION

Across 4 state government websites reporting retail prices for 7 medications commonly prescribed for chronic conditions, price information is often lacking. However, when retail prices for prescription medications were publicly reported, these prices varied significantly. Although other studies have examined variation in prices of a certain class of medications¹⁵⁻¹⁷ or in a particular

TRENDS FROM THE FIELD

TABLE 1. Retail Price Variations on 4 State Prescription Drug Price Websites

		State											
	Michigana			Missouria			New York ^a			Pennsylvania ^a			
Drug	n⁵	Median US\$ (IQR) ^c	Median % (IQR)4	n⁵	Median US\$ (IQR) ^c	Median % (IQR) ^d	n⁵	Median US\$ (IQR) ^c	Median % (IQR) ^d	n ^b	Median US\$ (IQR) ^c	Median % (IQR) ^d	
Advaire	123	66 (47-144)	20 (14-48)	87	36 (18-101)	11 (6-36)	281	115 (70-163)	45 (25-67)	359	65 (47-111)	21 (14-36)	
Atorvastatine	0	N/A	N/A	89	153 (92-183)	520 (188-1184)	303	88 (52-159)	60 (31-122)	350	159 (113-186)	496 (175-767)	
Lyrica ^e	104	101 (55-132)	33 (19-49)	58	47 (26-91)	16 (9-31)	216	74 (47-99)	41 (23-53)	180	46 (19-80)	15 (6-28)	
Metoprolol ^e	116	39 (20-65)	842 (442-1327)	88	38 (26-41)	792 (196-990)	293	39 (33-55)	974 (355-1419)	341	35 (20-40)	817 (234-983)	
Nasonexe	104	50 (26-64)	26 (13-35)	86	24 (15-54)	13 (7-32)	305	64 (44-74)	49 (32-60)	313	44 (28-75)	22 (13-40)	
Spirivae	115	69 (53-108)	22 (16-34)	79	40 (17-73)	12 (5-22)	311	114 (64-259)	41 (23-97)	364	71 (38-120)	21 (11-37)	
Zetia ^e	60	31 (16-45)	14 (6-20)	42	29 (13-216)	13 (6-503)	274	69 (40-99)	48 (25-76)	342	54 (32-79)	23 (12-36)	

IQR indicates interquartile range; N/A, not available.

geographic area, ¹⁸⁻²⁰ ours is the first study to document variation in publicly reported retail prices for prescription medications across different classes and different states.

From our searches in Michigan and Missouri, we found prices for medications were not reported for many zip codes in which there were pharmacies. Other research has illuminated the lack of availability of medications at pharmacies in a certain geographic area, ^{18,21} but we searched for prices of some of the most commonly prescribed medications in the United States and it is unlikely that these medications were truly unavailable at pharmacies. It is unclear why prices were not reported in these cases, but other studies have shown inconsistent availability of price information for other health services. ²²⁻²⁴ The causes of such deficiencies should be examined and remedied to make price information consistently available to consumers—a prerequisite for increasing the use of price information. ^{25,26}

When retail prices for prescription drugs were reported, we found substantial variation across all states and drugs we studied. These price variations comported with the findings of studies that reported high variability in prices both for medications representing a certain class ¹⁵⁻¹⁷ or a specific geographic area ¹⁸⁻²⁰ and in prices for other health services, such as imaging ²⁷ and laboratory studies. ²⁸ Variations in prices for prescription medications may be attributed to an array of factors, including differences in pharmacies' payer

mix and reimbursement levels, product costs, and discretion over pricing decisions. $^{\!\!\!\!\!\!\!\!^{29}}$

Regardless of their origins, large variations in retail prices for medications could potentially translate into large OOP savings for consumers who use this information to find a more affordable pharmacy. For example, the median price variation for a monthly supply of Lyrica was \$74 inNew York (Table 1), meaning consumers who switch from paying for this medication OOP at the highest-cost pharmacy in their zip code to the lowest-cost pharmacy could potentially save up to \$888 annually.

The extent to which this publicly reported price information could translate into OOP savings for consumers is unknown and requires further study. Yet, other initiatives to make healthcare prices more transparent and increase consumer use of price information have shown such efforts can indeed yield meaningful savings for consumers.^{7,8}

In regression analyses, we found these price variations were greater in zip codes that represented more densely populated areas or had mostly nonwhite residents. This information could be used by policy makers to target outreach to communities where consumers could anticipate greater savings from using publicly reported retail prices.

Finally, any effort to help consumers take advantage of these price variations must concede that despite growth in price

P < .001 from Kruskal-Wallis tests to compare the median price variation (both US\$ and %) across all 7 drugs in the state.

^bN = the number of zip codes for which at least 2 prices were reported for each drug.

Among zip code-drug combinations for which at least 2 prices were reported, we defined price variation in US\$ as the difference between the highest and lowest reported prices.

Among zip code-drug combinations for which at least 2 prices were reported, we defined percent price variation as the [[highest price – lowest price]/[lowest price]] × 100.

eP <.001 from Kruskal-Wallis tests to compare the median price variation (both US\$ and %) for the drug across all 4 states.

TABLE 2. Zip Code Characteristics Associated With Larger Variations in Publicly Reported Retail Prices for Prescription Drugs

	Mean Price Variation in US\$ (95% CI) ^a	P
Higher population density ^b	52.45 (38.91-65.99)	<.001
Majority nonwhite residents	59.80 (36.54-83.05)	<.001
Median age, years	-0.89 (-1.70 to -0.08)	.03
Lower median household income	1.05 (-11.00 to 13.11)	.86

CI indicates confidence interval

transparency initiatives, 3,30 consumer use of price information remains low. An April 2015 Kaiser Health tracking poll found that fewer than 1 in 10 Americans reported seeing price comparison information for hospitals or doctors in the last year and that fewer than half of these individuals used this information when making healthcare decisions.²⁵ An earlier survey found that 6% of Americans tried to determine the price they or their insurer would incur for a medical service, but less than half of these consumers compared prices from multiple providers.31 Most recently, the results of another survey showed Americans in HDHPs were no more likely than individuals in traditional plans to compare prices when seeking care.³² These data suggest that simply improving the comprehensiveness and consistency of publicly reporting prices does not translate to lower consumer OOP expenditures without pairing these enhancements with efforts to help consumers use such information when making healthcare decisions.

Limitations

To ensure comparability across medications and states, we limited our data collection to 7 medications for which prices were publicly reported in 4 states; however, these findings may not apply to all states or medications. Our estimate of price variation for each zip code was an upper bound, which would only translate into large OOP savings for consumers who switched from a higher cost pharmacy to a lower cost pharmacy. Our examination of zip codelevel factors associated with greater price variability was limited to the factors that were in the zip code tabulation-area data we derived from the 2010 US Census. The price data we collected does not account for discounts that may apply at the point of sale and could impact the overall variability in prices. Such discounts were integrated into medication prices reported by GoodRx, a national website and smartphone app that allows consumers to view medication prices, coupons, discounts, and savings tips at nearby pharmacies. Because we did not collect data on the types

of pharmacies reporting prices, we are unable to identify the characteristics of pharmacies associated with lower prices. Future research should examine how prices for prescription medications vary by type of pharmacy (eg, independent, chain, and discount).

CONCLUSIONS

Our study demonstrated that public reporting of retail prices for commonly prescribed prescription drugs was often incomplete. More consistent reporting of such prices could yield substantial savings for consumers who face high OOP expenditures. Policy makers should work to ensure retail prices for prescription drugs are reported comprehensively and consistently in order to develop new strategies to facilitate consumers' use of this information.

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^aMarginal effects obtained from generalized linear model with log link, controlling for drug, state, and number of pharmacies reported for zip code. Standard errors clustered by zip code.

^bReference group is the lower 50th percentile of zip code population density for the sample.

^{*}Zip codes where most residents were nonwhite.

⁴Reference group is the upper 50th percentile of zip code median household income for the sample.

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Full text and PDF at www.ajmc.com

eAppendix

State Websites:

Michigan http://www.michigandrugprices.com/

Missouri http://www.morxcompare.com/MoRxPriceCompare/Default.aspx

New York https://apps.health.ny.gov/pdpw/SearchDrugs/Home.action

Pennsylvania http://www.parxpricefinder.com/

Table. Generalized Linear Model Coefficients $(n = 5383)^a$

Independent Variable	Coefficient	95% CI	P
State – Michigan	-0.04	-0.20 to 0.12	.65
State – Missouri	-0.15	-0.33 to 0.03	.11
State – New York	-0.18	-0.27 to -0.10	<.001
Advair	0.96	0.89-1.02	<.001
Lyrica	0.69	0.61-0.77	<.001
Atorvastatin	1.08	1.02-1.14	<.001
Nasonex	0.41	0.35-0.48	<.001
Spiriva	1.22	1.10-1.34	<.001
Zetia	0.41	0.35-0.47	<.001
Number of pharmacies reporting prices	0.01	0.01-0.01	<.001
Majority nonwhite population	0.47	0.30-0.65	<.001
Lower median household income	0.01	-0.09 to 0.10	.86
Higher population density	0.42	-0.52 to -0.32	<.001
Median age	-0.01	-0.01 to 0.00	.03
Missing population information	-0.14	-0.41 to 0.14	.34
Constant	3.89	3.61-4.18	<.001

CI indicates confidence interval.

^aN = 5383 zip code–drug combinations for which at least 2 prices were reported.