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Trends in Prescription Drug Spending Leading Up to Health Reform

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Abstract

Over the past decade, prescription drug expenditures grew faster than any other service category and comprised an increasing share of per capita health spending. Using the 2005 and 2009 Medical Expenditure Panel Surveys, this analysis identifies the sources of spending growth for prescription drugs among the nonelderly population. We find that prescription drug expenditures among the nonelderly increased by $14.9 billion (9.2%) from 2005 to 2009 and expenditures increased in 12 out of the 16 therapeutic classes. Changes in the number of users and expenditures per fill were the drivers of spending fluctuations in these categories. The main results also provide insight into generic entry, the price gap between brand and generic drugs, and from a health reform evaluation perspective, the importance of separating prepolicy secular trends in expenditures from changes attributable to specific forces, such as shifts toward generic versions of blockbuster drugs.

Keywords

prescription drugs expenditures, health reform, Medical Expenditure Panel Surveys (MEPS), spending growth

Introduction

From 2001 to 2009, prescription drug expenditures grew faster than any other service category and comprised an increasing share of per capita health care spending (Blavin, Blumberg, Waidmann, & Phadera, 2012). During this period, real annual per capita

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expenditures on prescription drugs among the nonelderly increased by more than 50%, from $574 to $887, with significantly higher average annual growth rates in the first half of the period (9.1%) compared with the second half (2.4%). This increase in per capita expenditures was attributable to increases in the average expenditure per prescription and average number of fills per user; from 2001 to 2009, the average expenditure per prescription fill and the average number of prescription fills per user increased, while the share of the nonelderly population with at least one prescription decreased slightly from 61% to 58%.

Even though the primary reforms associated with the Affordable Care Act (ACA) target insurance markets (e.g., coverage expansions through Medicaid and health insurance marketplace), the ACA is also likely to affect the use of prescription drugs. For instance, comparative effectiveness research[1], along with cost containment and delivery system reform efforts, could discourage the use of costly, ineffective drugs or, conversely, encourage the use of low-cost drugs that are equally effective as higher cost interventions.[2] Furthermore, while the beneficiaries most directly affected by the closing of the Medicare Part D "doughnut hole" are not examined here, the increases in demand resulting from that change may be large enough to affect the market prices for everyone. Highlighting the sources of increased spending may provide insights for developing additional cost containment strategies.

Using the 2005 and 2009 Medical Expenditure Panel Surveys (MEPS), this analysis aims to identify the sources of recent spending growth for prescription drugs among the nonelderly population. We disaggregate total prescription drug expenditures by therapeutic class and analyze classes and subclasses that had the most substantial changes from 2005 to 2009, identifying the key drivers of increases or decreases in spending.[3] We also analyze how the distribution of drug expenditures by payer type changed over the analysis period.

New Contribution

This analysis contributes to the literature by estimating drug expenditures among the nonelderly population and examining the implications leading up to the ACA. This is also the first study to highlight drug classifications and to decompose the drivers of spending growth or decline within each of the major classes in the MEPS. This analysis can help target research efforts into whether further guidelines for appropriate use are warranted and provide insight into market dynamics driving price changes. From an evaluation perspective, it is important to understand the drivers of expenditure trends to predict what expenditures would have looked like in the absence of reform, for example, identify pre-ACA shifts toward generic versions of blockbuster drugs that have changed market dynamics.

Data and Methods

Our sample is the nonelderly population on the 2005 and 2009 MEPS Household Component (HC) full-year consolidated and prescribed medicine event files. The

MEPS HC is a nationally representative longitudinal survey that collects detailed information on health care utilization and expenditures, health insurance, and health status, as well as social, demographic, and economic characteristics for the U.S. civilian noninstitutionalized population. Household respondents on the HC report drug utilization and the number of times each drug was obtained; follow-back surveys of pharmacies are the primary source of price and expenditure data. The prescribed medicine event file contains additional details on prescribed medicines, such as drug classification and subclassification codes. As an assurance of data quality, Hill, Zuvekas, and Zodet (2011) find that the number of drug fills and total expenditures on the MEPS are reasonably accurate compared with Medicare Part D claims data.[4]

We assign therapeutic classes and subclasses using Multum Lexicon variables from Cerner Multum, Inc. To estimate changes over time, we use the 2009 class definition because Cerner Multum periodically makes changes to the therapeutic classification system.[5] This brief only focuses on changes in prescribed drug spending from 2005 to 2009; the 2001 MEPS used a different classification system and does not contain key subclassification information necessary for this analysis.

We use expert physician review, PubMed Health, and Drugs.com to classify specific drugs within a particular therapeutic subclass and determine their brand-name or generic status. To simplify the analysis, we group specific drugs by their primary purpose (e.g., drugs used to treat bipolar disorder) or active ingredient (e.g., methylphenidate).[6] We account for inflation by using the consumer price index for all urban consumers (CPI-U) to express all expenditures in 2011 prices.[7]

We decompose the change in prescription drug expenditures between 2005 and 2009 into changes in the fraction of the nonelderly with any prescription, the average number of fills per user, and the average expenditure per fill. For example, to estimate the share of expenditure growth from 2005 to 2009 attributable to changes in the share of the population with any prescription, we first estimate per capita expenditures in 2009 holding this share constant at 2005 levels. The difference between this simulated 2009 estimate and the actual 2009 estimate captures the change in expenditures attributable to changes in the share of the population with any prescription. We use a logarithmic decomposition, based on the equation $\log(\text{spending}_t) = \log(\text{number of users}_t) + \log(\text{fills per user}_t) + \log(\text{expenditure per fill}_t)$. We find similar magnitudes in all categories using a linear decomposition, but the logarithmic decomposition allows all three components to add up to 100%.

Results

Total expenditures on prescription drugs among the nonelderly increased by $14.9 billion (9.2%) from 2005 to 2009 (Table 1). The total number of prescription drug users and the number of purchases per user modestly increased during this period, together explaining about half of the total increase in expenditures,[8] while 52.3% of the increase in total expenditures during this period was attributable to increases in expenditures per purchase.

Table 1. Components of Prescription Drug Expenditures by Therapeutic Class, Nonelderly Population.

Services	Year		Difference	Log decomposition (%)
	2005	2009		
All therapeutic classes				
A. Number of users (million)	152.8	155.0	2.1	15.9
B. Number of purchases per user	12.6	12.9	0.4	31.8
C. Expenditures per purchase	$84.7	$88.7	$4.0	52.3
Total expenditure (A × B × C $billion)	$162.8	$177.7	$14.9	100.0
Immunologic agents				
A. Number of users (million)	0.9	1.3	0.4	33.0
B. Number of purchases per user	5.1	5.3	0.2	3.5
C. Expenditures per purchase	$631.9	$1,327.8	$696.0	63.6
Total expenditure (A × B × C $billion)	$2.9	$9.5	$6.5	100
Central nervous system agents				
A. Number of users (million)	60.7	63.6	2.9	23.0
B. Number of purchases per user	5.7	6.4	0.7	61.2
C. Expenditures per purchase	$72.2	$74.5	$2.3	15.8
Total expenditure (A × B × C $billion)	$24.9	$30.4	$5.5	100
Miscellaneous agents				
A. Number of users (million)	7.0	6.9	−0.2	−4.5
B. Number of purchases per user	5.1	5.1	0.0	1.1
C. Expenditures per purchase	$158.6	$279.3	$120.6	103.4
Total expenditure (A × B × C $billion)	$5.7	$9.8	$4.1	100
Anti-infectives				
A. Number of users (million)	66.4	65.5	−0.9	−6.7
B. Number of purchases per user	2.1	2.1	−0.1	−11.4
C. Expenditures per purchase	$83.3	$106.6	$23.3	118.1
Total expenditure (A × B × C $billion)	$11.9	$14.6	$2.8	100
Psychotherapeutic agents				
A. Number of users (mil)	21.7	23.5	1.9	86.7
B. Number of purchases per user	7.6	7.9	0.3	40.5
C. Expenditures per purchase	$111.4	$108.6	−$2.9	−27.2
Total expenditure (A × B × C $billion)	$18.3	$20.1	$1.8	100
Metabolic agents				
A. Number of users (mil)	25.4	29.2	3.7	274.6
B. Number of purchases per user	9.1	9.3	0.3	54.7
C. Expenditures per purchase	$105.3	$93.9	−$11.4	−229.3
Total expenditure (A × B × C $billion)	$24.2	$25.5	$1.2	100
Gastrointestinal agents				
A. Number of users (million)	20.2	18.6	−1.6	−87.1
B. Number of purchases per user	4.9	5.5	0.6	116.8
C. Expenditures per purchase	$125.3	$133.8	$8.5	70.3
Total expenditure (A × B × C $billion)	$12.4	$13.6	$1.2	100
Respiratory agents				
A. Number of users (million)	39.1	32.7	−6.4	−540.4
B. Number of purchases per user	4.5	4.1	−0.4	−275.5

(continued)

Table 1. (continued)

Services	Year 2005	Year 2009	Difference	Log decomposition (%)
C. Expenditures per purchase	$76.3	$103.4	$27.1	915.9
Total expenditure (A × B × C $billion)	$13.5	$14.0	$0.5	100
Topical agents				
A. Number of users (million)	33.8	32.0	−1.7	−60.9
B. Number of purchases per user	2.6	2.7	0.1	31.8
C. Expenditures per purchase	$72.1	$80.6	$8.5	129.0
Total expenditure (A × B × C $billion)	$6.4	$7.0	$0.6	100
Coagulation modifiers				
A. Number of users (million)	3.2	3.2	0.0	6.5
B. Number of purchases per user	6.0	6.5	0.5	37.2
C. Expenditures per purchase	$117.5	$133.6	$16.0	56.3
Total expenditure (A × B × C $billion)	$2.2	$2.8	$0.6	100
Nutritional products				
A. Number of users (million)	12.4	12.2	−0.2	−4.5
B. Number of purchases per user	4.2	4.3	0.1	7.5
C. Expenditures per purchase	$23.2	$31.6	$8.4	97.0
Total expenditure (A × B × C $billion)	$1.2	$1.7	$0.4	100
Alternative medicines				
A. Number of users (million)	0.4	0.9	0.6	82.5
B. Number of purchases per user	3.0	4.0	1.0	24.3
C. Expenditures per purchase	$142.2	$131.5	−$10.7	−6.8
Total expenditure (A × B × C $billion)	$0.2	$0.5	$0.3	100
Biologicals				
A. Number of users (million)	0.1	0.1	−0.1	89.1%
B. Number of purchases per user	15.3	7.4	−7.9	78.6
C. Expenditures per purchase	$1,011.0	$1,890.7	$879.7	−67.7
Total expenditure (A × B × C $billion)	$2.1	$0.8	−$1.2	100
Antineoplastics				
A. Number of users (million)	3.0	3.1	0.1	−4.5
B. Number of purchases per user	5.2	4.6	−0.5	18.0
C. Expenditures per purchase	$238.8	$140.4	−$98.4	86.5
Total expenditure (A × B × C $billion)	$3.7	$2.0	−$1.7	100
Hormones/hormone modifiers				
A. Number of users (million)	35.0	34.7	−0.2	4.0
B. Number of purchases per user	5.8	5.3	−0.5	48.3
C. Expenditures per purchase	$70.5	$64.8	−$5.7	47.7
Total expenditure (A × B × C $billion)	$14.3	$12.0	−$2.3	100
Cardiovascular agents				
A. Number of users (million)	32.9	37.3	4.4	−37.2
B. Number of purchases per user	10.4	9.6	−0.8	23.0
C. Expenditures per purchase	$55.2	$37.4	−$17.8	114.2
Total expenditure (A × B × C $billion)	$18.8	$13.4	−$5.4	100
Nonelderly population (million)	248	266	18	

Source. 2005 and 2009 Medical Expenditure Panel Surveys.
Note. Expenditures are expressed in 2011 prices.

The finding that about half of the cost growth is attributable to increases in expenditures per purchase could result from several types of changes. While it is possible that this change may represent a general increase in the price of pharmaceuticals, it is also possible that it results from a substitution from cheaper to more expensive versions of the same drug in the treatment of disease. Alternatively, this increase in expenditure per purchase may be the result of larger shifts in the composition of drugs prescribed. If entirely new treatments are developed, or new applications of existing drugs become widespread, the effect may be not only to increase the numbers of prescriptions written in aggregate, but if the drug is expensive enough and the growth in prescribing is large enough, to also increase the cost of the average prescription filled over all classes of drugs. Thus, it is important to look more closely at the changes in specific classes of drugs, and in some cases the specific drugs themselves, to understand the changes we observe in the aggregate.

Table 1 also shows that total expenditures increased in 12 out of the 16 therapeutic classes from 2005 to 2009. Immunologic agents ($6.5 billion)—drugs that enhance or suppress the immune system—and central nervous system (CNS) agents ($5.5 billion)—drugs that affect the brain or spinal cord—experienced the largest absolute increases in expenditures, together accounting for the majority of the total drug spending increase from 2005 to 2009. Based on the decomposition analysis, the increase in average expenditures per purchase is the primary driver behind the rise in expenditures among seven classes (anti-infectives, coagulation modifiers, miscellaneous agents, nutritional products, respiratory agents, topical agents, and immunologic agents), whereas the number of purchases per user is the primary driver among two classes (gastrointestinal agents and CNS agents) and the number of users among three classes (alternative medicines, psychotherapeutic agents, and metabolic agents).

In contrast, total expenditures declined among cardiovascular agents, hormone modifiers, antineoplastics—drugs used to inhibit the growth of cancer cells—and biologics—drugs made from living organisms such as Avastin to treat cancer and Humira for rheumatoid arthritis (Hugget, 2013). Expenditures on cardiovascular agents decreased by $5.4 billion, from $18.8 to $13.4 billion, a change primarily explained by declines in expenditure per purchase. The remaining results in this analysis focus on the two classes—immunologic agents and CNS agents—with the largest expenditure increase from 2005 to 2009 and the class with the largest expenditure decline cardiovascular agents.

Expenditures on Immunologic Agents

Between 2005 and 2009, expenditures on immunologic agents more than tripled, representing the largest absolute and percent increase in expenditures among all therapeutic classes. Table 2 decomposes expenditures among the immunologic agent therapeutic subclasses. Overall, expenditures among immunostimulants—drugs that stimulate the immune system, including vaccines—increased by $5.1 billion, representing 78% of the total increase in immunologic agent expenditures, whereas expenditures among the immunosuppressive agent therapeutic subclass (e.g., drugs used by transplant

Table 2. Components of Expenditures by Subtherapeutic Class, Immunologic Agents, Nonelderly Population.

Services	Year		Difference	Log decomposition (%)
	2005	2009		
Immunostimulants				
A. Number of users (million)	0.74	0.78	0.0	5.3
B. Number of purchases per user	4.4	4.0	−0.4	−8.5
C. Expenditures per purchase	$731	$2,389	$1,657	103.2
Total expenditure (A × B × C $billion)	$2.4	$7.4	$5.1	100.0
Immunosuppressive agents				
A. Number of users (million)	0.17	0.56	0.4	94.6
B. Number of purchases per user	8.4	7.2	−1.2	−12.0
C. Expenditures per purchase	$408	$507	$98.8	17.4
Total expenditure (A × B × C $billion)	$0.6	$2.0	$1.5	$100.0
Nonelderly population (million)	248	266	18	

Source. 2005 and 2009 Medical Expenditure Panel Surveys.
Note. Expenditures are expressed in 2011 prices.

patients to suppress the immune system to prevent organ rejection) increased by $1.5 billion. Nearly the entire increase in immunostimulant expenditures is explained by an increase in expenditures per purchase ($731 in 2005 vs. $2,389 in 2009), whereas the vast majority of the increase in immunosuppressive agent expenditures is explained by an increase in the number of users (approximately 170,000 in 2005 vs. 560,000 in 2009).

Immunostimulant expenditures are dominated by drugs for multiple sclerosis, representing the vast majority of immunostimulant expenditures in 2005 and 2009. Total expenditures on multiple sclerosis drugs increased by $4.7 billion from 2005 to 2009, and expenditure per fill nearly tripled. In contrast, the total number of fills increased by approximately 354,000 or 27% (data not shown).

Expenditures on CNS Agents

Table 3 shows that total expenditures on anticonvulsants and CNS stimulants each increased by more than $3.0 billion, the most among the seven CNS agent subclasses. Anticonvulsants are typically multiuse drugs prescribed to treat a wide range of medical conditions, including seizure disorders such as epilepsy, whereas CNS stimulants are used to enhance physical and mental processes. The increase in total expenditures among both subclasses was roughly equally attributable to increases in the number of users and expenditures per purchase. Tables 4 and 5 further explore changes in these subclasses from 2005 to 2009.

From 2005 to 2009, total expenditures on anticonvulsants increased by 55%, from $6.0 to $9.3 billion, with expenditures on generic drugs more than doubling, from $2.0

Table 3. Components of Expenditures by Subtherapeutic Class, Central Nervous System Agents, Nonelderly Population.

Services	Year		Difference	Log decomposition (%)
	2005	2009		
Anticonvulsants				
A. Number of users (million)	8.8	11.2	2.4	54.7
B. Number of purchases per user	7.3	7.4	0.0	0.9
C. Expenditures per purchase	$94	$113	$20	44.4
Total expenditure (A × B × C $billion)	$6.0	$9.3	$3.3	100.0
CNS stimulants				
A. Number of users (million)	4.6	6.1	1.5	43.6
B. Number of purchases per user	6.7	6.8	0.1	2.6
C. Expenditures per purchase	$110	$161	$45	53.8
Total expenditure (A × B × C $billion)	$3.3	$6.3	$3.0	100.0
Analgesics				
Total expenditure (A × B × C $billion)	$9.8	$9.5	$−0.3	
Antiemetic/antivertigo agents				
Total expenditure (A × B × C $billion)	$0.9	$0.5	$−0.4	
Anxiolytics sedatives and hypnotics				
Total expenditure (A × B × C $billion)	$2.6	$1.6	$−1.0	
Muscle relaxants				
Total expenditure (A × B × C $billion)	$1.7	$1.1	$−0.6	
Antiparkinson agents and others				
Total expenditure (A × B × C $billion)	$0.5	$1.9	$1.4	
Nonelderly population (million)	248	266	18	

Source. 2005 and 2009 Medical Expenditure Panel Surveys.
Note. Expenditures are expressed in 2011 prices.

to $4.1 billion, and expenditures on brand-name drugs increasing by 30%, from $4.0 to $5.3 billion (Table 4). The number of generic fills increased by 60% (35.9 million to 57.7 million), whereas the number of brand-name fills declined by 13% (28.3 million to 24.6 million) during this period. At the same time, average expenditures per generic fill increased by nearly 27%, from $56 to $71, compared with a 50% increase among brand-name fills, from $142 to $213.

The remaining rows in Table 4 highlight expenditures by anticonvulsant drug category. We find that increased expenditures ($3.2 billion) on multiuse and antiseizure anticonvulsants (e.g., Lyrica and lamotrigine) account for 94% of the growth in the class.[9] During this period, total expenditures for this group increased by approximately 68%, from $4.5 to $7.7 billion, primarily driven by the increased use of generic drugs. The increase in the number of generic fills for multiuse and antiseizure anticonvulsants are likely driven by lamotrigine and levetiracetam entering the market after the patents for Lamictal and Keppra, respectively, expired.[10] Interestingly, as new generics

Table 4. Use of Anticonvulsants by the Nonelderly Population.

Name of drug	2005			2009		
	Total expenditure ($billion)	Number of fills (million)	Expenditures per fill ($)	Total expenditure ($billion)	Number of fills (million)	Expenditures per fill ($)
All	6.0	64.3	94	9.3	82.3	113
Generic	2.0	35.9	56	4.1	57.7	71
Brand name	4.0	28.3	142	5.3	24.6	213
Multiuse and seizure	4.5	33.6	135	7.7	46.7	164
Generic	1.2	12.9	94	3.0	27.8	108
Brand name	3.3	20.7	161	4.7	18.9	247
Antianxiety, mood disorders, and schizophrenia	1.5	30.7	49	1.7	35.6	47
Generic	0.8	23.1	35	1.1	29.9	36
Brand name	0.7	7.6	91	0.6	5.7	104

Source. 2005 and 2009 Medical Expenditure Panel Surveys.
Note. Expenditures are expressed in 2011 prices.

entered the market, the price per fill of these two brand-name drugs increased dramatically, more than offsetting the drop in the number of brand-name fills. This finding is consistent with prior studies (e.g., Berndt & Aitken, 2011; Grabowski & Vernon, 1992) and could be attributable to lower levels of price sensitivity among brand-loyal consumers compared with those who switch to generics. Total expenditures on drugs to treat anxiety and mood disorders modestly increased by $.2 billion (12.5%), primarily driven by the increased use of generic drugs as brand-name drug consumption declined.

Total expenditures on CNS stimulants nearly doubled from $3.3 to $6.3 billion, as the number of fills and average expenditure per fill increased during this period (Table 5). Brand-name drugs accounted for more than 80% of all fills in 2005 and 2009, although generic fills increased at a faster rate during this period (61% vs. 25%). Similar to the trend among anticonvulsants, the average expenditure per brand fill among CNS stimulants increased by 54%, from $118 to $182, compared with only 7% among generics, from $68 to $73.

The most common use of CNS stimulants is the treatment of attention-deficit/hyperactivity disorder, and there are two principal sets of drugs within this group, distinguished by their active ingredients: amphetamine/dextroamphetamine and methylphenidate. The remainder of the CNS stimulants (other categories) includes the brand-name drugs Provigil and Nuvigil, which are primarily used to treat narcolepsy, and Straterra, another attention-deficit/hyperactivity disorder drug that has a different active ingredient (atomoxetine) than the other two categories. Among these categories, we find that total expenditures on amphetamine/dextroamphetamine more than doubled, from $0.9 billion to $2.2 billion. The number of generic fills increased by 144%,

Table 5. Use of Central Nervous System Stimulants by the Nonelderly Population.

Drug category	2005			2009		
	Total expenditure ($billion)	Number of fills (million)	Expenditure per fill ($)	Total expenditure ($billion)	Number of fills (million)	Expenditure per fill ($)
All	3.3	29.8	110	6.3	38.9	161
Generic	0.3	4.8	68	0.6	7.7	73
Brand name	3.0	25.0	118	5.7	31.3	182
Amphetamine and dextroamphetamine	0.9	9.2	100	2.2	16.3	136
Generic	0.2	2.5	77	0.5	6.2	84
Brand name	0.7	6.6	109	1.7	10.2	167
Methylphenidate	1.2	13.3	90	2.3	16.4	137
Generic	0.1	2.2	58	0.0	1.5	27
Brand name	1.1	11.1	97	2.2	15.0	148
Other (all brand names)	1.2	7.3	159	1.8	6.2	291

Source. 2005 and 2009 Medical Expenditure Panel Surveys.
Note. Expenditures are expressed in 2011 prices.

from 2.5 million to 6.2 million, while brand-name fills (e.g., Adderall and Vyvanse) increased by 53%, from 6.6 million to 10.2 million. Although the average expenditure per generic fill remained roughly constant, the average expenditure per brand fills increased by 53%, from $109 to $167.

The methylphenidate market is dominated by brand-name drugs (e.g., Ritalin, Focalin, and Concerta) in terms of total expenditures and number of fills. In fact, brand-name drugs accounted for 91% of all methylphenidate fills and 98% of expenditures in 2009, compared with 83% and 89%, respectively, in 2005. The average expenditure per generic fill declined by approximately 53%, from $58 to $27, whereas the average expenditure per brand-name fills increased by 53%, from $97 to $148.

Among all other CNS stimulants, total expenditures and expenditures per fill increased by 54% (from $1.2 to $1.8 billion) and 83% (from $159 to $291), respectively, whereas the number of fills decreased by 16%, from 7.3 million to 6.2 million.

Expenditures on Cardiovascular Agents

Table 6 shows that the $5.4 billion decline in expenditures on cardiovascular agents from 2005 to 2009 was primarily because of declines in angiotensin-converting enzyme (ACE) inhibitors (−$2.7 billion), beta-adrenergic blocking agents (−$2.1 billion), and calcium channel blocking agents (−$0.9 billion). There were also modest declines in expenditures on antiadrenergic agents, antiarrhythmic agents, and diuretics, and increases in expenditures on antihypertensive combinations, angiotensin II inhibitors, and other subtherapeutic classes.

Table 6. Components of Expenditures by Subtherapeutic Class, Cardiovascular Agents, Nonelderly Population.

Services	Year		Difference	Log decomposition (%)
	2005	2009		
Angiotensin-converting enzyme inhibitors				
A. Number of users (million)	9.5	12.2	2.6	−19.1
B. Number of purchases per user	6.4	6.0	−0.4	4.8
C. Expenditures per purchase	$62	$14	$−48	114.3
Total expenditure (A × B × C $billion)	$3.8	$1.0	$−2.7	100.0
Beta-adrenergic blocking agents				
A. Number of users (million)	10.7	10.6	0.0	0.3
B. Number of purchases per user	6.5	6.3	−0.1	2.3
C. Expenditures per purchase	$53	$23	$−30	97.3
Total expenditure (A × B × C $billion)	$3.6	$1.5	$−2.1	100.0
Calcium channel blocking agents				
A. Number of users (million)	4.1	4.8	0.6	−22.8
B. Number of purchases per user	6.0	6.1	0.1	−2.4
C. Expenditures per purchase	$74	$34	$−40	125.2
Total expenditure (A × B × C $billion)	$1.8	$1.0	$−0.9	100.0
Antiadrenergic agents, peripherally acting				
Total expenditure (A × B × C $billion)	$0.6	$0.5	$−0.1	
Antiadrenergic agents, centrally acting				
Total expenditure (A × B × C $billion)	$0.3	$0.2	$−0.1	
Antianginal agents				
Total expenditure (A × B × C $billion)	$0.2	$0.2	$0.0	
Antiarrhythmic agents				
Total expenditure (A × B × C $billion)	$1.5	$0.9	$−0.5	
Diuretics				
Total expenditure (A × B × C $billion)	$0.8	$0.6	$−0.2	
Antihypertensive combinations				
Total expenditure (A × B × C $billion)	$3.4	$4.5	$1.2	
Angiotensin II inhibitors				
Total expenditure (A × B × C $billion)	$2.4	$2.4	$0.0	
Other				
Total expenditure (A × B × C $billion)	$0.4	$0.5	$0.1	
Nonelderly population (million)	248	266	18	

Source. 2005 and 2009 Medical Expenditure Panel Surveys.
Note. Expenditures are expressed in 2011 prices.

The decomposition estimates associated with ACE inhibitors, beta blockers, and calcium channel blockers show that the decline in expenditures in these subclasses are entirely because of declines in the average expenditure per fill. This could be

attributable to a shift from brand-name drugs to generics. Given the vast number of cardiovascular drugs associated with each subtherapeutic class, we do not provide brand and generic estimates similar to those provided in Tables 4 and 5, but each of these subclasses experienced generic entry during the period of analysis. For example, ramipril, the generic for the ACE inhibitor Altace, entered in December 2007, and carvedilol, the generic for the beta blocker Coreg, entered in September 2007. Calcium channel blockers already had higher rates of generic efficiency, so that when Norvas began to face generic entrants in 2007, the generic market share increased from 47% in 2006 to 96% in 2009 (Berndt & Aiken, 2011).

Expenditures on Payer Type

Table 7 highlights how the drug expenditure distribution by payer type among the nonelderly substantially changed from 2005 to 2009. Overall, the proportion of drug spending among the nonelderly paid by private and public sources increased by 7 and 8 percentage points, respectively, whereas the proportion paid out of pocket by individuals and families declined by 14 percentage points. The decline in the proportion of drug expenses paid out of pocket is observed across all therapeutic classes except for alternative medicines. In contrast, from 2005 to 2009, the proportion of drug expenditures paid by private sources—mostly private insurance, but also including worker's compensation and other private sources—increased in all but two classes (antineoplastics and hormones/hormone modifiers), while the proportion of drug expenditures paid by public sources—primarily Medicaid, but also including Medicare, VA, Tricare, state/local, and other public—increased in all but three classes (immunological agents, nutritional products, and alternative medicines).

Conclusions

From 2005 to 2009, prescription drug expenditures among the nonelderly increased by $14.9 billion or 9.2%, albeit at a slower rate relative to the first half of the decade. Expenditures increased in 12 out of the 16 therapeutic classes, with the largest growth seen among immunologic agents and CNS agents. In contrast, expenditures on cardiovascular agents declined by approximately $5.4 billion or 29%. Our results indicate that these spending changes were attributable to a variety of factors. For instance, the rise in spending on immunostimulants was attributable to an increase in expenditures per fill and the decline in spending on cardiovascular drugs was attributable to a decline in expenditures per fill. In contrast, increases in the number of users and expenditures per fill were the drivers of spending growth for anticonvulsants and CNS stimulants.

These results provide some insight into generic entry, brand loyalty, and the price gap between brand and generic drugs. In the case of cardiovascular agents, from 2005 to 2009, we find that the average expenditure per fill declined by 58% for beta blockers, 47% for calcium channel blockers, and 72% for ACE inhibitors; each of these subclasses also experienced generic entry during this period. For anticonvulsant drugs

Table 7. Payer Distribution of Prescription Drug Expenditures by Therapeutic Class, Nonelderly Population.

	Year		
Services	2005 (%)	2009 (%)	Difference (%)
All therapeutic classes			
Private	44	51	7
Public	21	28	8
Self	35	21	−14
Immunologic agents			
Private	45	62	17
Public	41	31	−10
Self	14	7	−6
Central nervous system agents			
Private	41	46	5
Public	25	34	9
Self	34	20	−14
Miscellaneous agents			
Private	31	63	32
Public	18	24	6
Self	50	13	−38
Anti-infectives			
Private	43	52	9
Public	23	30	8
Self	34	18	−17
Psychotherapeutic agents			
Private	37	40	3
Public	33	39	6
Self	30	21	−9
Metabolic agents			
Private	48	56	7
Public	18	21	4
Self	34	23	−11
Gastrointestinal agents			
Private	51	62	11
Public	21	22	1
Self	28	16	−12
Respiratory agents			
Private	46	47	1
Public	24	34	10
Self	31	20	−11

(continued)

Table 7. (continued)

Services	Year		Difference (%)
	2005 (%)	2009 (%)	
Topical agents			
Private	48	54	6
Public	16	21	6
Self	36	25	−11
Coagulation modifiers			
Private	35	49	14
Public	21	34	12
Self	43	17	−26
Nutritional products			
Private	20	47	27
Public	32	26	−6
Self	48	27	−21
Alternative medicines			
Private	14	68	54
Public	66	8	−57
Self	20	23	3
Biologicals			
Private	6	58	52
Public	3	41	38
Self	91	1	−90
Antineoplastics			
Private	74	65	−10
Public	4	20	17
Self	22	15	−7
Hormones/hormone modifiers			
Private	54	47	−7
Public	8	23	15
Self	38	29	−9
Cardiovascular agents			
Private	42	43	1
Public	15	21	5
Self	43	36	−6

Source. 2005 and 2009 Medical Expenditure Panel Surveys.
Note. Expenditures are expressed in 2011 prices.

used to treat bipolar disorder and seizures, we also find that generic fills substantially increased and brand-name fills declined during a period of generic entry. In contrast, average expenditure per brand-name fill substantially increased during this period,

suggesting that some brand-loyal consumers who do not switch to generics are relatively insensitive to price increases.

While our analysis only extends through 2009, the key findings related to the gap between brand and generic medications likely persist through 2013. For instance, a recent report on drug expenditures finds that the market basket of brand drugs that cost $100 in 2008 would cost $188 in 2013, whereas a market basket of generic drugs that cost $100 in 2008 would cost only $50 in 2013 (in 2008 dollars). This growing price disparity between brand and generic medications is likely attributable to the wave of patent expirations for blockbuster brand drugs, which have opened the market to generic competition and have yielded lower drug costs (Express Scripts, 2013).

As the ACA progresses, prescription drug spending will be an important target for cost containment efforts such as using comparative effectiveness research to discourage the use of costly, ineffective drugs or, conversely, encourage the use of low-cost drugs that are equally effective as higher cost interventions. While this study is unable to determine whether or not specific drugs are over- or underconsumed because of a lack of data on effectiveness, from an ACA evaluation perspective, these patterns highlight the importance of separating prepolicy secular trends in prescription drug expenditures from changes attributable to specific forces, such as shifts toward generic versions of blockbuster drugs. As millions of individuals gain subsidized coverage through the Medicaid expansion and health insurance marketplace, differentiating between increased spending on low-cost generic substitutes for brand-name drugs going off patent will allow analysts to design benefit packages and cost containment strategies appropriately and effectively.

This study highlights a small number of drug classifications that account for the vast majority of prescription drug spending growth in recent years—immunologic agents and CNS agents, especially immunostimulants, anticonvulsants, and CNS stimulants. Such identification can help target research efforts into whether further guidelines for appropriate use are warranted and provide insight into market dynamics driving higher prices per fill.

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Notes

1. Major provisions on comparative effectiveness research are on pages 609-625, Subtitle D—Patient-Centered Outcomes Research, of H.R. 3590 The Patient Protection and Affordable Care Act, 1/5/2010.
2. An important area of research relates to identifying drugs that are associated with overuse or underuse relative to an optimal target. However, this is beyond the scope of this study, as we are unable to measure the level of effectiveness associated with specific drugs.
3. Using 1997 to 2007 data from the IMS Health, National Sales Perspectives, Aitken, Berndt, and Cutler (2008) also find that annual growth in real prescription drug spending slowed over time because of more patent expiration, increased generic penetration, and reduced new product innovations. Berndt and Aitken (2011) also use the National Sales Perspectives to analyze trends in prescriptions since the passage of the Waxman-Hatch Act of 1984. They find that the generic share of retail prescriptions has grown from 18.6% in 1984 to 74.5% in 2009.
4. Although the MEPS data represent the best source for data on population-wide prescription drug use and spending, it is important to note that some of the MEPS data could be biased because of changes in the survey editing methodology over time. Beginning with the 2007 data, the rules MEPS has used to identify outlier prices for prescription medications became much less stringent than in prior years. As a result, there is less editing of prices and quantities reported by pharmacies, more variation in prices for generics, lower mean prices for generics, higher mean prices for brand-name drugs, greater differences in prices between generic and brand-name drugs, and a somewhat lower proportion of spending on drugs is by families, as opposed to third-party payers (Agency for Healthcare Research and Quality, 2013).
5. For additional information on these and other Multum Lexicon variables, as well as the Multum Lexicon database itself, refer to http://www.multum.com/lexicon.html
6. A supplemental table that lists all the drugs within each of these groupings is available on request.
7. A possible alternative for deflating per capita spending is the medical care component of CPI (CPI-M). However, compared with the CPI-U, the CPI-M is by design more sensitive to changes in the market basket of medical services and changes in medical prices. Since one of the goals of this analysis is to understand the role of changes in these two factors, removing them from the trends defeats the purpose.
8. The increase in the number of users is driven by population growth. In per capita terms, the share of the population with at least one prescription decreased from 61.5% to 58.2% from 2005 to 2009.
9. The classification of anticonvulsants (e.g., multiuse vs. seizure) can vary depending on the source of information (physician review, PubMed Health, or Drugs.com). We also found that all multiuse drugs were associated with a nontrivial share of patients that report having epilepsy and other medical conditions, such as pain, anxiety, and mood disorders. We also found that all traditional seizure medications were prescribed to patients with anxiety or mood disorders.
10. It is important to note, however, that the change in the average expenditure per generic fill is somewhat misleading as the sample size and mix of generic drugs substantially changed from 2005 to 2009.

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