

Effects of Employee Salary And Chronic Disease on Response to a Drug Copayment Increase

August, 2001

**Office of Research and Development
Express Scripts Inc.**

Kathleen A. Fairman, MA, Outcomes Research Manager
Brenda R. Motheral, PhD, Senior Director of Outcomes Research*
Fred Teitelbaum, PhD, Vice President of Outcomes Research and
Cost Management

Acknowledgements: The authors thank Darryl Burroughs for technical assistance, Rochelle Henderson for analytic support, and Barrett Toan and anonymous reviewers for their valuable comments.

This paper was presented at the "Managing the Pharmacy Benefit" Conference sponsored by The University of Arizona, Tucson, Arizona, January, 1999.

*While conducting this study, Dr. Motheral was Assistant Professor, College of Pharmacy, The University of Arizona, Tucson, Arizona

Executive Summary

Faced with rapidly rising healthcare costs, healthcare payers have been increasing copayment levels over the past decade. Extensive research, including work conducted by the Express Scripts Outcomes Research Group, has suggested that copayment increases generally have modest effects on utilization. However, little is known about the effect of cost-sharing changes on families with lower incomes and/or member(s) with chronic disease. This study is the first to examine the effects of employee salary and chronic disease on response to a prescription drug copayment increase in a commercially insured population.

The study sample included 559 families (a service industry company's employees and their dependents), continuously HMO-enrolled from April 15, 1997 through March 15, 1998. On October 15, 1997, a multi-tier drug copayment structure was implemented, with copayments (per \leq 30-day supply): generic = \$4, lower-cost brand = \$10, and higher-cost brand = the greater of \$15 or 25% of the total drug cost, maximum \$50, mean \$19. Within a number of key drug subclasses, all formulary products were designated as higher-cost brand. These subclasses included non-sedating antihistamines, selective serotonin reuptake inhibitors and other new antidepressants, HMG CoA Reductase inhibitors ("statins") used to treat hyperlipidemia, proton pump inhibitors, and immunosuppressive medications.

We used pharmacy claims to conduct a retrospective pre-/post-implementation analysis with comparison groups. Salary comparison groups included: <\$20,000; \$20,000 - <\$40,000; \$40,000 - < \$60,000; and \$60,000 or more. Lower-salary was defined as an annual salary of < \$20,000. Chronic disease comparison groups were derived from a Chronic Disease Score (CDS)¹ that summarizes number and types of chronic disease. Each family's average CDS was calculated and used to classify that family into one of four approximately equally sized ("quartile") groups.

We also conducted an employee survey that provided qualitative information in interpreting claims-analysis results. Income comparison groups were derived from a survey question that asked families to indicate total family income.

The primary outcome measure was total drug expenditure, pre- versus post-copayment change. Results were controlled for family size, employee salary and CDS, using multivariate statistical techniques.

A. Key Findings

Response to a copayment change is influenced both by the magnitude of the change and by income. Following implementation, higher-salary families increased and lower-salary families decreased their expenditures for higher-cost brand drugs, the

medications for which copayments had increased the most. In contrast, expenditures for generic products, for which copayments were low and unchanged by the new copayment structure, did not differ by salary group. In an employee survey, lower-income families were more likely than higher-income families to report that out-of-pocket drug cost affects whether or not they fill prescriptions.

No consistent relationship between chronic disease and response to the copayment change was found.

B. Limitations

Before considering the policy implications of study findings for decision-makers, it is important to note several limitations. First, the pre- and post-implementation periods were in different seasons of the year. Second, we did not compare the multi-tier plan to another plan that remained with a generic/brand differential copayment structure throughout the pre- and post-implementation periods. For these reasons, we cannot specify the degree to which change from the pre-implementation period to the post-implementation period for the sample overall is due to seasonal variations, market trends, or other factors that would have affected utilization without the copayment change. Third, this study's results likely are not representative of benefit designs with more opportunities to find alternative medications with lower out of pocket costs. For example, a three-tier design that designates brand medications as either "preferred" (lower copayment) or "non-preferred" (higher copayment) will typically have as "preferred" at least one non-sedating antihistamine, at least one proton pump inhibitor, etc. Therefore, it is not appropriate to use these findings to predict cost savings following a multi-tiered copayment increase, nor should they be considered indicative of outcomes for typical three-tier structures.

Nonetheless, lower- and higher-salary groups served as appropriate comparison groups for each other, and all experienced the same copayment change at the same time. The primary value of these findings is that they demonstrate differential responses to large copayment increases across different salary groups.

Of course, salary is only a proxy indicator of income since in many families more than one spouse is employed. However, regression analyses controlling for marital status, as well as survey analyses of total family income, produced similar results.

Because the survey's response rate was low, its results should be interpreted cautiously. However, the results of the survey and the claims analysis were consistent.

Our sample size was insufficient to examine results within therapeutic classes, such as specific drug-to-drug switches or terminations of treatment. How enrollees make key decisions, such as whether to reduce a drug's dosage, substitute a different drug, or terminate treatment, is an important area for future research.

An important related question not addressed in this study is whether the reduced drug expenditures observed in the lower-income families were clinically significant. Potential medical and economic consequences of these reductions, such as morbidity, increased utilization of other healthcare services, or employee productivity changes, are important and rich topics for future research. Express Scripts has an ongoing stream of research addressing important issues of this type.

C. Implications

As drug-cost and utilization trends continue to escalate, increasing numbers of plan sponsors will be forced to seek more aggressive ways to manage costs. The most likely strategy to stem the rising tide of costs is to adjust the cost-sharing ratio between the plan and its members, increasing the member's share and proportionately lowering the share borne by the plan. In coming years, this trend is likely to continue.

In 1997, the Express Scripts Outcomes Research Group began a body of research into the impact of drug copayment increases on enrollees and payers. Express Scripts' 2000 study of a brand drug prescription copayment increase from \$10 to \$15 documented a modest reduction in the rate of utilization growth. Its 2001 study of a three-tier copayment found that in the first year after implementation, cost savings were achieved without increasing doctor visits and hospitalizations.

The present study suggests some factors that payers should consider in increasing members' share of cost. First, it should not be assumed that a modest overall impact represents a modest impact for every enrolled family. Because lower-income families represented just 26% of families in this study, their utilization changes had little mathematical influence on statistics for the study population overall. Had we looked only at overall plan statistics, we would not have seen the effect on the lower-income workers. Thus, when monitoring the outcomes of a large copayment change on a group of enrollees, payers should consider focusing on lower-income enrollees, perhaps via member survey. Second, a payer with a group of enrollees that is potentially particularly vulnerable to increased cost-sharing requirements, such as lower-income workers, might wish to take into account their ability to pay copayments in making benefit design decisions, particularly when no lower-cost alternatives are available to them. As cost-sharing levels continue to rise, detailed examinations of this type become increasingly important.

1. ¹ Clark D, VonKorff M, Saunders K et al. "A chronic disease score with empirically derived weights," *Medical Care* 1995;33:783-795.

I. Introduction

Faced with rapidly rising medical costs, healthcare payers have increased copayments for ambulatory services in recent years.¹⁻⁶ Cost-sharing systems are intended to make enrollees both sensitive to and partially financially responsible for their product choices.⁷⁻¹⁰

Modest utilization responses to drug copayment increases of less than \$5.00 have been documented in insured populations, but no study to date has examined the impact of more recent multi-tier designs with considerably higher copayments.¹¹⁻¹⁵ For example, a 1998 survey of managed-care organizations reported an average of \$16.77 per prescription for non-formulary (non-preferred) brand medications⁵ Copayments of \$25 or more for some medications are common.^{7,8}

A particularly important and unstudied topic is the effect of higher copayments on potentially vulnerable segments of the insured population, including those who are low-income or have chronic diseases. Evidence about the effects of cost-sharing on subsets of employed populations is limited, inconsistent and inconclusive. It has been suggested that the working poor have limited access to healthcare because of inability to pay copayments and deductibles.¹⁶ This possibility is consistent with research linking higher out-of-pocket costs with reduced utilization for Medicare and Medicaid recipients.^{17,18} The Rand Health Insurance Experiment also linked low income with utilization reductions and modest negative health impacts for those with specific medical conditions (hypertension, myopia, dental caries and gum disease) under cost-sharing arrangements.¹⁹ In contrast, a commercial HMO study found no relationship between estimated (census block) income and the impact of a \$5 office visit copayment.²⁰

Because cost-sharing is increasingly being used as a cost-containment mechanism and therefore affecting ever-larger numbers of people, its potential impact on utilization and health is a critical topic for healthcare policy analysis.²¹ With the objective of adding to the small body of existing research related to the impact of cost-sharing, this study examined response to the implementation of a multi-tier drug copayment structure (Table 1) in a commercially insured HMO population. It is the first study to examine whether the impact of cost-sharing among commercially insured families is affected by salary level or chronic disease.

II. Methods

A. Background

A multi-tier copayment structure was implemented in October of 1997 in an enrollee group that included a service-industry company's employees and their dependents. The new structure established three categories of medications: generics, lower-cost brands, and higher-cost brands. For prescriptions filled at network pharmacies for up to a 30-day supply of medication, copayments were: generics = \$4; lower-cost brands = \$10; and higher-cost brands = greater of \$15 or 25% up to a maximum of \$50. Participation in the multi-tier copayment plan was mandatory for all employees receiving health benefits through the company. In October of 1996, one year prior to multi-tier copayment implementation, the drug formulary had been closed. Under the closed formulary, no more than 30% of the market share was excluded from any of the top 15 drug classes. Prior authorization was used to request coverage of non-formulary medications. Following implementation of the multi-tier plan, the closed formulary remained unchanged except for minor adjustments.

Under the new copayment plan, within a number of drug subclasses commonly recognized as major contributors to payers' expenditures,²² all formulary products were designated as higher-cost brand (i.e., there were no generics or lower-cost brand products in those subclasses). These subclasses, all of which are primarily for chronic or episodic use, included non-sedating antihistamines, selective serotonin reuptake inhibitors (SSRIs) and other new antidepressants, HMG CoA Reductase inhibitors, proton pump inhibitors (PPIs), and immunosuppressive medications.

About one month prior to implementation, employees received notification of the upcoming copayment change. Flyers describing the change included a discussion of the rationale for the copayment increase, a listing of the new copayments for each drug cost category, a listing of the medications that would be designated as higher-cost brand, and a telephone number for pharmacist consultation in case of questions or problems.

Across all therapeutic classes, the mean copayment for a prescription filled at a network pharmacy (supply up to 30 days) was \$19 (median \$15), with approximately 15% of copayments exceeding \$25. The mean copayment for prescriptions filled via mail order (supply up to 90 days) was \$54 (median \$46), with approximately 17% of copayments exceeding \$75.

B. Sample

The unit of analysis for the study was the family, reflecting an assumption that purchasing decisions are made at the family level (i.e., children do not decide whether to fill prescriptions). The sample included families in which all members were continuously enrolled with the HMO during the study period of April 15, 1997, through March 15, 1998 (n=571). Of these, families with incomplete claims information (n=4) or utilization of drug products that were not covered except when prior-authorized (primarily injected fertility and contraceptive products, n=8) were excluded. For each of

the resulting 559 families in the sample, prescription claims data were linked with employees' demographic information, including salary, using anonymous identifiers.

C. Design and Variables

The study was a pre-/post retrospective analysis. Pre-implementation and post-implementation periods were, respectively, the five-month periods prior to (April 15, 1997, through September 14, 1997) and following (October 15, 1997, through March 15, 1998) copayment implementation. Because the three-tier plan was announced in mid-September of 1997, claims for the time period from September 15, 1997, through October 14, 1997, were excluded so that results would be unaffected by anticipatory utilization changes and would reflect pre- and post-implementation periods of equal length.

To form comparison groups, families were classified according to 1) the extent of chronic disease experienced by adult family members and 2) employees' annual salary levels.

Chronic disease was measured using the Chronic Disease Score (CDS). The CDS, which is based on pharmacy claims data, summarizes the number and type of chronic diseases and is a predictor of future outpatient healthcare utilization for adults (age 18 and over).²³ Each adult enrollee's CDS was calculated for the six months immediately preceding copayment implementation (April 15, 1997, through October 14, 1997). For each family, the average CDS was calculated as the sum of adults' scores, divided by the number of adults. Then each family was classified into one of four approximately equally sized (quartile) groups.

Based on preliminary analyses suggesting key salary level breakpoints for response to copayment implementation, families were grouped into \$20,000 salary increments: <\$20,000; \$20,000 - <\$40,000; \$40,000 - <\$60,000; \$60,000 or more.

The primary outcome measure was drug expenditure in the post-implementation period, in total and for each of the plan's three tiers. This measure was selected because it reflects both quantity and type (product mix) of medications obtained. Drug expense was measured as Average Wholesale Price (AWP) on October 15, 1997 (implementation date). AWP at one point in time was used so that results would be unaffected by price change.

D. Statistical Methods

Statistical analyses were performed using SPSS version 8.0. The significance (p) level was set at 0.05.

Analyses of Expenditures

The analysis focused on the differential response of the comparison groups to copayment implementation. We first conducted descriptive analyses of mean expenditures in the pre- and post-implementation periods, using Analysis of Variance (ANOVA) to compare pre-implementation-period values across salary and disease score groups. We then conducted Repeated Measures Multivariate ANOVA to assess whether employee salary or chronic disease affected pre-to-post-implementation change in expenditure (process), and performed linear regression analyses to assess the effect of employee salary and chronic disease on post-implementation-period expenditure (outcome).

Because preliminary examination of plotted data suggested violations of regression assumptions and the presence of outliers, pre- and post-implementation expense data were log-transformed in all statistical analyses, and CDS was log-transformed in the regression analyses. One dollar (\$1.00) was added to each family's drug expenses prior to transformation to account for \$0 expenditures (numbers ≤ 0 cannot be log-transformed).

One Repeated Measures ANOVA was performed for each tier. In each equation, the within-subjects factor was expenditure, pre- versus post-implementation, and family size was a covariate. Between-subjects factors were CDS (quartile groups) and salary (grouped into \$20,000 increments). Terms for interactions of within-subjects factors with between-subjects factors were tested to determine whether response to the copayment change was affected by salary level or chronic disease.

In the linear regression analyses, post-implementation period expenses, in total and for each tier, were regressed on the independent variables — CDS and salary level (dummy coded with salary < \$20,000 as the reference category) — controlling for family size. Because the dependent variables for these equations were measured in log units, unstandardized coefficients represent percentage differences.

Sensitivity regression analyses included equations in which: 1) marital status was tested as an additional predictor; 2) a term for interaction between chronic disease and salary < \$20,000 was tested (salary < \$20,000 was used as the main effects dummy variable in this equation); 3) pre-implementation period expense was included as an independent variable; 4) \$0.05 instead of \$1.00 was added to each family's drug expenditures; 5) utilization measures (number of prescription claims) were used as dependent variables instead of prescription expenditures; and 6) Poisson regression techniques were employed, using counts of post-implementation-period prescription claims in each tier as the dependent variables.

Employee Survey

To provide qualitative information in interpreting claims-analysis results, we performed descriptive analyses of an employee-benefits survey, conducted by mail five months after multi-tier copayment implementation. The survey included questions about the degree to which filling prescriptions is influenced by out-of-pocket cost and about

utilization of prescription medications during the respective five-month periods preceding and following implementation. Demographic data collected by the survey included family's total annual income, measured in \$20,000 increments. Because the survey was anonymous, we did not match claims to survey data.

III. Findings

The mean age for employees in the study sample was 36.8 years (Table 2). Higher-salary employees were older and had larger family sizes. However, among all enrollees, including both employees and dependents, mean age and CDS did not significantly differ across salary groups. Male enrollees were more prevalent in the higher-salary groups.

Overall, families paid a monthly out-of-pocket cost average of \$7.58 prior to and \$13.53 following implementation (78% increase, data not in table). The pre- and post-implementation- period ratios of copayments to total AWP expenditures were 11.6% and 21.7%, respectively (87% increase, data not in table).

A. Claims Data Analysis of Expenditures

Salary was unrelated to all expenditure measures in the pre-implementation period (Table 3). However, from the pre-implementation to the post-implementation periods, lower-salary families decreased and higher-salary families increased their expenditures for higher-cost brand products. Salary was not significantly related to change in expenditures for generic or lower-cost brand products.

As expected, higher CDS levels were associated with higher pre-implementation drug expenditures. Higher pre-implementation CDS was associated with pre-to-post-implementation reductions in total drug expenditures. This effect was not uniform across tiers. Among those in the top CDS quartile, generic expenses increased, while expenses for brand medications declined. However, the relationships between pre-to-post-implementation change and CDS for brand medication expenditures were not statistically significant.

In regression analyses (Table 4), in total and for every tier, larger family size and higher CDS were associated with higher expenditures in the post-implementation period. Controlling for these factors, salary was not associated with post-implementation expenditures for generic products. Salary was inconsistently related to expenditures for lower-cost brand products. In contrast, higher-cost brand expenditures showed a consistent and progressive relationship with salary. Higher-cost brand expenditures for families in the third (\$40,000 to <\$60,000) and fourth (\$60,000 or more) salary

categories, respectively, exceeded those for low-salary families ($\$ < 20,000$) by 62% and 67%. All sensitivity analyses produced similar results. Marital status and interaction terms were not significant.

B. Survey Analysis of Expenditures

Of 1,119 employees to whom benefits surveys were mailed, 292 returned the survey for a response rate of 26%. Analyses of survey data were limited to those whose health-insurance enrollment began prior to April 1997 (n excluded = 83) and who answered all utilization and demographic questions (n excluded = 32). In the sample of survey respondents meeting these criteria (n = 177), results (Table 5) were consistent with claims analysis findings.

Lower total family income was associated with employee reports that their out-of-pocket drug cost affects whether they fill prescriptions, and that, following implementation of the new copayment structure, their families had increased the behaviors of skipping medication doses and delaying refills in order to save money.

IV. Discussion

Findings of this study -- the first to examine the impact of salary level or chronic disease on response to cost-sharing in a commercially insured population -- suggest that response to copayment change is influenced both by the magnitude of change and by income. Employee salary was related to pre-to-post-implementation change and to post-implementation-period expenditures only for higher-cost brand drugs -- the products with the largest copayment increases. In contrast, expenditures for generic drugs -- the products for which copayments were low and unchanged by the new cost-sharing requirements -- did not differ by salary group. Survey findings similarly suggest that, consistent with economic theory, lower-income were more sensitive than higher-income families to increased out-of-pocket costs.

The pre-to-post decline in total expenditures among those with higher rates of chronic disease might represent "regression to the mean," a tendency for high utilization rates to decline over time. Another possible explanation is that the impact of the copayment change was greater for those with higher rates of chronic disease because many commonly used chronic medications (e.g., SSRIs, HMG CoA Reductase inhibitors, PPIs) were designed as higher-cost brand. This possibility is supported by the inconsistent pattern of expenditure changes across tiers for those in the highest CDS quartile. However, since the relationship between brand expenditure change and CDS was not statistically significant, results of this analysis are inconclusive.

Before considering the policy implications of study findings for decision-makers, it is important to note several limitations. First, the pre- and post-implementation periods were in different seasons of the year. Second, we did not compare the multi-tier plan to another plan that remained with a generic/brand differential copayment structure throughout the pre- and post-implementation periods. For these reasons, we cannot specify the degree to which change from the pre-implementation period to the post-implementation period for the sample overall is due to seasonal variations, market trends, or other factors that would have affected utilization without the copayment change. Third, this study's results might not be representative of benefit designs with more opportunities to find alternative medications with lower out of pocket costs. For example, a three-tier design that designates brand medications as either "preferred" (lower copayment) or "non-preferred" (higher copayment) will typically have as "preferred" at least one non-sedating antihistamine, at least one proton pump inhibitor, etc. Therefore, it is not appropriate to use these findings to predict cost savings following a multi-tiered copayment increase, nor should they be considered indicative of outcomes for typical three-tier structures.

Nonetheless, lower- and higher-salary groups served as appropriate comparison groups for each other, and all experienced the same copayment change at the same time. The primary value of these findings is that they demonstrate differential responses to large copayment increases across different salary groups.

Of course, salary is only a proxy indicator of income since in many families more than one spouse is employed. However, regression analyses controlling for marital status, as well as survey analyses of total income, produced similar results.

Because the survey's response rate was low, its results should be interpreted cautiously. However, the results of the survey and the claims analysis were consistent.

Our sample size was insufficient to examine results within therapeutic classes, such as specific drug-to-drug switches or terminations of treatment. How enrollees make key decisions, such as whether to reduce a drug's dosage, substitute a different drug, or terminate treatment, is an important area for future research.

An important related question not addressed in this study is whether the reduced drug expenditures observed in the lower-income families were clinically significant. Potential medical and economic consequences of these reductions, such as morbidity, increased utilization of other healthcare services, or employee productivity changes, are important and rich topics for future research. Express Scripts has an ongoing stream of research addressing important issues of this type.

These findings provide important policy implications for employers and other payers making health care benefit design decisions. First, payers commonly base health care benefit decisions on aggregate measures such as overall utilization change or expense reductions. This study suggests the need to do more. For example, because families with annual salaries less than \$20,000 represented a minority of the sample, examining

only aggregate statistics would reveal nothing of this group's experiences. To understand the results of a cost-sharing change in an employed population, it is necessary to examine the impact not just overall, but also in specific -- sometimes small -- groups that are particularly likely to be affected by cost-sharing. Second, a payer with a group of enrollees that is potentially particularly vulnerable to increased cost-sharing requirements, such as lower-income workers, might wish to take into account their ability to pay copayments in making benefit design decisions, particularly when lower-cost alternatives are not available to them. As cost-sharing levels continue to rise, detailed examinations of this type become increasingly important.

ENDNOTES

1. Dalzell M. "HMOs' delicate balancing act: The art of setting copayments," *Managed Care* 1997;6;48-50,53-54.
2. Harris J, Custer W. "Health care economic factors and the effects of benefits plan design changes," *Journal of Occupational Medicine* 1991;33;279-286.
3. Gabel J. "Ten ways HMOs have changed during the 1990s," *Health Affairs* 1997;16;134-145.
4. Hoechst Marion Roussel. *Managed Care Digest Series 1997*. Kansas City: Hoechst Marion Roussel; 1998.
5. Hoechst Marion Roussel. *Managed Care Digest Series 1998*. Kansas City: Hoechst Marion Roussel; 1999.
6. Pharmacy Benefit Management Institute. *The Wyeth Ayerst Prescription Drug Benefit Cost and Plan Design Survey Report*. Scottsdale, AZ: The Pharmacy Benefit Management Institute, Inc.; 1998.
7. Winslow R. "Co-payments rise for prescriptions," *Wall Street Journal* (January 12, 1999):B1,B4.
8. Emigh RC (Ed). *Novartis Pharmacy Benefit Report: Facts and Figures*. Totowa, NJ: Emron; 1998.
9. Burstall M. "Copayments for medicines: How much should patients pay?" *PharmacoEconomics* 1994;6;187-192.
10. Levy R, "Prescription cost sharing: Economic and health impacts, and implications for health policy," *PharmacoEconomics* 1992;2;219-237.
11. Harris B, Stergachis A, Ried L. "The effect of drug copayments on utilization and cost of pharmaceuticals in a health maintenance organization," *Medical Care* 1990;28;0907-917.
12. Johnson RE, Goodman MJ, Hornbrook MC, Eldredge MB. The effect of increased prescription drug cost-sharing on medical care utilization and expenses of elderly health maintenance organization members. *Medical Care* 1997;35:1119-1131.
13. Motheral BR, Henderson R. The effect of a copay increase on pharmaceutical utilization, expenditures, and treatment continuation. *Am J Managed Care* 1999;5:1383-1394.
14. Smith D. "The effects of copayments and generic substitution on the use and cost of prescription drugs," *Inquiry* 1993;30;189-198.
15. Smith D, Kirking D. "Impact of consumer fees on drug utilisation," *PharmacoEconomics* 1992;2;335-342.
16. Freeman H, Corey C. "Insurance status and access to health services among poor persons," *Health Services Research* 1993;28;531-541.

17. Nelson A, Reeder C, Dickson W. "The effect of a Medicaid drug copayment program on the utilization and cost of prescription services," *Medical Care* 1984;22;724-736.
18. Stuart B, Grana J. "Ability to pay and the decision to medicate," *Medical Care* 1998;36;202-211.
19. Manning W, Newhouse J, Duan N, Keeler E, Liebowitz A, Marquis M. "Health insurance and the demand for medical care: Evidence from a randomized experiment," *American Economic Review* 1987;77;251-277.
20. Cherkin D, Grothaus L, Wagner E. "Is magnitude of co-payment effect related to income? Using census data for health services research," *Social Science and Medicine* 1992;34;33-41.
21. Reeder C, Lingle E, Schulz R et al. "Economic impact of cost-containment strategies in third party programmes in the US," *PharmacoEconomics* 1993;4;92-103.
22. Teitelbaum F, Parker A, Martinez R, Roe C. 1998 Express Scripts Drug Trend Report. St. Louis, MO: Express Scripts, Inc.; 1999.
23. Clark D, VonKorff M, Saunders K et al. "A chronic disease score with empirically derived weights," *Medical Care* 1995;33;783-795.

Table 1
 Prescription Drug Copayments Before and After Implementation of New Copayment Structure

| Tier | Network Pharmacies | | Mail Order Pharmacy | |
|-------------------|--------------------|--|---------------------|---|
| | Before | After | Before | After |
| Generic | \$4.00 | \$4.00 | \$8.00 | \$8.00 |
| Lower-Cost Brand | \$7.00 | \$10.00 | \$12.00 | \$20.00 |
| Higher-Cost Brand | \$7.00 | Greater of \$15 or 25% (\$50 maximum, \$19 mean) | \$12.00 | Greater of \$30 or 25% (\$100 maximum, \$55 mean) |

Table 2
Employee, Family, and Enrollee Characteristics by Salary Level

| | <u>Whole Sample</u> | <u>Salary < \$20,000</u> | <u>\$20,000 -- < \$40,000</u> | <u>\$40,000 -- < \$60,000</u> | <u>\$60,000 or more</u> | <u>P value</u> ^{*1} |
|----------------------------------|-------------------------|---------------------------------|--------------------------------------|--------------------------------------|-----------------------------|------------------------------|
| N of families (%) | 559 | 144 (25.8) | 231 (41.3) | 98 (17.5) | 86 (15.4) | |
| Mean employee age | 36.8 | 36.3 | 35.1 | 38.3 | 40.1 | .001 |
| Mean family size | 2.4 | 1.9 | 2.3 | 2.5 | 3.2 | .000 |
| Mean enrollee age ^{*2} | 27.4 | 28.9 | 26.4 | 28.0 | 27.1 | .216 |
| Mean enrollee CDS ^{*3} | 464 | 527 | 460 | 440 | 420 | .058 |
| Male enrollees (%) ^{*2} | 44.0 | 35.7 | 43.0 | 48.8 | 50.0 | .003 |

¹ For mean age, family size and CDS, p value for ANOVA. For percent male, p value for Pearson chi square.

² N = 1331 enrollees.

³ CDS is calculated for adults only; N = 893 enrollees.

Table 3
Pre-to-Post Changes in Monthly Drug Expenditures

| | SALARY | | | | Salary p value ^a | CHRONIC DISEASE SCORE | | | | CDS p value ^a |
|-----------------------------|-----------|------------------------|------------------------|---------------------|--------------------------------|-----------------------|-------|-------|-------|-----------------------------|
| | <\$20,000 | \$20,000- <\$40,000 | \$40,000- <\$60,000 | \$60,000 or more | | 1 | 2 | 3 | 4 | |
| Generic pre (\$) | 12.98 | 14.68 | 12.65 | 14.05 | .457 | 3.70 | 5.44 | 13.02 | 33.44 | .000 |
| Generic post (\$) | 17.74 | 16.00 | 17.58 | 14.97 | | 6.89 | 6.87 | 13.43 | 39.56 | |
| Change (%) | 36.6 | 9.0 | 39.0 | 6.5 | | 86.4 | 26.3 | 3.2 | 18.3 | |
| Change natural log (%) | 16.6 | 10.6 | 7.4 | 8.3 | .725 | 50.8 | 36.3 | -6.0 | 2.1 | .009 |
| Lower-cost brand pre (\$) | 18.80 | 25.14 | 22.51 | 28.06 | .298 | 6.05 | 12.99 | 20.49 | 54.75 | .000 |
| Lower-cost brand post (\$) | 21.08 | 17.38 | 25.39 | 24.05 | | 6.50 | 11.84 | 17.55 | 47.41 | |
| Change (%) | 12.1 | -30.9 | 12.8 | -14.3 | | 7.4 | -8.8 | -14.4 | -13.4 | |
| Change natural log (%) | -7.8 | -10.6 | 5.0 | 1.6 | .323 | 13.2 | -10.9 | -3.0 | -7.5 | .250 |
| Higher-cost brand pre (\$) | 28.00 | 28.95 | 29.47 | 25.97 | .834 | 3.71 | 7.70 | 14.30 | 88.22 | .000 |
| Higher-cost brand post (\$) | 22.30 | 21.98 | 31.16 | 31.49 | | 7.47 | 8.87 | 20.43 | 64.56 | |
| Change (%) | -20.4 | -24.1 | 5.7 | 21.3 | | 101.5 | 15.2 | 42.8 | -26.8 | |
| Change natural log (%) | -14.9 | 17.9 | 19.5 | 39.9 | .031 | 85.7 | 29.4 | 14.2 | -6.4 | .065 |

Table 3 continued
Pre-to-Post Changes in Monthly Drug Expenditures

| | SALARY | | | | Salary p value ^a | CHRONIC DISEASE SCORE | | | | CDS p value ^a |
|------------------------|-----------|------------------------|------------------------|---------------------|--------------------------------|-----------------------|-------|-------|--------|-----------------------------|
| | <\$20,000 | \$20,000- <\$40,000 | \$40,000- <\$60,000 | \$60,000 or more | | 1 | 2 | 3 | 4 | |
| Total pre (\$) | 59.79 | 68.77 | 64.62 | 68.08 | .933 | 13.45 | 26.14 | 47.81 | 176.41 | .000 |
| Total post (\$) | 61.12 | 55.36 | 74.13 | 70.50 | | 20.85 | 27.59 | 51.41 | 151.53 | |
| Change (%) | 2.2 | -19.5 | 14.7 | 3.6 | | 55.0 | 5.5 | 7.5 | -14.1 | |
| Change natural log (%) | -2.6 | 2.7 | 4.2 | 8.8 | .352 | 25.7 | 6.2 | -2.6 | -3.9 | .001 |

^a For pre-period values, p for Analysis of Variance of log-transformed costs. For change value, p for interaction of between-subjects (salary and CDS, respective) and within-subjects (pre-to-post change) factors in Repeated Measures Analysis of Variance.

Table 4
 Unstandardized Coefficients (T) and R² (F) for Regression Analyses of Post-Period Expenditures

| | Generic | Lower-Cost Brand | Higher-Cost Brand | Total |
|-----------------------------|-----------------|------------------|-------------------|-----------------|
| Family size | ***0.447 (8.0) | ***0.298 (4.3) | ***0.435 (6.2) | ***0.487 (8.0) |
| Salary \$20,000 - <\$40,000 | 0.211 (1.1) | 0.067 (0.3) | 0.396 (1.6) | *0.419 (2.0) |
| Salary \$40,000 - <\$60,000 | -0.063 (-0.3) | **0.942 (3.1) | *0.620 (2.0) | *0.646 (2.5) |
| Salary \$60,000 or more | -0.022 (-0.9) | 0.185 (0.6) | *0.666 (2.0) | 0.433 (1.5) |
| Chronic Disease Score | ***1.817 (13.0) | ***1.749 (10.0) | ***1.916 (10.9) | ***2.213 (14.5) |
| R ² (F) | ***0.298 (46.9) | ***0.192 (26.3) | ***0.231 (33.2) | ***0.340 (57.0) |

*** p < .0001; ** p < .01; * p < .05

Table 5
Key Employee Survey Findings by Total Family Income

| <u>Employee Reports About Family</u> | <u>< \$20,000</u> | <u>\$20,000 - < \$40,000</u> | <u>\$40,000 - < \$60,000</u> | <u>\$60,000 or more</u> |
|---|----------------------|-------------------------------------|-------------------------------------|-----------------------------|
| Family delays refills to save money more often post than pre TTC (%)* | 33.3 | 26.0 | 22.0 | 11.8 |
| Family skips doses to save money more often post than pre TTC (%)* | 33.3 | 22.0 | 24.4 | 10.3 |
| Out-of-pocket cost “very much” affects prescription-filling (%)** | 66.7 | 28.0 | 14.6 | 10.3 |
| N of respondents | 18 | 50 | 41 | 68 |

* Linear-by-linear association test $p < .05$. Respondents were asked about the five months “pre” and “post” the TTC implementation. Scale choices (4-point, Likert-type) ranged from “No, never” to “Yes, often.” Figures are percentages of respondents exhibiting pre-to-post change from “No” to “Yes” direction.

** Linear-by-linear association test $p < .001$. Proportion answering “Yes, very much” on a 4-point Likert-type scale ranging from “Yes, very much” to “No, not at all.”