

The Price May Not Be Right: The Value of Comparison Shopping for Prescription Drugs

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Consumers typically know the price of a product and have some information about its quality before purchasing. This information makes comparison shopping possible and is a key tenet of well-functioning markets. However, health-care markets are different. Patients rarely know the price of a medical product or service before using it and sometimes even after the service is provided.

A lack of price transparency and difficulty in assessing its quality are the likely key reasons the price of medical care varies so widely. A primary care doctor visit in San Francisco (\$251) is twice as expensive as in Miami (\$95), and a lipid panel in Pittsburgh (\$19) is one-fourth of the price in Indianapolis (\$89), which is just a fraction of the cost in Dallas (\$343). Even within the same market, New Yorkers seeking magnetic resonance imaging (MRI) can pay anywhere between \$416 and \$4527 for the same service.¹

Although millions of Americans gained coverage through the Affordable Care Act (ACA), more than 32 million consumers remain uninsured and exposed to the full cost of services.² Many of the uninsured are low-income consumers, who lack coverage as a result of states' decisions not to expand Medicaid under the ACA. In addition, an increasing number of Americans are enrolled in health plans with high annual deductibles and face potentially high out-of-pocket costs. Four of 5 workers who now receive insurance through an employer pay a deductible, and 1 in 5 faces a deductible of \$2000 or more.³ Plan members can purchase covered medications at a negotiated rate that might not vary much across in-network pharmacies; however, the plan's negotiated price can be significantly greater than what consumers would pay using a store's proprietary discount card or with online coupons. As such, both the uninsured and an increasing number of insured consumers have incentives to use price information and discount programs to comparison shop for their prescription medications.

Several states have passed laws and private-sector initiatives are underway to encourage or require greater price transparency for medical services.⁴ Recent work suggests that providing employees with price information is associated with lower total claims

ABSTRACT

OBJECTIVES: To measure variations in drug prices across and within zip codes that may reveal simple strategies to improve patients' access to prescribed medications.

STUDY DESIGN: We compared drug prices at different types of pharmacies across and within local markets. In-store prices were compared with a Web-based service providing discount coupons for prescription medications. Prices were collected for 2 generic antibiotics because most patients have limited experience with them and are less likely to know the price ranges for them.

METHODS: Drug prices were obtained via telephone from 528 pharmacies in Los Angeles (LA) County, California, from July to August 2014. Online prices were collected from GoodRx, a popular Web-based service that aggregates available discounts and directly negotiates with retail outlets.

RESULTS: Drug prices found at independent pharmacies and by using discount coupons available online were lower on average than at grocery, big-box, or chain drug stores for 2 widely prescribed antibiotics. The lowest-price prescription was offered at a grocery, big-box, or chain drug store in 6% of zip codes within the LA County area. Drug prices varied dramatically within a zip code, however, and were less expensive in lower-income areas. The average price difference within a zip code was \$52 for levofloxacin and \$17 for azithromycin.

CONCLUSIONS: Price shopping for medications within a small geographic area can yield considerable cost savings for the uninsured and consumers in high-deductible health plans with high negotiated prices. Clinicians and patient advocates have an incentive to convey this information to patients to improve adherence to prescribed medicines and lower the financial burden of purchasing prescription drugs.

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payments for common medical services.⁵ In this paper, we examined the potential benefit of comparison shopping for prescription drug prices and pharmacy characteristics that patients should consider when shopping for medications. Prescription drugs provide a good test case because, unlike most medical services, the quality of the product is constant across providers, making it easy for patients to comparison shop. Further, the market for prescription drugs is generally local: the majority of Americans live within 5 miles of a pharmacy and about 80% of the population uses only 1 pharmacy for outpatient prescriptions.⁶ We compared drug prices from different types of pharmacies (ie, chain drug stores, independent pharmacies, grocery stores, big-box stores) within local markets and described how they compare with the prices of Web-based services offering discount coupons for prescription medications. We measured the extent to which prices vary within a zip code and whether drug prices vary in high- versus low-income areas. The extent of price variation within a market is an implicit measure of the benefit of price shopping and may reveal simple strategies that health plans and providers can use to help patients access prescribed medications.

METHODS

We conducted a cross-sectional analysis of drug prices from July to August 2014 from all outpatient prescription drug outlets in a selected set of zip codes in Los Angeles (LA) County. We focused on the prices of 2 commonly prescribed generic antibiotics for community-acquired pneumonia: levofloxacin and azithromycin. They are relatively equally prescribed and can be used as substitutes for each other in most areas. We purposely selected medications used for an acute medical condition because patients typically have limited experience with them and are less likely to know the range of prices for these products. Further, the consequences of not filling medications for acute infections, such as pneumonia, may lead to sepsis, resulting in otherwise preventable hospitalizations, increased healthcare costs, and greater risk of mortality. The acute nature of their use and limited time to price shop after diagnosis may result in greater price variation than for chronic medications, although there is limited evidence on this point.⁷

We used the American Community Survey to obtain zip code-level measures of population and median household income for LA County. As low-density areas have few pharmacies, we restricted the study sample to zip codes with at least 10,000 residents. We ranked the 164 remaining zip codes by median household income and selected the top (high-income) and bottom (low-income) quartiles for inclusion.

TAKEAWAY POINTS

The high costs of prescription drugs and lack of price transparency suggest that many patients might be overpaying for medications. We found that:

- ▶ Drug prices were lowest at independent pharmacies and when using online coupons compared with grocery, big-box, or chain drug stores.
- ▶ The average price difference within a zip code was \$52 for levofloxacin and \$17 for azithromycin.
- ▶ Medications were less expensive when purchased in lower-income areas.

Clinicians and patient advocates have an incentive to convey this information to their patients or members to improve adherence to prescribed medicines and lower the financial burden of purchasing prescription drugs.

We obtained a complete list of pharmacies operating in these 82 zip codes from the California Board of Pharmacy. We excluded hospital-based pharmacies and membership clubs (eg, Sam's Club, Costco) and categorized outpatient pharmacies in the following way: chain drug store (eg, CVS), independent pharmacy, grocery store (eg, Safeway), or big-box store (eg, Target). Prices at these pharmacies were obtained via telephone. Three trained research assistants (RAs) called all pharmacies on the list over a 1-month period from July to August 2014. They followed a standardized script informing pharmacy staff that they were calling from LA County Hospital on behalf of a hypothetical uninsured patient with pneumonia.

They then requested quotes for the cash prices for the generic forms of 7 tablets of 500-mg levofloxacin and 6 tablets of 250-mg azithromycin. Once a price was given, they asked about any available discounts that could lower the price of the drug (ie, "discounted price.") If there was no answer, the pharmacy staff was too busy to run a price check, or the RA was put on hold for more than 10 minutes, the RA would call back every hour with the same request until 5 PM that day and then resume hourly calls the next day at 8 AM. Phone prices for both medications were recorded on a standardized data collection sheet.

Given the growth in internet use and online purchases of prescription drugs, we simultaneously collected prices for the 2 medications obtained at the same set of pharmacies from GoodRx, a popular Web-based service that aggregates available discounts and directly negotiates with retail outlets to provide consumers with coupons for discounted drug prices. Patients can enter a medication name and zip code and the website will list prices at most pharmacies operating in or near that zip code. To test the acceptance of the GoodRx coupons, we physically presented them at 5% of the pharmacies to ensure their prices would be honored. The study protocol was reviewed by the University of Southern California's institutional review board prior to initiation. We examined the distribution of discounted drug prices by pharmacy type, as well as the extent of price variation in high- versus low-income areas, and then explored how prices varied across pharmacies in the same zip code. Given that most individuals purchase

TABLE 1. Variation in Drug Prices by Pharmacy Type

Drug	Pharmacy Type				
	Big-Box	Chain	Grocery Store	Independent	GoodRx
Levofloxacin	(n = 39)	(n = 170)	(n = 49)	(n = 270)	(n = 518) ^a
Mean price, \$	59	101	66	28	21
Minimum, \$	7	9	9	4	8
Maximum, \$	174	229	189	197	61
25th percentile	37	103	49	14	11
Median, \$	38	104	50	18	16
75th percentile	80	108	94	28	31
Interquartile ^b	2.16	1.05	1.92	2.00	2.82
Azithromycin	(n = 39)	(n = 170)	(n = 48)	(n = 271)	(n = 528)
Mean price, \$	25	37	26	23	20
Minimum, \$	11	12	4	2	10
Maximum, \$	40	124	46	134	26
25th percentile	22	38	10	15	16
Median, \$	22	39	28	20	18
75th percentile	29	40	43	37	25
Interquartile ^b	1.32	1.05	4.30	2.47	1.56

^aGoodRx reported prices at 518 of the 528 pharmacies.

^bInterquartile indicates the ratio of price at 75th/25th percentile. Prices reported include all discounts offered by the pharmacy.

TABLE 2. Distribution of Drug Prices in High- and Low-Income Zip Code Pharmacies

Drug	Low-Income Zip Codes (n = 265)	High-Income Zip Codes (n = 263)
Levofloxacin		
Mean price, \$	49	66
Minimum, \$	4	5
Maximum, \$	149	229
25th percentile	15	25
Median, \$	26	80
75th percentile	103	104
Interquartile ^a	6.87	4.16
Azithromycin		
Mean price, \$	26	30
Minimum, \$	2	4
Maximum, \$	53	134
25th percentile	18	20
Median, \$	25	28
75th percentile	38	40
Interquartile ^a	2.11	2.00

^aInterquartile indicates the ratio of price at 75th/25th percentile. Prices reported include all discounts offered by the pharmacy.

medications near home, examining prices within a zip code is an implicit measure of the potential cost savings from price shopping.

RESULTS

We obtained drug prices from 528 of 535 eligible pharmacies (98.7% response rate). The sample consisted of 170 chain drug stores, 49 grocery stores, 39 big-box stores, and 270 independent pharmacies. Independent pharmacies accounted for a larger proportion of the total number of pharmacies in low-income zip codes (65%) than in high-income areas (37%).

Table 1 shows the variation in drug prices by pharmacy type, categorized as chain, independent, grocery store, big-box, and online (GoodRx). This captures variation in prices both across and within zip codes and reflects the discounted price. The average price of generic levofloxacin purchased with a GoodRx coupon or at an independent pharmacy was less than half the price versus a grocery or big-

box store and less than one-fourth of the discounted price obtained over the phone at chain drug stores. Although prices were highest at chain drug stores, there was far less variation in price at this type of location (interquartile ratio [IQR], 1.05) compared with the other retail outlets (IQRs, ~2.0).

Prices varied less for azithromycin than levofloxacin, but relative prices followed a similar pattern. The lowest average prices were found via GoodRx (\$20) and at independent pharmacies (\$23); chain drug stores charged the most (\$37). There was little variation in price for chain drug stores (IQR, 1.05), particularly in comparison with independent pharmacies (IQR, 2.47) and grocery stores (IQR, 4.30). Asking for a discount had the largest effect at chain drug stores in the case of levofloxacin (lowering the average price by \$11, or 10%) and at grocery stores in the case of azithromycin (by \$8, or about 25%).

Table 2 shows the distribution of drug prices in high- and low-socioeconomic status (SES) areas, as defined by the median household income in the zip code. Levofloxacin and azithromycin were less expensive, on average, when purchased in pharmacies located in lower-income zip codes compared with higher-income zip codes. Because high- and low-income areas are likely to have a different mix of pharmacies (eg, big-box stores may be less likely to locate in low-income areas), we also estimated the average prices controlling for pharmacy type and the results were substantively unchanged. Although the median price of levofloxacin was \$26 in low-income areas, prices ranged from a low of \$4 to a high of \$149,

TABLE 3. Price Differences Between the Highest- and Lowest-Priced Pharmacy Within a Zip Code

Drug	All Zip Codes (N = 71) ^a	High-Income Zip Codes (n = 40)	Low-Income Zip Codes (n = 31)
Levofloxacin			
Mean price, \$	100.6	103.0	97.7
Minimum, \$	19.0	52.4	19.0
Maximum, \$	217.0	217.0	134.3
25th percentile	88.0	86.3	92.9
Median, \$	97.0	95.0	99.0
75th percentile	105.6	108.3	104.5
Azithromycin			
Mean price, \$	30.7	34.7	25.6
Minimum, \$	11.5	11.5	11.6
Maximum, \$	119.0	119.0	36.0
25th percentile	23.0	23.3	20.0
Median, \$	27.6	29.6	26.0
75th percentile	55.6	38.6	30.0

^aData reflect the price differences between the highest- and lowest-priced pharmacies within the same zip code. We excluded 11 zip codes with only 1 pharmacy or pharmacy type. Prices reported include all discounts offered by the pharmacy.

depending on the pharmacy. In high-income areas, the median price of levofloxacin was \$80 and ranged from \$5 to \$229.

Table 3 shows the extent of price variation within the same zip code, which is the implicit value of price shopping within a localized area. The average price difference between the highest and lowest-cost pharmacies in a zip code was greater than \$100 for levofloxacin and \$30 for azithromycin. Perhaps a more salient comparison is the average price difference between a randomly selected pharmacy and the lowest-priced pharmacy in the same zip code. In this case, consumers would save an average \$52 per prescription for levofloxacin and \$17 per prescription for azithromycin simply by comparison shopping within the same zip code (results not shown). We observed modestly greater price variation in high-income areas despite there being more pharmacies per zip code in low-income areas (7.7 pharmacies per zip code vs 6.5 in high-income zips).

Table 4 highlights general approaches for obtaining the lowest priced medication in an area. In more than half of the 71 unique zip codes in the study sample, independent pharmacies had the lowest price for levofloxacin (53%), followed by GoodRx (44%). In only 2 of 71 zip codes did a chain or big-box store have the lowest price for levofloxacin. We observed the same pattern when we restricted the analysis to the 39 zip codes with a big-box store. For both levofloxacin and azithromycin, the lowest price prescription was offered at a grocery, big-box, or chain drug store in just 6% of zip codes.

TABLE 4. Frequency of Pharmacy Type With Lowest Price Within the Zip Code^a

Pharmacy Type	Percent Lowest Price in Zip Code	
	All Zip Codes	Zip Codes With BB Store
Levofloxacin		
Independent	53.3%	45.5%
GoodRx	44.2%	48.5%
Grocery store	0.0%	0.0%
Chain	1.3%	3.0%
BB	1.3%	3.0%
	100.0%	100.0%
Azithromycin		
Independent	70.9%	55.6%
GoodRx	26.6%	38.9%
Grocery store	2.5%	5.6%
Chain	0.0%	0.0%
BB	0.0%	0.0%
	100.0%	100.0% ^b

BB indicates big-box.

^aWe excluded 11 zip codes with just 1 pharmacy or pharmacy type in the zip; 39 zip codes included a pharmacy with a big-box store.

^bTotal may not add to 100.0 due to rounding.

DISCUSSION

In our study sample of 528 pharmacies, prices found at independent pharmacies and by using online discount coupons were markedly lower, on average, than at grocery, big-box, or chain drug stores for 2 widely prescribed antibiotics. Drug prices varied dramatically within a zip code and typically were less expensive when purchased in lower-income areas. The average price difference within a zip code was \$52 for levofloxacin and \$17 for azithromycin, which suggests that price shopping within a small geographic area can yield considerable cost savings, particularly for uninsured and insured consumers in high-deductible health plans with high negotiated prices. A possible explanation for the greater price variation with levofloxacin is that it recently became available as a generic, so there has been less time to establish a fair market value.

There is a common perception that chain drug stores have lower prices than independent pharmacies due to economies of scale and the fact that the chains derive a smaller fraction of their revenue from the sale of prescription drugs. However, chain drug stores typically compete less on price and more on convenience, brand name, and nondrug items.⁸ By contrast, independent pharmacies compete largely on price and service to induce consumers to bypass chain drug stores.⁹ Our results suggest that cash-paying consumers often face a premium for going to chain drug stores and could save substantially by using online coupons or purchasing their medications at independent pharmacies in the same or neighboring zip codes.

Although poor adherence is endemic, it is particularly problematic for individuals of lower SES.¹⁰ An estimated 20% to 35% of patients are primary nonadherent by failing to fill an initial prescription, and an additional 20% discontinue therapy after filling the first prescription.¹¹⁻¹³ In 2012, 22% of uninsured adults aged 18 to 64 years reported not getting needed prescription drugs due to cost compared with 5% of adults who were insured for the whole year.¹⁴ Noncompliance with antibiotics for respiratory infections can result in treatment failure, worsening severity of disease, sepsis, antibiotic resistance, and increased risk of hospitalization.

A critical question is the extent to which consumers would use price information in purchasing medical services. The highly touted movement toward “consumer-directed healthcare” relies on patients having easy access to information concerning drug prices and quality. A recent survey indicates that a majority of Americans have tried to find out how much they would have to pay out of pocket—not including a co-pay—before getting care. However, the survey also reveals that most Americans are not aware that prices can vary across healthcare providers.¹⁵

Our results differ from those of a Florida study by Gellad et al that obtained drug prices for 3 chronic medications (esomeprazole, fluticasone, and clopidogrel) and a generic antibiotic (azithromycin).⁷ They found that mean drug prices were 9% higher in the poorest zip codes and that independent pharmacies in the poorest areas charged the highest mean prices. We, however, found the opposite: lower prices at independent and online pharmacies and pharmacies located in low-income areas. A possible explanation for the differences across studies is that the Florida study obtained drug prices from a website whereas we collected prices by calling individual pharmacies. We also asked for any available discounts and verified concordance with in-store prices in a pilot study. The Florida study also restricted the sample to pharmacies that filled 1 of the 4 drugs to a Medicaid beneficiary in a single month (November 2006). This may have resulted in a nonrepresentative sample of pharmacies across income areas. By contrast, we collected price data over the phone from all available pharmacies. We focused on price variation for antibiotics under the assumption that consumers would have limited experience purchasing them (and thus would be less aware of price) and the consequences of not filling the prescription due to cost would have a more immediate impact on health.

Limitations

There are several limitations to our study, the most prominent of which is that we only measured prices of 2 medications for an acute condition in a single county in California (LA County). We do not know if the findings will hold in other regions or states. However, LA is an economically and culturally diverse county with a broad array of income levels and population densities. The magnitude of price variation across outlets and the savings associated with online coupons at nationwide chains suggest that we could expect

similar results in other areas of the country. The extent of price variation may be lower for chronic medications, but these by their nature (length of time taken) may impose a larger financial burden on patients. Future research should focus on comparing prices across a broader spectrum of pharmaceuticals, including medications for chronic diseases.

Another limitation of our study is that we obtained drug prices via telephone rather than in person, and pharmacies may offer discounts in the store that they are unable or unwilling to provide over the phone. Also, the calls to the pharmacy were made from a doctor's office on behalf of a hypothetical uninsured patient, and the callers asked each pharmacy for any potential discounts after an original price was provided. Over 98% of pharmacies in our sample provided prices over the phone. Patients calling on their own behalf may not receive the same discounts we received. Additionally, we only called pharmacies in the highest and lowest quartiles of median income. It is possible that we might have a better understanding of price variation if we had contacted all pharmacies regardless of income level.

Finally, we used a single website to represent discounts available online. Nonetheless, GoodRx is the largest price aggregator and coupon tool used by thousands of doctors and millions of patients every month. Further, 100% of GoodRx coupons were honored when physically presented at the pharmacy during this study.

CONCLUSIONS

Slowing the growth of healthcare costs underscores nearly every health policy initiative in the United States and is the motivation for public and private efforts to increase price transparency in healthcare markets. Price transparency initiatives face considerable obstacles, however; most prominently, how to reliably measure and convey information about quality and price for thousands of complex medical services produced by a wide array of providers and organizations. The task is less daunting for prescription drugs because quality is fixed.

The extent of price variation found in this study suggests that consumers could readily benefit from greater price transparency. If this information were widely available to consumers, large variations in drug prices across pharmacies would likely be reduced. ■

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