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Explaining Drug Spending Trends: Does Perception Match Reality?

Increased volume, not rising prices, accounted for drugs’ higher levels of spending in this study of therapies for seven common medical problems.

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ABSTRACT: Several recent studies have made clear that drug expenditures are rising more rapidly than other health care spending. What has not been clear, however, is how much drug spending is driven by price rather than volume and whether volume increases are appropriate. This DataWatch takes a closer look at the components and drivers of drug spending using large claims databases from managed care and employer-sponsored health benefit plans. In both environments this study found volume, not price, to be the largest driver of drug spending for seven diseases studied. For four of the diseases, we review the clinical issues that may have influenced volume growth.

Medicine has changed dramatically over the past several years, as pharmaceutical therapies have assumed a more prominent role. Prescription drug spending represented 7.8 percent of total health care spending in 1998. However, those costs have increased at double-digit rates in each of the past two years, and rates of this magnitude are expected to continue.

The current perception is that this rapid growth is largely driven by price increases, the promotion of inappropriate use through widespread “direct-to-consumer” (DTC) sales campaigns, and accelerated approvals of new, higher-price drugs. Prior studies that have examined these issues were limited by types of data used (prescription drug information only in several cases) or pricing metrics (average wholesale prices rather than actual transaction prices), or they did not disaggregate growth into disease-specific component factors (for example, prescriptions per person, cost per prescription, days of therapy per prescription, prevalence, or inflation). In this

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paper we examine price and volume factors that influence the level of and growth in spending on prescription drugs. The causes of drug spending increases, we found, are more involved than the popular story of price hikes and consumer-oriented advertising.

**Underlying Drivers Of Drug Spending Trends**

The underlying drivers of spending trends can be classified into two categories: new science, and better practice. As science advances, this new knowledge improves providers’ ability to target treatments to those patients at highest risk, diagnose them more accurately and earlier, and more effectively treat the diseases found. Through these avenues, new science creates the basis for increased patient identification, changes in drug therapy mix and duration, and targeted combination therapies.

The second driver is better practice, or the translation of science into routine care. Evidence-based medicine, practice guidelines, and performance measures have the potential to increase the number of diagnosed patients or the number undergoing optimal treatment. In this context, the following changes may explain a large part of recent prescription drug spending trends: (1) Growing prevalence of identified and treated disease: More patients may enter treatment because the rate of diagnosis and awareness of disease have increased. In addition, as survival times lengthen, the number of patients under treatment will grow. (2) Demographic shifts toward an older population: Older patients tend to have more chronic and severe cases of a disease or multiple conditions, each of which may require more treatment. (3) Mix of existing therapies toward more costly agents: The percentage of patients using specific medications can shift over time, as evidence warranting the use of one drug versus another accumulates or as standards of practice change. (4) Increasing quantities of medication used per patient: “Intensive” changes in therapy occur when the dosing regimen increases so that a patient receives more therapy over the same time period (for example, higher doses to treat specific cancers or to keep blood sugar under better control for diabetes). Quantity also may increase through the use of more “extensive” therapy, so that therapy is provided over longer periods of time (for example, ongoing use of antidepressants to prevent recurrence). (5) Introduction of new therapeutic agents: The efficacy and side-effect profile of new drugs may create options for patients who previously were untreated or under-treated. (6) Inflation: Price increases of existing therapies also may contribute to the growth in drug spending.
Study Methods

The diseases and drug classes selected for these analyses are those with the highest spending or are among the fastest-growing categories reported in other studies. The analyses described below were completed for seven disease/drug categories and were conducted by two research groups that worked independently. Detailed findings are reported for antidiabetic, antihyperlipidemic, hormone replacement therapy, and asthma drug categories.

- **Data sources.** Two data sources of medical and pharmaceutical administrative claims were used for this study: (1) 1995 and 1998 data from Protocare Sciences’ databases, and (2) 1994 and 1997 data from MEDSTAT’s MarketScan databases. Protocare Sciences data represent the experience of managed care plan enrollees residing in more than twenty states (primarily in the Midwest and South) who were covered by employers and other commercial groups, as well as Medicare-eligible persons enrolled in health maintenance organizations (HMOs). The MEDSTAT Private Pay Fee-for-Service Database contains the health care service use of active employees, their dependents, early retirees, and persons continuing coverage who are covered by noncapitated health benefit plans of large employers nationwide. MarketScan data used for this study were contributed by a common set of employers in 1994 and 1997.

Prescription drug and medical claims histories were examined to identify patients treated with a particular drug (“users”) or with a diagnosis corresponding to an approved indication for that drug but no drug use (“potential users”). Two patient groups were analyzed using Protocare Sciences data: asthmatics and women eligible for hormone replacement therapy. The expenditure analyses for antidiabetic, antihyperlipidemic, antidepressant, antihistamine, and gastrointestinal agents were conducted using the MarketScan database. The selection of which database to use for each condition was made a priori without respect to expectations about differential spending patterns in the two patient populations.

- **Factors contributing to spending growth.** Growth in prescription drug spending was computed using a multiplicative growth equation, where the product of the individual growth factors equaled the overall growth rate in spending per health plan member. For each drug category, total spending growth was disaggregated into several price and volume factors. We defined *price factors* as those affecting the price per day of therapy and *volume factors* as those affecting the intensity of use and the number of users.

The spending growth analyses were conducted at the level of individual National Drug Codes (NDCs). For NDCs available in both the base and comparison years (“established drugs”), we calcu-
lated two price factors (inflation and the change in strength and therapeutic mix) and two volume factors (changes in the number of prescriptions per person and the number of days supplied per prescription). Inflation was measured by calculating an index of changes in actual transaction prices, similar to the Consumer Price Index (CPI). The measure of therapeutic and strength mix captured the extent to which spending was affected by a change in the mix of drugs used within a drug category (such as a change from one dosage level to another for a drug or from one drug to another in the same class). One price and two volume factors were calculated to capture the impact of new NDCs (“new drugs”): changes in the average price per day, the number of prescriptions per person, and the number of days per prescription. A final volume factor calculated was the change in the number of users and potential users of prescription drugs per thousand plan members.

Findings

For each of the seven diseases/drug categories analyzed, we observed substantial drug spending increases ranging from 43 percent to 219 percent during the three-year observation period (Exhibit 1). When we decomposed that increase, we found that although the average transaction price rose in every case but one, the impact on the rise in drug spending was greatly exceeded by that of growth in medication volume. The relative ratios of increased volume to increased price ranged from a low of 2.5:1 for hormone replacement therapy to more than 10:1 for gastrointestinal agents and lipid-
lowering drugs.

Payments for antidiabetic drugs increased by more than 90 percent between 1994 and 1997 (Exhibit 2). The majority of the increase—approximately seventy-three percentage points—resulted from changes in volume factors, primarily prescriptions per person, because of the use of newer drugs and prevalence of the disease. Price changes contributed about twenty-one percentage points (inflation, 11 percent over three years; new therapies, 23 percent; and change in therapeutic mix, –13 percent).

Price factors had little influence on the 80 percent increase in expenditures for the cholesterol-lowering drug class during the three-year time period (Exhibit 2). Although the average price per day of the drugs that were already on the market in 1994 fell over the three-year period, the strength and therapeutic mix of these existing products was somewhat more expensive in 1997 than in 1994. Prices of new drugs were similar to or lower than those already on the market. On the volume side, there were modest increases in prescriptions per person and days of therapy per prescription. The most striking change over the three years was the increase in our measure of disease prevalence (fifty-four percentage points).

Spending on hormone replacement therapy increased by more than 200 percent from 1995 to 1998 (Exhibit 2). The number of patients treated per thousand health plan members represented 100 percentage points of total growth, and patients with treatment received more prescriptions (a 36 percent increase in prescriptions per patient for established drugs and a 21 percent increase for new drugs). Prices for established medications contributed 42 percent during the three years, and a shift in the mix of established therapies was responsible for twenty-one percentage points of the overall increase.

### EXHIBIT 2
Factors Responsible For Growth In Price And Volume For Various Pharmaceutical Categories

<table>
<thead>
<tr>
<th>Category</th>
<th>Price</th>
<th>Volume</th>
<th>Prescriptions per patient</th>
<th>Days per prescription</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Inflation rate</td>
<td>Mix (established therapies)</td>
<td>New drug prices</td>
<td>Prevalence</td>
</tr>
<tr>
<td>Asthma</td>
<td>−0.5%</td>
<td>17%</td>
<td>−5%</td>
<td>25%</td>
</tr>
<tr>
<td>Hormone replacement therapy</td>
<td>42</td>
<td>21</td>
<td>0.3</td>
<td>100</td>
</tr>
<tr>
<td>Antidiabetics</td>
<td>11</td>
<td>−13</td>
<td>23</td>
<td>34</td>
</tr>
<tr>
<td>Antihyperlipidemics</td>
<td>−7</td>
<td>10</td>
<td>−4</td>
<td>54</td>
</tr>
<tr>
<td>Antidepressants</td>
<td>7</td>
<td>10</td>
<td>2</td>
<td>38</td>
</tr>
<tr>
<td>Antihistamines</td>
<td>6</td>
<td>8</td>
<td>0.1</td>
<td>22</td>
</tr>
<tr>
<td>Gastrointestinal</td>
<td>2</td>
<td>3</td>
<td>−2</td>
<td>23</td>
</tr>
</tbody>
</table>

**SOURCE:** Authors’ analysis.
expenditure changes.

For asthma, we observed a 94 percent increase in medication expenditures (Exhibit 2). Price changes for new or established drugs had a negative impact on spending growth, although a shift in type of therapy prescribed contributed 17 percent. On the volume side, prevalence contributed about one-fourth of the spending growth. The primary driver was the increase in number of asthma-related prescriptions filled each year, which grew from 8.7 to 14.2 per patient, and a large shift from established to new drugs.

In our data only 24 percent of asthma patients in 1995 were using inhaled corticosteroids. By 1998 our study showed that 40 percent of patients received at least one prescription for such medicines. Not only did more patients receive at least one canister of the medication during the year, but a substantial number received three or more (19 percent in 1998 versus 9 percent in 1995). Annual asthma medication costs per patient rose markedly during the study time frame (from $236 to $460). During this same period, emergency room visits fell by thirty-one visits per thousand asthma patients. Hospitalizations for asthma decreased also (by thirty-five per thousand asthma patients). The savings from these service changes helped to offset the increase in drug spending.

### Discussion And Policy Implications

Health plans, employers, the Health Care Financing Administration, and patients increasingly voice concerns about drug spending. Although it still represents a relatively small share of overall spending, drug spending is rising faster than spending for other categories of health care services. In our study we found that volume, not price, primarily drove this growth. This finding did not differ greatly when we studied both a managed care environment and a population that received health benefits from a group of large employers.

Large increases in prevalence drove volume growth for two drug categories (hormone replacement therapy and lipid-lowering drugs). What could have accounted for the extraordinary growth of patients receiving these treatments? From the standpoint of new science, increasing evidence supports the efficacy of these therapies to reduce the risk of osteoporosis and heart disease. Improvements in practice may also have occurred. Over time, patients and physicians may have gained greater awareness of the benefits of both treatments. This heightened awareness likely increased lipid or osteoporosis screening as part of a routine visit to the doctor, and hence the conditions were discovered and treated.

Volume also rose for asthma and diabetes, but prevalence played a relatively smaller role. Instead, each patient appeared to receive
more-intensive treatment with many more prescriptions in the third compared with the base year. Once again, new science or better practice may account for the change.

For asthma, the role of anti-inflammatory medications (inhaled corticosteroids) has been known for a decade. However, their critical importance was highlighted in 1997 in the National Heart, Lung, and Blood Institute (NHLBI) practice guidelines on asthma therapy. During this time frame, pharmacy benefit management (PBM) companies, health plans, and disease management companies have stressed to patients and providers the need to incorporate these principles into routine practice. This emphasis may explain some of the observed increase in prescriptions per patient and the shift to newer therapies.

In a landmark 1993 article, the Diabetes Control and Complications Trial (DCCT) showed that tighter management of blood sugar reduced the risk of diabetic complications such as kidney dysfunction and loss of vision. In addition, several new classes of chemically distinct medications became available, having much greater ability to reduce blood sugar levels compared with the older agents. The DCCT study and the efficiency of these new medications both enabled and encouraged more-intensive medication regimens. In an effort to more closely control their disease, patients may have received multiple medications (some at higher doses), which would contribute to the observed rise in prescriptions per person.

Policy implications. Our examples have shown that the reality of rising drug spending may differ from the simple story of rising prices. As health plans and payers consider the needs of their patients and the limits of their resources, a detailed examination of their data would be informative. Disaggregating spending trends would allow analysis of the underlying clinical and population drivers of spending and help to determine the appropriateness of spending increases. If the analyses here are representative, it is likely that volume will be the main component of change for most diseases examined, the relative weight between volume and price will vary, and individual factors will have differing influences across diseases.

Rhetoric frequently focuses on the impact of price and also how advertising inappropriately increases volume. In the data we examined, price did play a role. But on closer examination, it was a relatively minor one (ranging from –1 percent to 29 percent of the total...
growth). Although it is likely that advertising does influence volume growth, a more salient question to answer is whether or not that growth is appropriate.

If the proportion of a patient population treated for a particular condition increases (as was the case for antihyperlipidemic and hormone replacement therapy), should this increase be expected, given available therapies and standards of practice for the condition? If the intensity of treatment per patient increases for a specific drug class or disease category, does this change reflect improved practice standards, or perhaps a shift to pharmaceutical therapy away from other forms of treatment? Our data for diabetes and asthma therapies are consistent with these influences. However, other explanations may apply to other selected drug classes or diseases. For this reason, it is important for payers and providers to examine their own data to identify possibly inappropriate use of medications or therapies that differ from evidence-based or consensus standards.

This study did not apply practice guidelines to individual cases, so we could not identify definitively whether the growth in volume resulted from more appropriate or more inappropriate use. With that caveat, we believe that the volume growth observed for the categories we examined should, in most cases, improve the health and well-being of the population. If additional analysis were to confirm that observed increases in volume were clinically warranted, a difficult question then arises: Who should pay for increased drug costs? In some cases, the medication costs may be offset by reductions in hospital, laboratory, or physician services, as observed for asthma. In other cases, net cost savings may not occur in the near term, if at all. Yet if patients, for example, with milder and non-suicidal depression feel better on medication, or if more expensive but less sedating antihistamines improve concentration, are these gains worth the extra costs? If they are, should the patient, the health plan, the employer, or society pay for those improvements? Cost-effectiveness studies may help to answer these questions. But, importantly, these studies must lead to a dialogue addressing each participant’s willingness to pay for the improvements in health that medications, when used appropriately, can create.

If volume represents the primary driving force behind drug spending growth, then future research should examine this volume and determine what use is appropriate and what use is not. But this examination must also focus on the impact of medications on the total cost of care and the overall improvement in patients’ well-being. With these data in hand, we can compare our willingness to pay with the benefits that appropriate use of medications can bring.
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NOTES

6. To express spending growth as a sum of individual factors, a logarithmic transformation was applied to linearize the equation. Exhibit 2 shows the linearized growth rate for each factor. The total growth rate for each drug category is then the sum of the linearized growth rates for that category. Exhibit 1 depicts the sum of price and volume factors.