

# The Relationship Between Drug Utilization and Out-of-Pocket Expenses for Oral Antineoplastics Compared to a Market Basket of Commonly Used Drugs

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## ABSTRACT

**OBJECTIVES:** The main objective was to evaluate the relationship between the average out of pocket cost (OPC) paid and the total prescription volume (TRx) for oral antineoplastics compared to a market basket of commonly utilized oral drugs. Is drug utilization more sensitive to OPC changes when there is greater competition and/or when the ailments treated by those drugs are less acute? We hypothesized an inversely proportional relationship between OPC and TRx for the market basket drugs, demonstrating a price-elastic demand. However, for the antineoplastics, we predicted a less elastic demand.

**METHODS:** We obtained monthly OPC data and TRx data from SDI's VONA and VOPA databases from 1/07-4/09. We compared prescription volume for eight oral antineoplastics (capecitabine, imatinib, lenalidomide, thalidomide, sunitinib, erlotinib, temozolomide, dasatinib) to a market basket of eight commonly utilized oral drugs (celecoxib, sitagliptin, rosuvastatin, fenofibrate, ramipril, simvastatin, atorvastatin, amlodipine). To clearly elucidate the effect OPC had on TRx, we analyzed data from eight large private insurance plans in the US that showed high prescription patterns for the market basket drugs, and calculated every month the percentage of prescriptions each plan covered. We calculated the correlation coefficient ( $r^2$ ) for the relationships between a drug's average OPC and its TRx.

**RESULTS:** For the antineoplastics, no drug-payer pairs showed significantly negative correlations ( $r^2 < 0.5$ ) between OPC and TRx proportions. However, of the 64 possible drug-payer pairs in the market basket, 26 showed significantly negative correlations, demonstrating a much more price-elastic demand with respect to monthly OPC fluctuations.

**CONCLUSIONS:** Antineoplastic utilization appears to be inelastic with respect to OPC fluctuations vis-à-vis the chosen market basket. This observation may be a function of the severity of disease, the lack of treatment options or both. Broader treatment options and specifically generic competition may contribute to this finding. Further research is warranted to track these relationships in a prospective, multi-factorial manner in order to better infer a cause-effect relationship. Furthermore, an analysis incorporating the proportion of written prescriptions that are filled as a function of monthly OPC fluctuations is an avenue of further research.

## INTRODUCTION

- It has been shown in the US that drug prescribing behavior can be influenced by the level of reimbursement for a particular drug. Differential drug coverage affects patient care and healthcare costs by impacting prescribing behavior (DeWitt, 2006)
- Adherence in disease management programs for five commonly used drug classes (angiotensin-converting enzyme inhibitors/angiotensin receptor blockers, beta-blockers, diabetes medications, statins and steroids) were significantly enhanced in plans with lower OPC for these drugs (Chernew, 2008)
- The relationship between disease management adherence and a patient's perceived quality of life is a complex one. Adherence to long-term treatments is often poor for conditions that require continual treatment (e.g. hypertension, hyperlipidaemia), especially when the patient does not notice substantial improvements in quality of life with continued treatment (Nunes, 2001)

## OBJECTIVES

- To determine if monthly OPC changes for a given insurance plan precipitated changes in the number of prescriptions filled by patients for the drugs analyzed (as represented by the percentage of total prescriptions in a plan that were represented by a particular drug)
- To determine if the sensitivity to changing OPC was different depending on whether the drugs are for chronic conditions (market basket) or for antineoplastics, which can more directly affect quality of life

## METHODS

- Eight oral antineoplastics and eight drugs of a comparable market basket that are usually used as part of a long-term treatment regimen were chosen for analysis
  - Colors correspond to those used in data charts

Capecitabine	Amlodipine
Dasatinib	Atorvastatin
Erlotinib	Celecoxib
Imatinib	Fenofibrate
Lenalidomide	Ramipril
Sunitinib	Rosuvastatin
Temozolomide	Simvastatin
Thalidomide	Sitagliptin

- Eight private drug payers in the US were chosen based on the highest volume of total prescriptions of the drugs analyzed here for the period January 2007 to April 2009 using SDI's VOPA database:

- Argus
- BCBS of Illinois
- BCBS of Texas
- Catalyst Health Solutions
- Express-Scripts
- Medco Health
- Prescription Solutions
- Wellpoint BC of California

Note: each payer is represented in the charts by the respective symbol next to their name

- To normalize for the discrepancy in the total volume of prescriptions written (whether they are filled or not) and the volume of prescriptions that are specifically dispensed, we denote prescription volume as proportion of prescriptions represented by a particular plan
  - Example: the proportion of amlodipine prescriptions represented by Medco in May 2008 is determined by:

$$\frac{\text{amlodipine prescriptions filled by Medco patients in May 2008}}{\text{total prescriptions filled by Medco patients in May 2008}}$$

- A key assumption is that the populations covered by these plans are so large that they reliably mirror the overall US population
- Prescription and OPC data were obtained by SDI's VONA database monthly from January 2007 to April 2009
- Correlation coefficients ( $r^2$ ) were calculated for the relationship between the drug-plan proportions and the average OPC for each given plan

## RESULTS

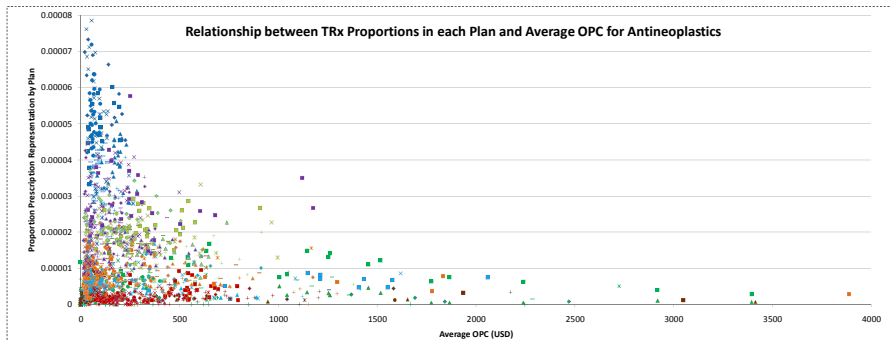


Figure 1a: For the antineoplastics, scatterplots depicting the relationship between the proportions of prescriptions represented by the individual plans for the eight chosen drugs (y-axis) and the average OPC paid by patients covered by those plans (x-axis). All data are monthly from January 2007 to April 2009. Each color represents a drug, and each shape specifies a payer, as described in the methods.

	capecitabine	dasatinib	erlotinib	imatinib	lenalidomide	sunitinib	temozolomide	thalidomide
Argus	-0.031	0.509	-0.005	-0.132	0.372	0.142	-0.346	0.140
BCBS of IL	0.172	-0.248	0.257	-0.181	-0.276	-0.214	-0.047	-0.196
BCBS of TX	-0.281	-0.032	-0.206	-0.042	0.404	-0.299	-0.370	-0.390
Catalyst	-0.491	0.433	0.128	0.012	0.320	0.017	-0.424	0.341
Express Scripts	0.457	0.448	0.359	-0.378	-0.013	-0.168	0.205	0.210
Medco	0.017	-0.216	0.095	-0.143	0.377	0.338	-0.494	0.107
Rx Solutions	0.104	-0.032	-0.201	-0.457	-0.235	0.053	0.255	0.116
Wellpoint BC of CA	0.064	-0.062	-0.225	0.243	-0.018	-0.204	0.094	0.319

Figure 1b: For the antineoplastics, the correlation coefficients between the proportions of prescriptions represented by the individual plans for the eight chosen drugs (y-axis) and the average OPC paid by patients covered by those plans (x-axis). Numbers in red represent positive correlations greater than 0.5. All data are monthly from January 2007 to April 2009.

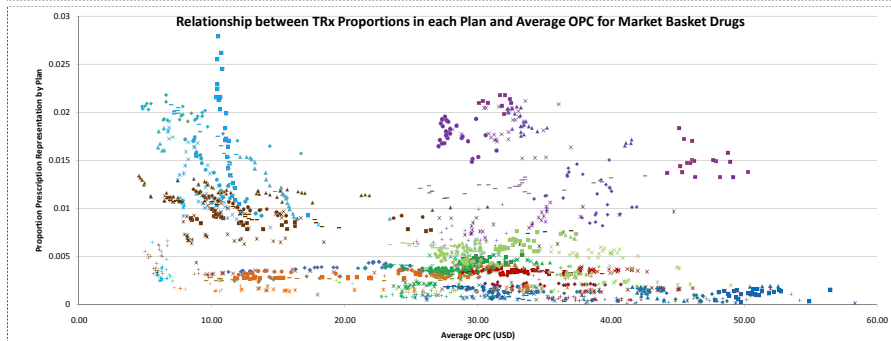


Figure 2a: For the market basket, scatterplots depicting the relationship between the proportions of prescriptions represented by the individual plans for the eight chosen drugs (y-axis) and the average OPC paid by patients covered by those plans (x-axis). All data are monthly from January 2007 to April 2009. Each color represents a drug, and each shape specifies a payer, as described in the methods.

	amlodipine	atorvastatin	celecoxib	fenofibrate	ramipril	rosuvastatin	simvastatin	sitagliptin
Argus	-0.535	-0.262	0.002	-0.682	0.731	-0.745	-0.864	0.370
BCBS of IL	-0.715	-0.925	-0.637	0.206	0.640	0.567	-0.644	-0.166
BCBS of TX	-0.825	-0.750	-0.750	0.336	0.851	0.711	-0.887	-0.301
Catalyst	-0.800	-0.112	-0.114	-0.469	0.796	-0.611	-0.942	0.296
Express Scripts	-0.872	0.686	-0.397	-0.846	0.445	-0.798	-0.946	-0.737
Medco	-0.827	-0.471	-0.625	-0.301	0.612	-0.296	-0.919	-0.518
Rx Solutions	-0.492	0.083	-0.448	-0.064	-0.509	-0.438	-0.103	0.012
Wellpoint BC of CA	-0.354	0.698	0.672	0.154	0.472	0.137	-0.521	-0.076

Figure 2b: For the market basket, the correlation coefficients between the proportions of prescriptions represented by the individual plans for the eight chosen drugs (y-axis) and the average OPC paid by patients covered by those plans (x-axis). Numbers in green represent negative correlations less than -0.5. Numbers in red represent positive correlations greater than 0.5. All data are monthly from January 2007 to April 2009.

## CONCLUSIONS

- With no pairs showing significantly negative correlations between price and prescriptions for the antineoplastics compared to 26 pairs for the market basket, it is clear that the latter market demonstrates a greater degree of elasticity with respect to OPC fluctuations
- Whether the differences in elasticity are due to the greater severity of disease in cancer and the chance for a greater improvement in quality of life compared to the chronically-used market basket drugs, or due to the great degree of competition between drugs in the market basket, or both is unclear, warranting future research
- An analysis showing the proportion of written prescriptions that are actually filled as a measure of drug adherence with respect to OPC fluctuations is an avenue of further research

## REFERENCES

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