Changes in Price for Generic Drugs in the USA, 2008–2016

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Widespread use of low-cost generic drugs has improved patient adherence and clinical outcomes while reducing health care spending. However, some generic drug prices have risen due to insufficient competition levels,[1, 2] and drug shortages,[3] which threatens to undermine these benefits.[4] To characterize the recent trends in the US generic-drug marketplace, we sought to examine price changes for generic drugs between 2008 and 2016.

METHODS

The pharmacy files from Truven MarketScan Commercial Claims and Encounters Database—comprised of de-identified insurance claims sourced from 130 commercial employer-based health plans covering 30 million annual lives—for years 2008–2016 were utilized to identify a cohort of drugs available as generics throughout the 9-year period. The total price/unit associated with a generic drug dispensing was estimated by summing the patient and third-party components, and dividing by quantity supplied. The 9-year study period was divided into 18 intervals of 6 months. Prices were estimated for each generic drug in every period, with the first half of 2008 as the baseline.

Percentage changes in drug prices from their baseline were estimated for the study-drugs in every period; categories of price change ratios were calculated by dividing the price in each period by the baseline value. Subgroup analysis included stratification per baseline prescription frequency, a representation of market size. Baseline prescribing frequency was estimated by dividing the number of study-drug dispensings by total dispensings in the baseline period. Study drugs were grouped into three prescription frequency groups, with the high tercile corresponding to the most commonly prescribed drugs.

RESULTS

Within the overall cohort of 1099 generic drugs, mean prices increased by 39.9% (95% CI, 25.7–54.3) from their 2008 levels, with most of this increase occurring during or after 2012 (Fig. 1; $p < 0.001$ for trend). By contrast, median prices fell 30.0% (interquartile range [IQR], − 60.5 to 40.1). Prices for 189 (17.2%) drugs more than doubled, and for 112 (10.1%) more than tripled; 711 (64.6%) drug prices decrease during this period, and for 668 (60.8%) drugs, this decrease was by more than 10%.

The mean drug price changes in the low-, middle-, and high-prescription frequency groups were 91.5% (95% CI, 61.2–121.8; $p < 0.001$ for trend), 42.6% (95% CI, 17.8–67.4; $p < 0.001$ for trend), and − 14.2% (95% CI, − 30.1 to 1.7; $p = 0.48$ for trend), while the median changes in price were − 9.4% (IQR, − 44.1 to 97.7), − 25.0% (IQR, − 55.4 to 51.0), and − 54.3% (IQR, − 71.0 to − 17.9). Ninety (24.6%) drugs in the low-prescription frequency group had prices more than double compared with 28 (7.7%) in the high-prescription frequency group. Prices for 293 (80.0%) drugs in the high-prescription frequency group decreased, and for 283 (77.3%) this decrease was for more than 10%.

DISCUSSION

Between 2008 and 2016 in a cohort of 1099 generic drugs, prices for 189 (17.2%) drugs more than doubled, while 668 (60.8%) drugs experienced a price decrease (Table 1). Deflationary pressures on the generic drug market including recent consolidations within the system for the distribution and financing of prescription drugs may explain why prices for most drugs decreased during this period.[5] Decreases in generic drug prices occurred among the most commonly used products, signaling a favorable net effect for patients and overall health

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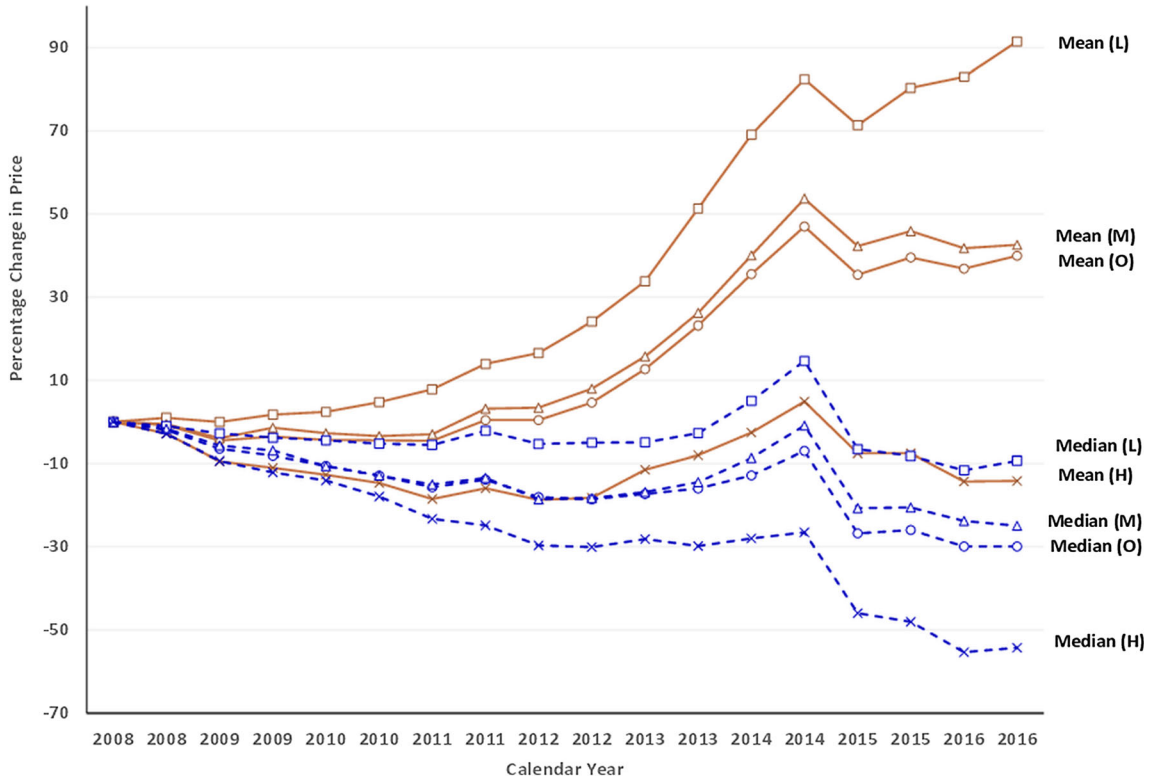

Figure 1 Mean and median percentage change in generic drug prices, 2008–2016 for the overall cohort of generic drugs, and within terciles of prescribing frequency. Drug prices were estimated for 1099 generic drugs for the 14 study periods (not adjusted for inflation). Prices estimated in the first half of 2008 were used as reference. Baseline prescribing frequency was estimated by dividing the number of study-drug dispensings by the total number of dispensings in the baseline period; using terciles, study drugs were grouped into three prescription frequency groups, with the highest tercile corresponding to the most commonly prescribed drugs. The red line represents the mean change in prices and the blue median. The lowest-, middle-, and highest-prescribing frequency groups are represented by (L), (M), and (H) respectively, while the overall cohort is represented with (O).

care spending. However, our findings may not be generalizable to drugs that became generic after 2008.

By contrast, we identified a higher prevalence of price spikes among infrequently prescribed generic drugs. The increasing divergence between the mean and median changes in drug prices after 2011 suggests greater price spikes among this small cadre of generic drugs during the final years of our study. Policy solutions should seek to stabilize prices for these drugs without affecting effective competition that helps keep costs low among the majority of generic drugs.

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Author Contributions *Dr. Dave had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.*

Study concept and design: Dave, Kesselheim.
Acquisition, analysis, or interpretation of data: All authors.
Drafting of the manuscript: Dave.
Critical revision of the manuscript for important intellectual content: All authors.
Statistical analysis: Dave, Brill.
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Table 1 Price Changes in the Cohort of Generic Drugs for Calendar Periods 2008–2016

Calendar time	2008*	2010*	2012*	2014*	2016*
Price ratio group, *n* (%)†					
Overall ($N = 1099$)					
Increased in price	307 (27.9)	251 (22.8)	315 (28.6)	491 (44.6)	388 (35.3)
$1 \leq \text{ref} < 1.10$	242 (22.0)	103 (9.4)	67 (6.1)	46 (4.2)	33 (3.0)
$1.10 \leq \text{ref} < 2$	62 (5.6)	116 (10.5)	163(14.8)	264(24.0)	166 (15.1)
$2 \leq \text{ref} < 3$	2 (0.2)	19 (1.7)	42 (3.8)	80 (7.3)	77 (7.0)
≥ 3 ref	1 (0.1)	13 (1.2)	43 (3.9)	101 (9.2)	112 (10.1)
Decreased in price	792 (72.0)	848 (77.1)	784 (71.3)	608 (55.3)	711 (64.6)
$0.90 < \text{ref} < 1$	707 (64.3)	211 (19.1)	102 (9.3)	83 (7.5)	43 (3.9)
$0.50 < \text{ref} \leq 0.90$	84 (7.6)	606 (55.1)	571 (51.9)	393 (35.7)	273 (24.8)
$0.33 < \text{ref} \leq 0.5$	1 (0.1)	30 (2.7)	82 (7.5)	93 (8.5)	196 (17.8)
≤ 0.33 ref	0 (0.0)	1 (0.1)	29 (2.6)	39 (3.5)	199 (18.1)
Lowest prescription frequency group ($n = 366$)‡					
Increased in price	155 (42.3)	145 (39.6)	163 (44.5)	207 (56.5)	167 (45.6)
$1 \leq \text{ref} < 1.10$	116 (31.6)	66 (18.0)	32 (8.7)	15 (4.1)	10 (2.7)
$1.10 \leq \text{ref} < 2$	38 (10.3)	61 (16.6)	90 (24.5)	108 (29.5)	67(18.3)
$2 \leq \text{ref} < 3$	1 (0.3)	12 (3.3)	20 (5.5)	37 (10.1)	34 (9.3)
≥ 3 ref	0 (0.0)	6 (1.6)	21 (5.7)	47 (12.8)	56 (15.3)
Decreased in price	211 (57.6)	221 (60.3)	203 (55.4)	159 (43.4)	199 (54.3)
$0.90 < \text{ref} < 1$	175 (47.8)	78 (21.3)	44 (12.0)	28 (7.7)	18 (4.9)
$0.50 < \text{ref} \leq 0.90$	35 (9.6)	136 (37.1)	136 (37.1)	102 (27.8)	106 (28.9)
$0.33 < \text{ref} \leq 0.5$	1 (0.3)	7 (1.9)	18 (4.9)	19 (5.2)	36 (9.8)
≤ 0.33 ref	0 (0.0)	0 (0.0)	5 (1.4)	10 (2.7)	39 (10.6)
Middle prescription frequency group ($n = 367$)‡					
Increased in price	105 (28.6)	74 (20.2)	101 (27.5)	180 (49.1)	148 (40.4)
$1 \leq \text{ref} < 1.10$	84 (22.9)	29 (7.9)	21 (5.7)	20 (5.5)	9 (2.5)
$1.10 \leq \text{ref} < 2$	20 (5.5)	36 (9.8)	51 (13.9)	92 (25.1)	68 (18.5)
$2 \leq \text{ref} < 3$	1 (0.3)	5 (1.4)	14 (3.8)	31 (8.5)	35 (9.6)
≥ 3 ref	0 (0.0)	4 (1.1)	15 (4.1)	37 (10.1)	36 (9.8)
Decreased in price	262 (71.5)	293 (80.0)	266 (72.6)	187 (51.0)	219 (59.8)
$0.90 < \text{ref} < 1$	244 (66.6)	77 (21.0)	36 (9.8)	30 (8.2)	11 (3.0)
$0.50 < \text{ref} \leq 0.90$	18 (4.9)	211 (57.6)	209 (57.1)	134 (36.6)	96 (26.2)
$0.33 < \text{ref} \leq 0.5$	0 (0.0)	4 (1.1)	16 (4.4)	16 (4.37)	70 (19.1)
≤ 0.33 ref	0 (0.0)	1 (0.3)	5 (1.4)	7 (1.91)	42 (11.4)
Highest prescription frequency group ($n = 366$)‡					
Increased in price	47 (12.8)	32 (8.74)	51 (13.9)	104 (28.4)	73 (19.9)
$1 \leq \text{ref} < 1.10$	42 (11.4)	8 (2.2)	14 (3.8)	11 (3.0)	14 (3.8)
$1.10 \leq \text{ref} < 2$	4 (1.09)	19 (5.2)	22 (6.0)	64 (17.4)	31 (8.5)
$2 \leq \text{ref} < 3$	0 (0.0)	2 (0.5)	8 (2.2)	12 (3.23)	8 (2.2)
≥ 3 ref	1 (0.3)	3 (0.8)	7 (1.9)	17 (4.6)	20 (5.5)
Decreased in price	319 (87.1)	334 (91.2)	315 (86.0)	262 (71.5)	293 (80.0)
$0.90 < \text{ref} < 1$	288 (78.6)	56 (15.3)	22 (6.0)	25 (6.8)	14 (3.8)
$0.50 < \text{ref} \leq 0.90$	31 (8.4)	259 (70.7)	226 (61.7)	157 (42.8)	71 (19.3)
$0.33 < \text{ref} \leq 0.5$	0 (0.0)	19 (5.2)	48 (13.1)	58 (15.8)	90 (24.5)
≤ 0.33 ref	0 (0.0)	0 (0.0)	19 (5.2)	22 (6.0)	118 (32.2)

Drug-specific price ratios were estimated using prices from the first half of 2008 as reference; the cohort was comprised of 1099 generic drugs

**Data for second half of the calendar year are presented*

†Categories of price change ratios were calculated by dividing the price of a drug in each period by their reference (baseline) value estimated in the first half of 2008

‡Baseline prescribing frequency was estimated by dividing the number of study-drug dispensings by the total number of dispensings in the baseline period; using terciles, study drugs were grouped into three prescription frequency groups, with the highest tercile corresponding to the most commonly prescribed drugs

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