

A Comparison of the Costs of Dispensing Prescriptions through
Retail and Mail Order Pharmacies

Final Report to the NCPA Foundation

February 2013

Norman V. Carroll, R.Ph., Ph.D.
Professor of Pharmacoeconomics and Health Outcomes
School of Pharmacy
Virginia Commonwealth University

Executive Summary

Over the past several years, a number of health plans have implemented mandatory programs that require patients to use mail order pharmacies for maintenance prescriptions. Independent retail pharmacies, which serve a substantial proportion of Medicare Part D beneficiaries, are concerned that the Centers for Medicare and Medicaid Services (CMS) may change its rules to allow health plans to offer mandatory mail order in Part D plans.

Plan sponsors use mail order pharmacies because they believe mail order dispensing will lower their prescription drug costs. While mail order pharmacies may be able to offer lower costs as a result of efficiencies in dispensing and purchasing, the use of different ingredient cost schedules for mail and retail pharmacies, differences in utilization and wastage rates, and differences in rates of generic substitution could lower the savings that plans actually realize. Further, plans usually discount patients' copayments to induce them to use mail order pharmacies. This substantially reduces any savings that plan sponsors realize. The objective of this study was to compare costs for prescriptions dispensed through mail order and retail pharmacies in Medicare Part D plans. The total cost of a Part D prescription is defined as the sum of costs paid by third-parties and costs paid by the patient. While the great majority of third-party payment for Part D prescriptions comes from Medicare, a portion for many prescriptions is paid by state pharmaceutical assistance plans, other insurance, and Part D plans (rather than Medicare) as enhanced benefits.

The sample of prescriptions for the study consisted of a 5% random sample of 2010 prescription drug event (PDE) data supplied by CMS. The sample of drugs analyzed consisted of the top 300 products for which mail order prescriptions were dispensed as defined by the Medispan generic product identifier (GPI). Total costs, costs paid by Medicare, costs paid by all third-party payers (including Medicare), and patient costs were calculated for the mail order sample and then compared with what the comparable costs would have been *if the prescriptions had been dispensed by retail pharmacies*. The PDEs included in the study sample were dispensed in the Initial Coverage Limit phase of Part D by retail or mail pharmacies and dispensed for patients who were insured by Part D for 12 months in 2010, who received no Part D subsidies, and who were alive for the full 2010 year.

The following statistics were calculated for each of the 300 GPIs: mean per unit costs (total, Medicare, all third-party payer, and patient) for mail and retail pharmacies, mean mail order quantity dispensed, and total number of mail order prescriptions dispensed. The actual total costs for mail pharmacies were then calculated as the sum (over all GPIs) of the products of mean mail order per unit cost, mean mail order quantity dispensed per prescription, and total number of mail order prescriptions dispensed. Actual mail order costs were then compared with what costs would have been if the same prescriptions had been dispensed at retail pharmacies. Retail pharmacy costs were calculated as the sum of the products of mean per unit retail costs, mean *mail order* quantity dispensed, and total number of *mail order* prescriptions dispensed.

The top 300 products accounted for 84.8% of mail order costs. Mail pharmacies accounted for 7.8% of prescriptions dispensed and 14.1% of total spending. The median supplies of medication dispensed were 30 days for retail pharmacies and 90 days for mail order pharmacies.

About 15% of prescriptions dispensed in retail pharmacies were for 90 day or greater supplies. Only 1% of mail order prescriptions were dispensed for a 30 day or less supply

The primary analysis compared costs between 90-day or greater supplies dispensed at mail with 90-day or greater supplies dispensed at retail. Costs per unit of medication for retail pharmacies, as compared with mail order pharmacies, were lower for total costs (\$0.94 vs. \$0.96), Medicare costs (\$0.59 vs. \$0.63), and all third-party payer costs (\$0.64 vs. \$0.72) and higher for patient costs (\$0.31 vs. \$0.24). Results from a comparison of all prescriptions that met the inclusion criteria, regardless of days supply, indicated that total costs and patient costs were higher, all third-party payer costs were lower, and Medicare costs were about the same for prescriptions dispensed at retail pharmacies. In both samples, generic substitution rates were higher for retail pharmacies (91.4% vs. 88.8% for 90-day and greater supply prescriptions and 90.2% vs. 89.1% for all study prescriptions.)

The primary results of the study, which were based on a large, random sample of Medicare Part D patients, indicated that neither Medicare nor other third-party payers realized savings when patients used mail order pharmacies. Further, when comparable days-supplies were dispensed, the total cost of using retail pharmacies was lower than the cost of using mail pharmacies. When comparing all prescriptions, not just those dispensed in 90-day or greater supplies, retail pharmacy costs were lower for all third party payers and about the same for Medicare. A primary reason that plans did not realize savings is that patients paid relatively less of total prescription costs, and plans paid relatively more, when patients used mail order pharmacies.

Introduction

Health plans and pharmacy benefit management companies (PBMs) that participate in the Medicare Part D program currently offer their patients a choice of mail order or retail pharmacy service for their prescriptions. Although patients are usually offered substantial economic incentives, in the form of lower copayments, to use mail order, they can pay higher copayments and continue to use retail pharmacies. Over the past several years, and outside of Medicare Part D, a number of health plans and PBMs have implemented mandatory programs that require patients to use mail order pharmacies for maintenance prescriptions^{1,2}. These plans are mandatory in the sense that if patients do not use the designated mail order pharmacy, the plan will not pay for their medicines. Independent retail pharmacies, which serve a substantial proportion of Part D beneficiaries, are concerned that the Centers for Medicare and Medicaid Services (CMS) may change its rules to allow health plans and PBMs to offer mandatory mail order in Part D plans.

Plan sponsors effectively subsidize patient copayments when they use mail order pharmacies based on the belief that mail order dispensing will lower their prescription drug costs. Mail order pharmacies claim that they offer lower costs to plan sponsors as a result of more efficient dispensing operations and volume purchasing of generic drugs³⁻⁷. However, the fact that mail order pharmacies may have the ability to provide lower unit costs for prescriptions does not necessarily mean that plan sponsors realize lower costs by using mail order pharmacies. The use of different ingredient cost schedules for mail and retail pharmacies, differences in utilization and wastage rates, and differences in rates of generic substitution could lower the savings that health plans actually realize through mail order pharmacies. Further, plans usually discount patients' copayments to induce them to use mail order pharmacies. Discounting copayments directly and substantially reduces any savings that plan sponsors may realize^{8,9}.

A few studies have conducted empirical analyses to compare the costs of retail pharmacy and mail order dispensing. These studies suggest that when the same market baskets of products are compared, mail order dispensing is associated with lower total costs and lower costs to patients, but not necessarily lower costs to plan sponsors^{8,10-12}. The copayment reductions that are used to induce patients to use mail order pharmacies shift costs from patients to plan sponsors. The greater the difference in retail and mail copayments, the smaller the mail order savings realized by plan sponsors. Further, copayment reductions have a substantial effect on the rate of usage of mail order pharmacies. The greater the copayment reductions, the more likely patients are to use mail order pharmacies¹². Thus, plan sponsors need to reduce copayments to get patients to use mail order, but the lower copayments reduce any savings that plans sponsors' may realize from mail order dispensing.

Savings from use of mail order pharmacies would also be affected by differences in use of generic drugs between mail and retail pharmacies. Results of past research are mixed on this subject. In a study based on data from five large PBMs, Wosinska and Huckman found generic substitution ratios (the number of prescriptions dispensed as generics divided by the number of prescriptions for which generic alternates were available) were 92.99% for mail pharmacies and 92.02% for retail pharmacies¹³. Johnsrud et al.¹⁰ found that generic dispensing rates (the number of prescriptions dispensed as generics divided by the total number of prescriptions

dispensed) were 4-5% higher in retail pharmacies than in mail pharmacies for a matched market basket of the products most commonly dispensed by mail order pharmacies.

There are several research gaps in the current literature. First, none of the existing studies have specifically examined mail order use or costs in the Medicare Part D population. In fact, most of the studies of comparative costs were conducted before the Part D program was implemented. The Medicare population is older than the commercially insured population, so it is likely to use more prescription drugs and a different mix of drugs. Second, there has been little research into differences in generic substitution rates between mail and retail pharmacies and the existing research provides conflicting results. Given the impact that generic substitution has on costs, this is an important area for future research.

Study Objectives/Research Questions:

The objective of this study was to compare plan sponsor costs for prescriptions dispensed through mail order versus retail pharmacies to patients in Medicare Part D plans. The study also compared differences in total costs, costs paid by Medicare, and costs paid by patients.

Methods

Overview:

The study compared costs for prescriptions dispensed from mail order and retail pharmacies. The sample of drugs consisted of the top 300 products for which mail order prescriptions were dispensed. Products were defined by the Medispan generic product identifier or GPI (Wolters Kluwer Health, Indianapolis, IN). The sample of prescriptions was selected from 2010 prescription drug event (PDE) data supplied by CMS. PDEs are records of dispensed prescriptions and are roughly comparable to prescription claims. Generic substitution rates were calculated for mail and retail pharmacies for the sample of the top 300 products.

Costs Examined:

The total cost of a Part D prescription is defined as the sum of the ingredient cost, dispensing fee, and any sales tax. The total cost is also defined as the sum of Covered D Plan Paid Amount (the amount paid by Medicare as part of the standard benefit), Non-Covered Plan Paid Amount (the amount paid by the Part D plan that exceeds that Medicare standard benefit), Low Income Cost Share (LICS - the amount paid by Medicare to reduce the cost share for low income patients), Other TrOOP Amount, Patient Liability Reduction due to Other Payer Amount (PLRO), and the amount paid by the patient. Other TrOOP (True Out Of Pocket payment) amount is defined as "all qualified third party payments that contribute to a beneficiary's TrOOP" except for low income subsidies and patient payments.¹⁴ Other Troop Amounts are payments made on the patient's behalf by, for example, state pharmacy assistance programs or charities. PLRO is defined as "amounts by which patient liability is reduced due to payment by other payers that are not TrOOP-eligible and do not participate in Part D. Examples of non-TrOOP-eligible payers:

group health plans, worker's compensation, and governmental programs (e.g. VA, TRICARE)."¹⁵ Non-Covered Plan Paid Amounts arise when plans offer enhanced benefit plans to patients. The enhanced benefits include payment for drugs that are not covered by Part D and / or reduced patient cost sharing. In this study "all third-party payer costs" were defined as all prescription drug costs not paid by the patient. This was defined as the sum of Covered D Plan Paid Amount, Non-Covered Plan Paid Amount, Other TrOOP Amount, and Patient Liability Reduction. The study did not include patients receiving the LICS. "Medicare costs" were defined in this study as the costs paid by the Medicare program as part of the standard benefit.

Total costs, all third-party payer costs, Medicare costs, and patient costs were calculated for the mail order sample and then compared with what the comparable costs would have been *if the prescriptions had been dispensed by retail pharmacies.*

Description of Sample:

The following CMS data files for the 2010 year were used for the study:

- The Master Beneficiary Summary file included de-identified data describing Part D patients and the prescription drug plans in which they were enrolled. This file included a 5% random sample of Medicare Part D patients which provided a total of 2,727,742 patients.
- The Prescription Drug Events and Drug Characteristics files provided information about prescriptions dispensed to Part D patients. These files included such information as drug name, strength, and dosage form; quantity dispensed; date dispensed; and payment sources. The files included information on 61,621,582 PDEs.
- The Pharmacy Characteristics file included information on 66,685 participating pharmacies. Information included pharmacy type (e.g., mail or retail), the state in which the pharmacy was located, and whether it was part of a chain.

All files included identification numbers that allowed the researcher to link patients and organizations within the datasets, but not to identify specific individuals or organizations. Files with patient data were linked using the 'BENE_ID' variable. Files with pharmacy data were linked using the 'CCW_PHARMACY_ID' variable.

The original files provided by CMS included data on all types of Medicare patients and pharmacies and on prescriptions dispensed to these patients and from these pharmacies. The following exclusions were made to develop the final data sample.

First, PDEs that were not dispensed in the Initial Coverage Limit phase of Part D coverage were excluded from the sample. This was necessary because the relative levels of patient and plan costs differ greatly across benefit phases. On average, patients pay 100% of the drug cost in the deductible phase, approximately 25% in the Initial Coverage Limit phase, 100% in the coverage gap, and 5% in the catastrophic coverage phase. The relative levels of patient and plan costs are

more consistent within the Initial Coverage Limit phase. This is also the phase in which most prescriptions are dispensed.

Second, PDEs that were not dispensed in retail or mail pharmacies were excluded. The original sample also included prescriptions dispensed by other types of pharmacies (e.g. long term care pharmacies, specialty pharmacies, and nuclear pharmacies).

Third, patients who were not insured by Part D for 12 months in 2010; those that received either Medicaid, retiree drug subsidy, or other premium or copayment subsidy, and patients that died during 2010 were excluded from the sample.

Fourth, a small number of PDEs that appeared to be outliers were excluded. For example, there were a number of PDEs for which the quantity dispensed was unusually high (e.g., 25,000 tablets dispensed) and a number for which total costs were unusually low (e.g. less than \$1). PDEs with a pricing exception code were also excluded. These were prescriptions that were dispensed out-of-network, with Medicare as the secondary payer, or with other special pricing instructions. These were excluded because they had atypical prices.

Finally, the sample included only those PDEs for drugs in the top 300 products (defined by GPI) dispensed by mail pharmacies in 2010. (Each GPI includes all products with the same active ingredients, strengths, route of administration, and dosage form. Branded drugs and their generic equivalents are classified into the same GPI.) Identification of the top 300 products was based on total costs. Limiting the sample to these products allowed for mail order and retail pharmacy costs to be compared for the same sample of products. This was important because mail order and retail pharmacies dispense different mixes of products; mail order pharmacies dispense primarily maintenance drugs (those used to treat chronic conditions such as hypertension, high cholesterol, or heart disease) while retail pharmacies dispense both maintenance drugs and those used for acute needs (such as antibiotics and pain medications).

Figure 1 shows the files used and exclusion and inclusion criteria used to generate the final sample.

Analysis:

The sample for the analysis consisted of prescriptions dispensed through mail or retail pharmacies for the top 300 mail order products. That is, the top 300 products dispensed at mail pharmacies were identified, then all prescriptions for these products, from both mail and retail pharmacies, were included in the sample. A list of the top 300 GPIs is shown in Figure 2. The following statistics were calculated for each of the 300 products: mean per unit costs (total, all third-party payer, Medicare, and patient) for mail and retail pharmacies, mean mail order pharmacy quantity dispensed, and total number of mail order prescriptions dispensed. Mean unit costs were weighted by both mean quantity dispensed per prescription and number of prescriptions dispensed. Mean mail order quantity dispensed was weighted by number of prescriptions dispensed.

The primary analysis for the study compared costs for 90-day or greater supplies dispensed at mail with the costs of 90-day or greater supplies dispensed at retail. A secondary analysis compared all prescriptions that met the inclusion criteria, regardless of days-supply dispensed. In the latter analysis, retail prescriptions were predominantly dispensed as 30-day supplies and mail order prescriptions as 90-day supplies.

Total (actual) costs to mail pharmacies were calculated as the sum (over all GPIs) of the products of mean mail order per unit cost, mean mail order quantity dispensed per prescription, and total number of mail order prescriptions dispensed (Figure 3). This was done separately for total, all third-party payer, Medicare, and patient costs. Actual mail order pharmacy costs were then compared with what costs would have been if the same prescriptions had been dispensed at retail pharmacies. Retail pharmacy costs were calculated as the sum of the products of mean per unit retail costs, mean *mail order* quantity dispensed, and total number of *mail order* prescriptions dispensed. This comparison showed the differences in costs between what was actually paid to mail pharmacies and what would have been paid if the same prescriptions had been dispensed at retail pharmacies. Because the analysis was based on GPIs, which group branded products and their generic alternates into the same category, it takes into account differences in generic substitution rates between mail order and retail pharmacies.

Generic substitution rates were calculated for the sample of the top selling 300 products. The product dispensed for each PDE was classified using the Medispan Source Code (Wolters Kluwer Health, Indianapolis, IN) as either a co-licensed brand, single source brand, brand with generic alternative, or generic. The generic substitution rate was calculated as the number of generic prescriptions dispensed divided by the total number of prescriptions dispensed for which generic alternatives were available. For this calculation, the numerator was all prescriptions classified as "generic" and the denominator was all prescriptions classified as "generic" or "brands with generic alternatives".

The data also included dispense as written (DAW) codes for situations in which generic alternatives were available for prescribed products but branded products were dispensed (Figure 4). Three of the codes described situations in which the pharmacist would have no choice but to dispense a branded product. These were "Substitution Not Allowed by Physician", "Substitution Not Allowed - Brand Drug Mandated by Law", and "Substitution Allowed - Generic Drug Not Available in Marketplace". Because the pharmacist would have to dispense a brand product in these situations, we reduced the denominator of the generic substitution ratio by the amount of prescriptions dispensed with these codes.

If the proportions of prescriptions dispensed in each GPI were different between mail and retail pharmacies then comparing overall generic substitution rates could be misleading. To adjust for this the analysis calculated the mean generic substitution rate for each GPI for both mail and retail pharmacies, then calculated the weighted mean rate across all GPIs using the number of mail order prescriptions dispensed as the weighting factor. This provided a comparison of the actual generic substitution rate for mail pharmacies with what the generic substitution rate would have been if the same prescriptions had been dispensed in retail pharmacies.

Results

Descriptive Results

Total costs for all prescriptions dispensed from mail order pharmacies for all products equaled \$116,405,275. Total costs for the top 300 products dispensed from mail order pharmacies were \$98,722,939 which was 84.8% of total costs.

A descriptive analysis of the top 300 products indicated that 11,473,868 prescriptions for these products were dispensed by retail pharmacies and 965,720 were dispensed from mail pharmacies in 2010. This indicates that, for these products, 7.8% of Part D prescriptions were dispensed through mail order pharmacies. However, because of the larger quantities dispensed, mail order accounted for 14.1% of total spending. (Total costs for mail order prescriptions for the sample were \$98,447,849, compared with retail pharmacy sales of \$598,420,025.)

The typical prescription dispensed by a retail pharmacy had a mean per unit (e.g. per tablet or per gram) cost of \$1.09 and a mean quantity dispensed of 47.8 units. This resulted in a mean prescription price of \$52.16. By comparison, the typical prescription dispensed from a mail order pharmacy had a mean per unit cost of \$0.98, a mean quantity dispensed of 103.8 units, and a mean prescription price of \$101.94. (These statistics for retail and mail order pharmacies should not be compared because, while the samples consisted of the same 300 products, different quantities and numbers of prescriptions of each were dispensed.)

For the analysis of 90-day and greater supplies, there were 893,633 prescriptions dispensed from mail pharmacies and 1,817,384 dispensed from retail pharmacies. The typical 90-day or greater prescription dispensed by a retail pharmacy had a mean per unit cost of \$0.74 and a mean quantity dispensed of 106.4 units. This resulted in a mean prescription price of \$78.48. By comparison, the typical 90-day or greater prescription dispensed from a mail order pharmacy had a mean per unit cost of \$0.96, a mean quantity dispensed of 108.8 units, and a mean prescription price of \$104.63. (As before, these statistics should not be compared because different quantities and numbers of prescriptions for each GPI were dispensed.)

Comparison of mail order versus retail costs:

Results of the comparisons of costs for prescriptions with 90-day or greater supplies dispensed for the top 300 products from mail order pharmacies and for the same products, in the same quantities per prescription and numbers of prescriptions dispensed from retail pharmacies are shown in Table 1. These figures differ from the ones stated above because in this analysis retail and mail order unit prices are applied to mail order quantities per prescription and total prescriptions dispensed. Thus, this analysis has a different mix of prescriptions dispensed compared to the analysis above and this difference resulted in changes in the mean retail pharmacy costs per unit.

Costs per unit of medication for retail pharmacies, compared with for mail order pharmacies, were lower for total costs (\$.94 vs. \$0.96), all third-party payer costs (\$0.64 vs. \$0.72),

Medicare costs (\$0.59 vs. \$0.63), and higher for retail pharmacies for patient costs (\$0.31 vs. \$0.24). All differences were statistically significant at $p < 0.001$.

Mean all third-party payer costs per unit of medication were compared by GPI between mail and retail pharmacies. Retail pharmacies had lower all third-party payer costs for 244 GPIs while mail pharmacies had lower costs for 56 GPIs. As shown in Table 2, retail pharmacies were more likely to have lower costs for GPIs that included generic alternatives while mail pharmacies were more likely to have lower costs for GPIs that included only branded products.

The generic substitution rate for 90-day or greater supplies, after accounting for DAW codes, was 88.8% for mail order pharmacies. If these prescriptions had been dispensed in retail pharmacies, the generic substitution rate would have been 91.4%. Any differences in generic substitution rates were reflected in mean costs for each GPI because the GPI includes both generic and branded versions of each product.

The secondary analysis compared all prescriptions that met the inclusion criteria, regardless of days supply. For this analysis, the median supplies of medication dispensed were 30 days for retail pharmacies and 90 days for mail order pharmacies. About 15% of prescriptions dispensed in retail pharmacies were for 90 day or greater supplies. Only 1% of mail order prescriptions were dispensed for a 30 day or less supply

In this analysis, costs per unit of medication for retail pharmacies, compared with for mail order pharmacies, were higher for total costs (\$1.03 vs. \$0.98), lower for all third-party payer costs (\$0.70 vs. \$0.73), about the same for Medicare costs (\$0.640 vs. \$0.642), and higher for retail pharmacies for patient costs (\$0.33 vs. \$0.25). The differences for total, all third-party payer, and patient costs were statistically significant at $p < 0.001$. Retail pharmacies had lower all third-party payer costs for 165 GPIs while mail pharmacies had lower costs for 135 GPIs. As shown in Table 4, retail pharmacies were more likely to have lower costs for GPIs that included generic alternatives while mail pharmacies were more likely to have lower costs for GPIs that included only branded products. The generic substitution rate for this sample of prescriptions, after accounting for DAW codes, was 89.1% for mail order pharmacies. If these prescriptions had been dispensed in retail pharmacies, the generic substitution rate would have been 90.2%.

Discussion

The results of this study were based on a large, random sample of Medicare Part D patients. Within this group, the sample was limited to patients who received no subsidy or premium assistance and who were insured for all of 2010. Further, it was limited to prescriptions dispensed for the top 300 products. These accounted for about 85% of total mail order costs. Consequently, the results of this study should be representative of and generalizable to Medicare Part D patients in stand-alone drug plans who do not receive premium or copayment support.

The primary results of the study indicated that plan sponsors did not realize savings when their members used mail order pharmacies. For the comparison of 90-day and greater supplies, total,

Medicare, and all third party costs (which include enhanced benefits from Part D plans as well as payments made on patients' behalf by charities, state pharmaceutical assistance programs, and other third-party payers) were lower for prescriptions dispensed from retail pharmacies. For the comparison of primarily 90-day mail and primarily 30-day retail prescriptions, all third-party costs were lower and Medicare costs were about the same for retail pharmacies. A primary reason that plans did not realize savings is that patients paid relatively less of total prescription costs, and plans paid relatively more, when patients used mail order pharmacies. The results also suggest that the costs of generic drugs are higher at mail pharmacies and that retail pharmacies had somewhat higher rates of generic substitution.

Compared with past research, the results of the current study indicate a lower, and for plan sponsors non-existent, cost advantage for mail order pharmacies. The Lewin Study estimated total mail order savings of 10%.⁷ Johnsrud et al, in a study of two state benefit programs in Texas, found that total costs were 12.5% lower from mail order pharmacies and that plan sponsor costs were 0.5% higher in one plan and 13.7% and 0.4% lower for the other plan¹⁰. Carroll, in a study of a small health plan in the northeast, found total costs were 7.8% lower while sponsor costs were 4.8% higher when mail order pharmacies were used⁸. One possibility for the differences between the current study and past studies is that the Part D population is different from the populations examined in earlier studies. The Part D population is older than the samples in most earlier studies (with the possible exception of the retiree plan in Johnsrud's study¹⁰). Older patients probably take a different mix of drugs than younger patients. Another possibility is that differences in mail order and retail costs have decreased over time. An analysis based on a survey of plan sponsor reimbursement data suggest that the growth of 90-day retail prescriptions has decreased the total cost difference between mail and retail pharmacies¹⁰. This is supported by a study by Khandelwal and colleagues that found no differences in overall allowed charges between 90-day prescriptions dispensed by mail and retail pharmacies¹⁶. Finally, as copayments have increased over time, the cost to plan sponsors of incentivizing use of mail order pharmacies by reducing patient copayments has also increased. This would account for higher mail order costs to plan sponsors in our study compared with earlier studies.

This situation presents a dilemma for plan sponsors. They want their members to use mail order pharmacies to realize promised savings from lower mail order costs. But to induce members to use mail order pharmacies, plans must reduce copayments. This, in turn, reduces or eliminates any savings the plans realize. The results of the current study indicate that plans in the Medicare Part D program realize no savings when their members use mail order pharmacies.

It may be possible that plan sponsors could increase mail order use by requiring their members to use mail order rather than by incentivizing them with lower copays. While there is little research on this topic, the few available studies and reports indicate that most patients use mail order pharmacies because of reduced copays^{12,16-19}. This suggests that requiring members to use mail order and not providing lower copayments could result in substantial member dissatisfaction and plan switching.

Alternatively, plan sponsors could offer patients a plan design that offers the same copayments for mail order and retail pharmacy. Under this scenario, plans may see fewer prescriptions filled

through mail order, but plan sponsors would realize a much larger share of any savings that result from mail order usage.

A limitation of the study was that it did not examine differences in medication wastage rates between mail and retail pharmacies. A number of studies have found substantial differences in medication wastage rates between 30-day and 90-day supplies of medications²⁰⁻²⁵. These studies suggest wastage rates of roughly 1% for 30-day supplies and about twice that for 90-day supplies. The studies also point out that as drug costs rise, the costs of waste also rise. The higher wastage rate for 90-day supplies, which are much more common at mail order pharmacies, would further add to the cost advantage of retail pharmacy for plan sponsors in the Part D program.

Another potential limitation of the study was that the data did not include information about rebates. The Medicare Part D data that CMS makes available to researchers do not include rebate information^{26;27}. However, this would only be an issue if rebates on mail prescriptions were greater than rebates on retail prescriptions and if this difference were passed on to Medicare. While little is known about rebates because of the confidential nature of rebate contracts, it seems unlikely that manufacturers would pay a higher rebate because a drug was sold through one channel rather than another. It seems more likely that the manufacturer would be primarily concerned with how much of the drug were sold, not the channel through which it was sold.

Conclusion

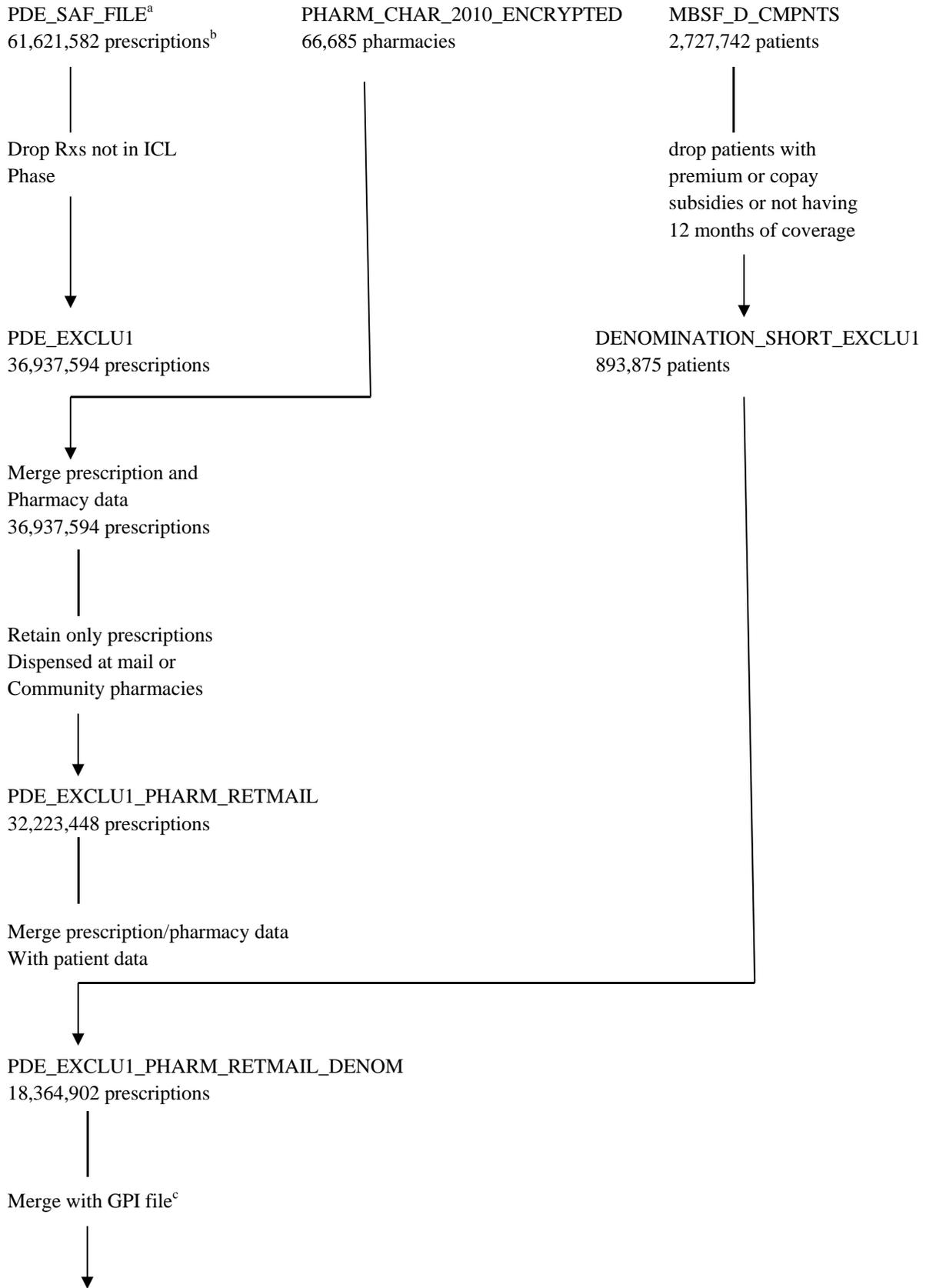
This study compared the costs of prescriptions dispensed by mail order pharmacies with what those prescriptions would have cost if dispensed by retail pharmacies. Results based on a large random sample of Medicare Part D patients indicated that when comparing 90-day supplies of medication, total costs, Medicare costs, and all third-party costs were lower through retail pharmacies. Even when comparing 30-day retail and 90-day mail prescriptions, plan sponsors did not realize savings by using mail order pharmacies.

Reference List

- (1) Pharmacy Benefit Management Institute. *The Takeda Prescription Drug Benefit Cost & Plan Design Survey Report: 2006 Edition*. Scottsdale, AZ: Pharmacy Benefit Management Institute, Inc., 2006.
- (2) Pharmacy Benefit Management Institute. *The Takeda Prescription Drug Benefit Cost & Plan Design Survey Report: 20011-2012 Edition*. Scottsdale, AZ: Pharmacy Benefit Management Institute, Inc., 2011.
- (3) Horgan C, Goody B, Knapp D, Fitterman L. The role of mail service pharmacies. *Health Aff* 1990;9(3):66-74.
- (4) Codling M. *Rapid Growth for Mail-Order Drug Dispensing*. Cambridge, MA: Arthur D. Little Decision Resources, 1987.
- (5) Kirking DM, Ascione FJ, Richards JW. Choices in prescription-drug benefit programs: mail versus community pharmacy services. *MILBANK-Q* 1990;68; P 29-51:-511.
- (6) Enright SM. Mail-order pharmaceuticals. *Am J Hosp Pharm* 1987;44:1870-1873.
- (7) The Lewin Group. Mail-service pharmacy savings: a ten-year outlook for public and private purchasers. *Pharmaceutical Care Management Association Website* [serial online] 2005;1-11 Accessed January 30, 2006.
- (8) Carroll NV, Brusilovsky I, York B, Oscar R. Comparison of the costs of community and mail service pharmacy. *J Amer Pharm Assoc* 2005;45:336-343.
- (9) Pharmacy Benefit Management Institute. *The Takeda Prescription Drug Benefit Cost & Plan Design Survey Report: 2005 Edition*. Scottsdale, AZ: Pharmacy Benefit Management Institute, Inc., 2006.
- (10) Johnsrud M, Lawson KA, Shepherd MD. Comparison of mail-order with community pharmacy in plan sponsor cost and member cost in two large pharmacy benefit plans. *J Manage Care Pharm* 2007;13:122-134.
- (11) Visaria J, Seoane-Vazquez E, Szeinbach SL, Rodriguez-Monguio R. Comparing the cost of community pharmacy and mail-order pharmacy in a US retirement system. *Int J Health Plann Manage* 2012;27:e41-e50.
- (12) Clark BE, Siracuse MV, Garis RI. A comparison of mail-service and retail community pharmacy claims in 5 prescription benefit plans. *Res Social Adm Pharm* 2009;5:133-142.
- (13) Wosinska M, Huckman RS. Generic dispensing and substitution in mail and retail pharmacies. *Health Aff (Millwood)* 2004;Suppl Web Exclusives:W4-16.
- (14) Part D Drug Event File. *ResDAC webpage* [serial online] 2013; Accessed January 23, 2013.

- (15) *Pharmaceutical Benefits Under State Medical Assistance Programs*. Reston, VA: National Pharmaceutical Council, 1997.
- (16) Khandelwal N, Duncan I, Rubinstein E, Ahmed T, Pegus C. Community pharmacy and mail order cost and utilization for 90-day maintenance medication prescriptions. *J Manag Care Pharm* 2012;18:247-255.
- (17) Birtcher KK, Shepherd MD. Users' perceptions of mail-service pharmacy. *Am Pharm* 1992;NS32:967-972.
- (18) Fried L. Rite Aid levels 'paying' field between drug-store and mail-order prescriptions. *Drug Store News* 20[8], CP4. 1998.
- (19) Patients prefer independents to mail order. *Drug Topics* 143[5], 10. 1999.
- (20) Vuong T, Fenrick B, Starner CI, Schafer J, Gunderson BW, Gleason PP. Statin waste associated with 90-day supplies compared to 30-day supplies [abstract]Vuong T, Fenrick B, Starner CI, Schafer J, Gunderson BW, Gleason PP. *J Manage Care Pharm* 2011;17:232-272
- (21) Domino ME, Olinick J, Sleath B, Leinwand S, Byrns PJ, Carey T. Restricting patients' medication supply to one month: saving or wasting money? *Am J Health Syst Pharm* 2004;61:1375-1379.
- (22) Parikh SP, Dishman BR, Smith TL. Ninety-day versus thirty-day drug-dispensing systems. *Am J Health Syst Pharm* 2001;58:1190-1191.
- (23) Walton SM, Arondekar BV, Johnson NE, Schumock GT. A model comparing unnecessary costs associated with various prescription fill-quantity policies: illustration using VA data. *J Manage Care Pharm* 2001;7:386-390.
- (24) Taitel M, Fensterheim L, Kirkham H, Sekula R, Duncan I. Medication days' supply, adherence, wastage, and costs among chronic patients in Medicaid. *Medicare & Medicaid Research Review* 2012;2:E1-E13.
- (25) Murphy P, Khandelwal N, Duncan I. Comparing medication wastage by fill quantity and fulfillment channel. *American Journal of Pharmacy Benefits* 2012;4:e166-e171.
- (26) CMS Guide to Requests for Medicare Part D Prescription Drug Event (PDE) Data Version 3.0 . *Centers for Medicaid and Medicare Services Website* [serial online] 2013; Accessed January 22, 2013.
- (27) Questions and Answers on Obtaining Prescription Drug Event (PDE) Data. *Centers for Medicaid and Medicare Services Website* [serial online] 2013; Accessed January 22, 2013.

Figure 1. Preparation of Sample for Analysis



PDE_EXCLU1_PHARM_RETMAIL_DENOM2

18,364,902 prescriptions



Select prescriptions for top 300 GPIs
dispensed by mail pharmacies



TOP300ALL

12,500,676 prescriptions



Drop outliers and prescriptions
With pricing exception codes



TOP300ALLR1

12,439,588 prescriptions



Exclude prescriptions in
less than 90-day supplies



TOP300ALLR1D

2,711,017 prescriptions

^a The first line in each entry is the file name. The file names on the first line were assigned by CMS. All other file names were created by the researcher.

^b The second line in each entry indicates the contents of the file.

^c Generic Product Indicator (Wolters Kluwer Health, Indianapolis, IN)

Figure 2. Top 300 generic product indicator (GPI) classes dispensed by mail order pharmacies

Generic Product Identifier	Generic Drug Name	Strength	Dosage Form
12405085100310	Valacyclovir Hcl	500 Mg	Tablet
13000020100305	Hydroxychloroquine Sulfate	200 Mg	Tablet
21300050100310	Methotrexate Sodium	2.5 Mg	Tablet
21402810000310	Anastrozole	1 Mg	Tablet
21402835000320	Exemestane	25 Mg	Tablet
21402860000320	Letrozole	2.5 Mg	Tablet
23100030004030	Testosterone	50 Mg (1%)	Gel In Packet (Gram)
23100030004040	Testosterone	1.25g (1%)	Gel In Metered-Dose Pump
24000015000310	Estrogens,Conjugated	0.3 Mg	Tablet
24000015000320	Estrogens,Conjugated	0.625 Mg	Tablet
27104002002020	Insulin Aspart	100/ML	Cartridge (ML)
27104003002020	Insulin Glargine,Hum.Rec.Anlog	100/ML (3)	Insulin Pen (ML)
27104005002020	Insulin Lispro	100/ML	Vial (Sdv,Mdv Or Additive)
27104006002020	Insulin Detemir	100/ML	Vial (Sdv,Mdv Or Additive)
27104010002005	Insulin Regular, Human	100/ML	Vial (Sdv,Mdv Or Additive)
27104020001805	Nph, Human Insulin Isophane	100/ML	Vial (Sdv,Mdv Or Additive)
27104070001820	Insuln Asp Prt/Insulin Aspart	70-30/ML	Vial (Sdv,Mdv Or Additive)
27104080001820	Insulin Npl/Insulin Lispro	75-25/ML	Vial (Sdv,Mdv Or Additive)
27104090001810	Hum Insulin Nph/Reg Insulin Hm	70-30/ML	Vial (Sdv,Mdv Or Additive)
27170020002060	Exenatide	10mcg/0.04	Pen Injector (ML)
27200027000340	Glimepiride	4 Mg	Tablet
27200030007510	Glipizide	5 Mg	Tablet, Extended Release 24 Hr
27200030007520	Glipizide	10 Mg	Tablet, Extended Release 24 Hr
27200040000315	Glyburide	5 Mg	Tablet
27250050000320	Metformin Hcl	500 Mg	Tablet
27250050000340	Metformin Hcl	850 Mg	Tablet
27250050000350	Metformin Hcl	1000 Mg	Tablet
27250050007520	Metformin Hcl	500 Mg	Tablet, Extended Release 24 Hr
27280040000330	Nateglinide	120 Mg	Tablet
27550070100330	Sitagliptin Phosphate	50 Mg	Tablet
27550070100340	Sitagliptin Phosphate	100 Mg	Tablet
27607050100320	Pioglitazone Hcl	15 Mg	Tablet
27607050100330	Pioglitazone Hcl	30 Mg	Tablet
27607050100340	Pioglitazone Hcl	45 Mg	Tablet
27607060100330	Rosiglitazone Maleate	4 Mg	Tablet
27607060100340	Rosiglitazone Maleate	8 Mg	Tablet
27992502700320	Sitagliptin Phos/Metformin Hcl	50mg-500mg	Tablet
27992502700340	Sitagliptin Phos/Metformin Hcl	50-1000mg	Tablet
27997002400330	Glyburide/Metformin Hcl	5 Mg-500mg	Tablet
27998002400320	Pioglitazone Hcl/Metformin Hcl	15mg-500mg	Tablet
27998002400340	Pioglitazone Hcl/Metformin Hcl	15mg-850mg	Tablet
28100010100305	Levothyroxine Sodium	25 Mcg	Tablet
28100010100310	Levothyroxine Sodium	50 Mcg	Tablet
28100010100315	Levothyroxine Sodium	75 Mcg	Tablet
28100010100317	Levothyroxine Sodium	88 Mcg	Tablet
28100010100320	Levothyroxine Sodium	100 Mcg	Tablet

28100010100322	Levothyroxine Sodium	112 Mcg	Tablet
28100010100325	Levothyroxine Sodium	125 Mcg	Tablet
28100010100330	Levothyroxine Sodium	150 Mcg	Tablet
30042010100370	Alendronate Sodium	70 Mg	Tablet
30042048100360	Ibandronate Sodium	150 Mg	Tablet
30042065100330	Risedronate Sodium	35 Mg	Tablet
30042065100380	Risedronate Sodium	150 Mg	Tablet
30043020002080	Calcitonin,Salmon,Synthetic	200/Dose	Aerosol, Spray With Pump (MI)
30044070002020	Teriparatide	20mcg/Dose	Pen Injector (MI)
30053060100320	Raloxifene Hcl	60 Mg	Tablet
31200010000305	Digoxin	125 Mcg	Tablet
32100025007520	Isosorbide Mononitrate	30 Mg	Tablet, Extended Release 24 Hr
32100025007530	Isosorbide Mononitrate	60 Mg	Tablet, Extended Release 24 Hr
32200040007420	Ranolazine	500 Mg	Tablet, Extended Release 12 Hr
33200020000303	Atenolol	25 Mg	Tablet
33200020000305	Atenolol	50 Mg	Tablet
33200020000310	Atenolol	100 Mg	Tablet
33200030057510	Metoprolol Succinate	25 Mg	Tablet, Extended Release 24 Hr
33200030057520	Metoprolol Succinate	50 Mg	Tablet, Extended Release 24 Hr
33200030057530	Metoprolol Succinate	100 Mg	Tablet, Extended Release 24 Hr
33200030057540	Metoprolol Succinate	200 Mg	Tablet, Extended Release 24 Hr
33200030100305	Metoprolol Tartrate	25 Mg	Tablet
33200030100310	Metoprolol Tartrate	50 Mg	Tablet
33200040100320	Nebivolol Hcl	5 Mg	Tablet
33200040100330	Nebivolol Hcl	10 Mg	Tablet
33300007000310	Carvedilol	6.25 Mg	Tablet
33300007000320	Carvedilol	12.5 Mg	Tablet
33300007000330	Carvedilol	25 Mg	Tablet
34000003100320	Amlodipine Besylate	2.5 Mg	Tablet
34000003100330	Amlodipine Besylate	5 Mg	Tablet
34000003100340	Amlodipine Besylate	10 Mg	Tablet
34000010107040	Diltiazem Hcl	240 Mg	Capsule, Extended-Release Degradable
34000010117060	Diltiazem Hcl	360mg	Capsule, Extended Release
34000010127020	Diltiazem Hcl	120 Mg	Capsule, Ext Release 24 Hr
34000010127030	Diltiazem Hcl	180 Mg	Capsule, Ext Release 24 Hr
34000010127040	Diltiazem Hcl	240 Mg	Capsule, Ext Release 24 Hr
34000010127050	Diltiazem Hcl	300 Mg	Capsule, Ext Release 24 Hr
34000013007510	Felodipine	5 Mg	Tablet, Extended Release 24 Hr
34000013007520	Felodipine	10 Mg	Tablet, Extended Release 24 Hr
34000020007530	Nifedipine	30 Mg	Tablet, Extended Release
34000020007540	Nifedipine	60 Mg	Tablet, Extended Release
34000020007570	Nifedipine	30 Mg	Tablet, Extended Release 24 Hr
34000020007575	Nifedipine	60 Mg	Tablet, Extended Release 24 Hr
34000020007580	Nifedipine	90 Mg	Tablet, Extended Release 24 Hr
34000030100420	Verapamil Hcl	240 Mg	Tablet, Extended Release
34000030107035	Verapamil Hcl	240 Mg	Capsule, Extended Release Pellets
35300010100305	Flecainide Acetate	100 Mg	Tablet
35400005000305	Amiodarone Hcl	200 Mg	Tablet
35400028100320	Dronedarone Hydrochloride	400 Mg	Tablet
36100005100330	Benazepril Hcl	20 Mg	Tablet

36100020100315	Enalapril Maleate	20 Mg	Tablet
36100030000305	Lisinopril	5 Mg	Tablet
36100030000310	Lisinopril	10 Mg	Tablet
36100030000315	Lisinopril	20 Mg	Tablet
36100030000330	Lisinopril	40 Mg	Tablet
36100040100340	Quinapril Hcl	40 Mg	Tablet
36100050000130	Ramipril	5 Mg	Capsule (Hard, Soft, Etc.)
36100050000140	Ramipril	10 Mg	Capsule (Hard, Soft, Etc.)
36150030000320	Irbesartan	150 Mg	Tablet
36150030000340	Irbesartan	300 Mg	Tablet
36150040200320	Losartan Potassium	25 Mg	Tablet
36150040200330	Losartan Potassium	50 Mg	Tablet
36150040200340	Losartan Potassium	100 Mg	Tablet
36150055200340	Olmesartan Medoxomil	20 Mg	Tablet
36150055200360	Olmesartan Medoxomil	40 Mg	Tablet
36150070000320	Telmisartan	40 Mg	Tablet
36150070000340	Telmisartan	80 Mg	Tablet
36150080000320	Valsartan	80 Mg	Tablet
36150080000330	Valsartan	160 Mg	Tablet
36150080000340	Valsartan	320 Mg	Tablet
36170010100340	Aliskiren Hemifumarate	300 Mg	Tablet
36202005100330	Doxazosin Mesylate	4 Mg	Tablet
36202040100115	Terazosin Hcl	5 Mg	Capsule (Hard, Soft, Etc.)
36991502200130	Amlodipine Besylate/Benazepril	5 Mg-10 Mg	Capsule (Hard, Soft, Etc.)
36991502200140	Amlodipine Besylate/Benazepril	5mg-20mg	Capsule (Hard, Soft, Etc.)
36991502200150	Amlodipine Besylate/Benazepril	10mg-20mg	Capsule (Hard, Soft, Etc.)
36991502200160	Amlodipine Besylate/Benazepril	10mg-40mg	Capsule (Hard, Soft, Etc.)
36991802550305	Lisinopril/Hydrochlorothiazide	10-12.5mg	Tablet
36991802550310	Lisinopril/Hydrochlorothiazide	20-12.5 Mg	Tablet
36991802550320	Lisinopril/Hydrochlorothiazide	20-25mg	Tablet
36993002100310	Amlodipine/Valsartan	5mg-160mg	Tablet
36993002100340	Amlodipine/Valsartan	10mg-320mg	Tablet
36994002300320	Irbesartan/Hydrochlorothiazide	150-12.5mg	Tablet
36994002300340	Irbesartan/Hydrochlorothiazide	300-12.5mg	Tablet
36994002300350	Irbesartan/Hydrochlorothiazide	300mg-25mg	Tablet
36994002450320	Losartan/Hydrochlorothiazide	50-12.5mg	Tablet
36994002450325	Losartan/Hydrochlorothiazide	100-12.5mg	Tablet
36994002450340	Losartan/Hydrochlorothiazide	100mg-25mg	Tablet
36994002500320	Olmesartan/Hydrochlorothiazide	20-12.5 Mg	Tablet
36994002500340	Olmesartan/Hydrochlorothiazide	40-12.5mg	Tablet
36994002500345	Olmesartan/Hydrochlorothiazide	40mg-25mg	Tablet
36994002600340	Telmisartan/Hydrochlorothiazid	80-12.5mg	Tablet
36994002700320	Valsartan/Hydrochlorothiazide	80-12.5mg	Tablet
36994002700340	Valsartan/Hydrochlorothiazide	160-12.5mg	Tablet
36994002700350	Valsartan/Hydrochlorothiazide	160-25mg	Tablet
36994002700360	Valsartan/Hydrochlorothiazide	320-12.5mg	Tablet
36994002700370	Valsartan/Hydrochlorothiazide	320mg-25mg	Tablet
37200030000305	Furosemide	20 Mg	Tablet
37200030000310	Furosemide	40 Mg	Tablet
37500020000305	Spirolactone	25 Mg	Tablet

37600040000110	Hydrochlorothiazide	12.5 Mg	Capsule (Hard, Soft, Etc.)
37600040000305	Hydrochlorothiazide	25 Mg	Tablet
37990002300105	Triamterene/Hydrochlorothiazid	37.5-25 Mg	Capsule (Hard, Soft, Etc.)
39100016100330	Colesevelam Hcl	625 Mg	Tablet
39200006006540	Fenofibric Acid (Choline)	135mg	Capsule,Delayed Release
39200025000323	Fenofibrate Nanocrystallized	145mg	Tablet
39200025000325	Fenofibrate	160 Mg	Tablet
39200025100115	Fenofibrate,Micronized	134mg	Capsule (Hard, Soft, Etc.)
39200025100130	Fenofibrate,Micronized	200 Mg	Capsule (Hard, Soft, Etc.)
39200030000310	Gemfibrozil	600 Mg	Tablet
39300030000320	Ezetimibe	10 Mg	Tablet
39400010100310	Atorvastatin Calcium	10 Mg	Tablet
39400010100320	Atorvastatin Calcium	20 Mg	Tablet
39400010100330	Atorvastatin Calcium	40 Mg	Tablet
39400010100350	Atorvastatin Calcium	80 Mg	Tablet
39400030107530	Fluvastatin Sodium	80 Mg	Tablet, Extended Release 24 Hr
39400050000310	Lovastatin	20 Mg	Tablet
39400050000320	Lovastatin	40 Mg	Tablet
39400060100305	Rosuvastatin Calcium	5 Mg	Tablet
39400060100310	Rosuvastatin Calcium	10 Mg	Tablet
39400060100320	Rosuvastatin Calcium	20 Mg	Tablet
39400060100340	Rosuvastatin Calcium	40 Mg	Tablet
39400065100330	Pravastatin Sodium	20 Mg	Tablet
39400065100340	Pravastatin Sodium	40 Mg	Tablet
39400065100360	Pravastatin Sodium	80 Mg	Tablet
39400075000320	Simvastatin	10 Mg	Tablet
39400075000330	Simvastatin	20 Mg	Tablet
39400075000340	Simvastatin	40 Mg	Tablet
39400075000360	Simvastatin	80 Mg	Tablet
39450050000450	Niacin	500 Mg	Tablet, Extended Release
39450050000460	Niacin	750 Mg	Tablet, Extended Release
39450050000470	Niacin	1000 Mg	Tablet, Extended Release
39500045200130	Omega-3 Acid Ethyl Esters	1 G	Capsule (Hard, Soft, Etc.)
39994002300330	Ezetimibe/Simvastatin	10mg-20mg	Tablet
39994002300340	Ezetimibe/Simvastatin	10mg-40mg	Tablet
39994002300350	Ezetimibe/Simvastatin	10mg-80mg	Tablet
41550024100320	Fexofenadine Hcl	60 Mg	Tablet
41550024100350	Fexofenadine Hcl	180 Mg	Tablet
42200032301810	Fluticasone Propionate	50 Mcg	Spray, Suspension
42200045101820	Mometasone Furoate	50 Mcg	Aerosol, Spray With Pump
42401015102020	Azelastine Hcl	137 Mcg	Aerosol, Spray With Pump
44100030123420	Ipratropium Bromide	17mcg	Hfa Aerosol With Adapter
44100080100120	Tiotropium Bromide	18 Mcg	Capsule, With Inhalation Device
44201010103410	Albuterol Sulfate	90 Mcg	Hfa Aerosol With Adapter
44201058108020	Salmeterol Xinafoate	50 Mcg	Disk, With Inhalation Device
44209902013220	Ipratropium/Albuterol Sulfate	18-103mcg	Aerosol With Adapter (Gram)
44209902413220	Budesonide/Formoterol Fumarate	80-4.5mcg	Hfa Aerosol With Adapter
44209902413240	Budesonide/Formoterol Fumarate	160-4.5mcg	Hfa Aerosol With Adapter
44209902708020	Fluticasone/Salmeterol	100-50mcg	Disk, With Inhalation Device
44209902708030	Fluticasone/Salmeterol	250-50mcg	Disk, With Inhalation Device

44209902708040	Fluticasone/Salmeterol	500-50mcg	Disk, With Inhalation Device
44400010103428	Beclomethasone Dipropionate	80mcg	Aerosol With Adapter (Gram)
44400033223230	Fluticasone Propionate	110mcg	Aerosol With Adapter (Gram)
44400033223240	Fluticasone Propionate	220mcg	Aerosol With Adapter (Gram)
44400036208020	Mometasone Furoate	220mcg 120	Aerosol Powder, Breath Activated
44505050100330	Montelukast Sodium	10 Mg	Tablet
49200020100305	Ranitidine Hcl	150 Mg	Tablet
49270025106520	Esomeprazole Mag Trihydrate	20 Mg	Capsule,Delayed Release
49270025106540	Esomeprazole Mag Trihydrate	40 Mg	Capsule,Delayed Release
49270040006520	Lansoprazole	30 Mg	Capsule,Delayed Release
49270060006520	Omeprazole	20 Mg	Capsule,Delayed Release
49270060006530	Omeprazole	40 Mg	Capsule,Delayed Release
49270070100620	Pantoprazole Sodium	40 Mg	Tablet, Delayed Release
49270076100620	Rabeprazole Sodium	20 Mg	Tablet, Delayed Release
52100040000120	Ursodiol	300 Mg	Capsule (Hard, Soft, Etc.)
52500030000620	Mesalamine	400 Mg	Tablet, Delayed Release
54000017107520	Darifenacin Hydrobromide	7.5 Mg	Tablet, Extended Release 24 Hr
54000017107530	Darifenacin Hydrobromide	15 Mg	Tablet, Extended Release 24 Hr
54000030100305	Oxybutynin Chloride	5 Mg	Tablet
54000030107520	Oxybutynin Chloride	5 Mg	Tablet, Extended Release 24 Hr
54000030107530	Oxybutynin Chloride	10 Mg	Tablet, Extended Release 24 Hr
54000030107540	Oxybutynin Chloride	15 Mg	Tablet, Extended Release 24 Hr
54000060200310	Solifenacin Succinate	5 Mg	Tablet
54000060200320	Solifenacin Succinate	10 Mg	Tablet
54000070207020	Tolterodine Tartrate	2 Mg	Capsule, Ext Release 24 Hr
54000070207030	Tolterodine Tartrate	4 Mg	Capsule, Ext Release 24 Hr
55350020000320	Estradiol	25 Mcg	Tablet
55350025003710	Estrogens,Conjugated	0.625mg/G	Cream With Applicator
56851020000120	Dutasteride	0.5 Mg	Capsule (Hard, Soft, Etc.)
56851030000320	Finasteride	5 Mg	Tablet
56852010107530	Alfuzosin Hcl	10 Mg	Tablet, Extended Release 24 Hr
56852070100110	Tamsulosin Hcl	0.4 Mg	Capsule, Ext Release 24 Hr
58160020100320	Citalopram Hydrobromide	20 Mg	Tablet
58160034100320	Escitalopram Oxalate	10 Mg	Tablet
58160034100330	Escitalopram Oxalate	20 Mg	Tablet
58160040000120	Fluoxetine Hcl	20 Mg	Capsule (Hard, Soft, Etc.)
58160040000140	Fluoxetine Hcl	40 Mg	Capsule (Hard, Soft, Etc.)
58160060000320	Paroxetine Hcl	20 Mg	Tablet
58160070100310	Sertraline Hcl	50 Mg	Tablet
58160070100320	Sertraline Hcl	100 Mg	Tablet
58180025106730	Duloxetine Hcl	30 Mg	Capsule,Delayed Release
58180025106750	Duloxetine Hcl	60 Mg	Capsule,Delayed Release
58180090100360	Venlafaxine Hcl	75 Mg	Tablet
58180090107030	Venlafaxine Hcl	75 Mg	Capsule, Ext Release 24 Hr
58180090107050	Venlafaxine Hcl	150 Mg	Capsule, Ext Release 24 Hr
58300040107430	Bupropion Hcl	150 Mg	Tablet, Extended Release
58300040107520	Bupropion Hcl	150 Mg	Tablet, Extended Release 24 Hr
58300040107530	Bupropion Hcl	300 Mg	Tablet, Extended Release 24 Hr
59153070100310	Quetiapine Fumarate	25 Mg	Tablet
59153070100320	Quetiapine Fumarate	100 Mg	Tablet

60204080100315	Zolpidem Tartrate	10 Mg	Tablet
62051025100310	Donepezil Hcl	5 Mg	Tablet
62051025100320	Donepezil Hcl	10 Mg	Tablet
62051030107030	Galantamine Hbr	16 Mg	Capsule, Extended Release Pellets
62051040008530	Rivastigmine	9.5mg/24hr	Patch, Transdermal 24 Hours
62053550100330	Memantine Hcl	10 Mg	Tablet
65100095100320	Tramadol Hcl	50 Mg	Tablet
65991702100310	Hydrocodone Bit/Acetaminophen	5 Mg-500mg	Tablet
66100007200630	Diclofenac Sodium	75 Mg	Tablet, Delayed Release
66100052000330	Meloxicam	15 Mg	Tablet
66100055000320	Nabumetone	500 Mg	Tablet
66100525000120	Celecoxib	100 Mg	Capsule (Hard, Soft, Etc.)
66100525000130	Celecoxib	200 Mg	Capsule (Hard, Soft, Etc.)
68000010000310	Allopurinol	300 Mg	Tablet
68000020000310	Colchicine	0.6 Mg	Tablet
72200030200110	Phenytoin Sodium Extended	100 Mg	Capsule (Hard, Soft, Etc.)
72600030000110	Gabapentin	100 Mg	Capsule (Hard, Soft, Etc.)
72600030000130	Gabapentin	300 Mg	Capsule (Hard, Soft, Etc.)
72600030000140	Gabapentin	400 Mg	Capsule (Hard, Soft, Etc.)
72600030000330	Gabapentin	600 Mg	Tablet
72600030000340	Gabapentin	800 Mg	Tablet
72600043000330	Levetiracetam	500 Mg	Tablet
72600057000115	Pregabalin	50 Mg	Capsule (Hard, Soft, Etc.)
72600057000120	Pregabalin	75 Mg	Capsule (Hard, Soft, Etc.)
72600057000135	Pregabalin	150 Mg	Capsule (Hard, Soft, Etc.)
73203060100310	Pramipexole Di-Hcl	0.25 Mg	Tablet
73203060100315	Pramipexole Di-Hcl	0.5 Mg	Tablet
73203060100320	Pramipexole Di-Hcl	1 Mg	Tablet
73203070100320	Ropinirole Hcl	1 Mg	Tablet
73209902100320	Carbidopa/Levodopa	25mg-100mg	Tablet
73209902100420	Carbidopa/Levodopa	50mg-200mg	Tablet, Extended Release
79700030000210	Potassium Chloride	10 Meq	Capsule, Extended Release
79700030000430	Potassium Chloride	10 Meq	Tablet, Extended Release
79700030100430	Potassium Chloride	10 Meq	Tablet, Ext Release, Particles/Crystals
79700030100440	Potassium Chloride	20 Meq	Tablet, Ext Release, Particles/Crystals
83200030200303	Warfarin Sodium	1 Mg	Tablet
83200030200305	Warfarin Sodium	2 Mg	Tablet
83200030200310	Warfarin Sodium	2.5 Mg	Tablet
83200030200315	Warfarin Sodium	5 Mg	Tablet
85155516000330	Cilostazol	100 Mg	Tablet
85158020100320	Clopidogrel	75 Mg	Tablet
85159902206920	Aspirin/Dipyridamole	25-200mg	Capsule, Extended Release Multiphase
86250030107630	Timolol Maleate	0.50%	Gel-Forming Solution
86259902152020	Brimonidine Tartrate/Timolol	0.2%-0.5%	Drops
86259902202020	Dorzolamide Hcl/Timolol Maleate	2%-0.5%	Drops
86330015002020	Bimatoprost	0.03%	Drops
86330050002020	Latanoprost	0.01%	Drops
86330070002020	Travoprost (Benzalkonium)	0.00%	Drops
86330070002025	Travoprost	0.00%	Drops
86602020102005	Brimonidine Tartrate	0.10%	Drops

86602020102007	Brimonidine Tartrate	0.15%	Drops
86720020001620	Cyclosporine	0.05%	Dropperette, Single-Use Dropdispenser
86802320001820	Brinzolamide	1%	Suspension, Drops(Final Dosage Form)
90850060005930	Lidocaine	5%(700mg)	Adhesive Patch, Medicated

Figure 3. Calculation of costs for prescriptions dispensed by mail order pharmacies and what costs would have been if these prescriptions had been dispensed in retail pharmacies.

Calculation of mail order costs:

For each GPI* class, costs were calculated as:

Mean per unit cost for mail order prescriptions x number of units dispensed per prescription for mail order prescriptions x number of mail order prescriptions dispensed

This calculation was made for each of the 300 GPI classes. The sum of costs for all 300 GPI classes equaled total costs for these products when dispensed from mail order pharmacies.

Calculation of costs if prescriptions had been dispensed in retail pharmacies:

For each GPI class, costs were calculated as:

Mean per unit cost for prescriptions dispensed at retail pharmacies x number of units dispensed per prescription for mail order prescriptions x number of mail order prescriptions dispensed

This calculation was made for each of the 300 GPI classes. The sum of costs for all 300 GPI classes equaled total costs for these products when dispensed from retail pharmacies.

*GPI = generic product identifier. (Each GPI includes all products with the same active ingredients, strengths, route of administration, and dosage form. Branded drugs and their generic equivalents are classified into the same GPIs.)

Figure 4. Dispense as written (DAW) codes used in Medicare Part D prescription data

0 = No Product Selection Indicated

1 = Substitution Not Allowed by Prescriber

2 = Substitution Allowed - Patient Requested That Brand Product Be Dispensed

3 = Substitution Allowed - Pharmacist Selected Product Dispensed

4 = Substitution Allowed - Generic Drug Not in Stock

5 = Substitution Allowed - Brand Drug Dispensed as Generic

6 = Override

7 = Substitution Not Allowed - Brand Drug Mandated by Law

8 = Substitution Allowed - Generic Drug Not Available in Marketplace

9 = Other

Table 1. Comparison of costs for 90-day or greater supply prescriptions dispensed from mail order and retail pharmacies*

	Cost per unit (\$)	Units dispensed	Average prescription cost (\$)	No. of prescriptions dispensed	Total spending (\$)
Total costs					
Retail pharmacy	0.94	108.8	102.76	893,644	91,830,145
Mail order pharmacy	0.96	108.8	104.63	893,644	93,504,245
All third-party payer costs**					
Retail pharmacy	0.64	108.8	69.33	893,644	61,953,543
Mail order pharmacy	0.72	108.8	78.70	893,644	70,325,574
Medicare costs***					
Retail pharmacy	0.59	108.8	64.26	893,644	57,432,254
Mail order pharmacy	0.63	108.8	68.65	893,644	61,347,552
Patient costs					
Retail pharmacy	0.31	108.8	33.43	893,644	29,876,602
Mail order pharmacy	0.24	108.8	25.94	893,644	23,178,670

* Number of units dispensed and number of prescription dispensed are the same for mail order and retail pharmacies because the analysis compared actual mail order costs to what costs would have been if the same prescriptions had been dispensed in retail pharmacies.

** The total cost of a Part D prescription is defined as the sum of the ingredient cost, dispensing fee, and any sales tax. The total cost is also defined as the sum of Covered D Plan Paid Amount (the amount paid by Medicare as part of the standard benefit), Non-Covered Plan Paid Amount (the amount paid by the Part D plan that exceeds that Medicare standard benefit), Low Income Cost Share (LICS - the amount paid by Medicare to reduce the cost share for low income patients), Other TrOOP Amount, Patient Liability

Reduction due to Other Payer Amount (PLRO), and the amount paid by the patient. Other TrOOP (True Out Of Pocket payment) amount is defined as "all qualified third party payments that contribute to a beneficiary's TrOOP" except for low income subsidies and patient payments.¹⁴ Other Troop Amounts are payments made on the patient's behalf by, for example, state pharmacy assistance programs or charities. PLRO is defined as "amounts by which patient liability is reduced due to payment by other payers that are not TrOOP-eligible and do not participate in Part D. Examples of non-TrOOP-eligible payers: group health plans, worker's compensation, and governmental programs (e.g. VA, TRICARE)."¹⁵ Non-Covered Plan Paid Amounts arise when plans offer enhanced benefit plans to patients. The enhanced benefits include payment for drugs that are not covered by Part D and / or reduced patient cost sharing. In this study "all third-party payer costs" were defined as all prescription drug costs not paid by the patient. This was defined as the sum of Covered D Plan Paid Amount, Non-Covered Plan Paid Amount, Other TrOOP Amount, and Patient Liability Reduction. The study did not include patients receiving the LICS. "Medicare costs" were defined in this study as the costs paid by the Medicare program as part of the standard benefit.

***Medicare Costs were defined in this study as Covered D Plan Paid Amount. This is the amount the plan paid for standard Medicare Part D benefits for Part D-covered drugs and is equal to Medicare's share of payments.

Table 2. Comparison of number of generic product indicator (GPI) classes for which mail or retail pharmacy has lower mean per unit all third-party payer costs for 90-day or greater supply prescriptions

Less Expensive Channel	GPI includes:					
	Generics		Only brands		Total	
	No.	%	No.	%	No.	%
Mail	13	23.2	43	76.8	56	100.0
Retail	160	65.6	84	34.4	165	100.0
	173	57.7	127	42.3	300	100.0

Chi-square with 1 df = 33.4, $p < 0.001$

Table 3. Comparison of costs for prescriptions dispensed from mail order and retail pharmacies (includes all prescriptions regardless of days supply dispensed)*

	Cost per unit (\$)	Units dispensed	Average prescription cost (\$)	No. of prescriptions dispensed	Total spending (\$)
Total costs					
Retail pharmacy	1.03	103.8	107.24	965,720	103,563,579
Mail order pharmacy	0.98	103.8	101.94	965,720	98,447,849
All third-party payer costs**					
Retail pharmacy	0.70	103.8	72.72	965,720	70,235,196
Mail order pharmacy	0.73	103.8	76.29	965,720	73,688,963
Medicare costs***					
Retail pharmacy	0.64	103.8	66.44	965,720	64,165,503
Mail order pharmacy	0.64	103.8	66.66	965,720	64,373,811
Patient costs					
Retail pharmacy	0.33	103.8	34.51	965,720	33,328,391
Mail order pharmacy	0.25	103.8	25.64	965,720	24,758,884

* Number of units dispensed and number of prescription dispensed are the same for mail order and retail pharmacies because the analysis compared actual mail order costs to what costs would have been if the same prescriptions had been dispensed in retail pharmacies.

** The total cost of a Part D prescription is defined as the sum of the ingredient cost, dispensing fee, and any sales tax. The total cost is also defined as the sum of Covered D Plan Paid Amount (the amount paid by Medicare as part of the standard benefit), Non-Covered Plan Paid Amount (the amount paid by the Part D plan that exceeds that Medicare standard benefit), Low Income Cost Share

(LICS - the amount paid by Medicare to reduce the cost share for low income patients), Other TrOOP Amount, Patient Liability Reduction due to Other Payer Amount (PLRO), and the amount paid by the patient. Other TrOOP (True Out Of Pocket payment) amount is defined as "all qualified third party payments that contribute to a beneficiary's TrOOP" except for low income subsidies and patient payments.¹⁴ Other Troop Amounts are payments made on the patient's behalf by, for example, state pharmacy assistance programs or charities. PLRO is defined as "amounts by which patient liability is reduced due to payment by other payers that are not TrOOP-eligible and do not participate in Part D. Examples of non-TrOOP-eligible payers: group health plans, worker's compensation, and governmental programs (e.g. VA, TRICARE)."¹⁵ Non-Covered Plan Paid Amounts arise when plans offer enhanced benefit plans to patients. The enhanced benefits include payment for drugs that are not covered by Part D and / or reduced patient cost sharing. In this study "all third-party payer costs" were defined as all prescription drug costs not paid by the patient. This was defined as the sum of Covered D Plan Paid Amount, Non-Covered Plan Paid Amount, Other TrOOP Amount, and Patient Liability Reduction. The study did not include patients receiving the LICS. "Medicare costs" were defined in this study as the costs paid by the Medicare program as part of the standard benefit.

***Medicare Costs were defined in this study as Covered D Plan Paid Amount. This is the amount the plan paid for standard Medicare Part D benefits for Part D-covered drugs and is equal to Medicare's share of payments.

Table 4. Comparison of Number of Generic Product Indicator (GPI) Classes for which Mail or Retail Pharmacy has lower Mean Per Unit All Third Party Payer Costs

Less Expensive Channel	GPI includes:					
	Generics		Only brands		Total	
	No.	%	No.	%	No.	%
Mail	42	31.1	93	68.9	135	100.0
Retail	131	79.4	34	20.6	165	100.0
	173	57.7	127	42.3	300	100.0

Chi-square with 1 df = 70.9, $p < 0.001$