Impact of Drug Coverage on Medical Expenditures Among the Elderly

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Our study compares expenditures for Medicare covered medical services among enrollees in three State pharmacy assistance programs with spending among low-income residents eligible or near-eligible for, but not enrolled in such State-sponsored programs after controlling for between-group differences in demographic, socioeconomic, health status, and insurance status characteristics. We estimate a two-part model in total and by type of service (inpatient, outpatient, and professional) and chronic condition (hypertension, heart disease, and arthritis). We find that drug coverage has no discernible effect on the use and cost of inpatient services, but is associated with a statistically significant increase in Medicare spending for physician services.

INTRODUCTION

The 2003 Medicare Prescription Drug, Improvement, and Modernization Act authorized CMS to begin offering a comprehensive outpatient drug benefit (Part D) to its elderly and disabled Medicare beneficiaries in January 2006. Part D represents the greatest single expansion of the Medicare Program since its inception in 1965. The benefit remains controversial in large part because it is expected to be hugely expensive, adding more than $900 billion to Medicare spending over the next 10 years and representing an increase in total Medicare benefit outlays of 15 percent (U.S. Congressional Budget Office, 2007).

The net long-term increase in Medicare spending for outpatient drugs may prove to be lower than this if both of two things occur: (1) Part D significantly increases access to appropriate medications and (2) the use of Medicare covered medical services is sensitive to the use of prescription medications. For example, if the introduction of Part D results in an increase in the use of statin drugs by beneficiaries at elevated risk for myocardial infarction or stroke, and if the probability of myocardial infarction or stroke is substantially reduced by the use of statins, then Part D spending on statins might be offset by reduced spending for emergency department and inpatient care. However, the drug benefit may increase the cost of medical care if drug and nondrug medical services, such as physician office visits for prescribing and monitoring medications, are complementary or if pharmaceuticals lead to adverse events or medical complications.

Evidence that enhanced access to prescription drugs reduces health care utilization is mixed. Yang and Norton (2006) use Medicare Current Beneficiary Survey (MCBS) data to show that an increase in outpatient prescription drug use (not coverage) leads to minor, but significant offsets in Medicare inpatient spending. Furukawa (2004), employing the same source of data, finds that Medicare beneficiaries with private drug coverage have significantly lower nondrug spending than those without drug coverage, although

the offset varies by source of coverage and type of service. Khan, Kaestner, and Lin (2007) also use MCBS data to analyze the impact of drug coverage on service use and find that prescription drug coverage significantly increases the utilization of prescription medications, but has no discernable effect on hospital admissions.

Our study contributes to this literature by exploiting a natural experiment created by the implementation of State pharmacy assistance programs for low-income beneficiaries. We evaluate the impact of drug coverage on medical costs by comparing expenditures for Medicare covered medical services among enrollees in three State pharmacy assistance programs in 2003 with medical spending for low-income residents who were eligible or near eligible for, but not enrolled in State-sponsored programs over the same period. Using information collected through enrollee and nonenrollee surveys, we control for differences in demographic, socioeconomic, and health status characteristics between the two groups. Utilization and expenditure effects are estimated in total and for inpatient, hospital outpatient, and physician services separately.

POLICY CONTEXT

In 2003, Vermont offered three pharmacy benefit programs to its low-income elderly and disabled residents (Table 1). The first, called VScript, was initiated in 1989 as a State-funded program to offer low-income Medicare beneficiaries a 50-percent subsidy on maintenance prescription drugs. The second, called VHAP Pharmacy, was introduced 7 years later as part of the State's 1115 Medicaid waiver. It employed both State and Federal dollars to provide a more generous drug benefit package with less enrollee cost sharing to seniors and disabled residents with slightly lower incomes than its VScript counterpart. In 1999 VScript became absorbed into the 1115 waiver as well and in 2000 the State-funded only portion of the

Table 1
Comparison of Vermont's Pharmacy Assistance Programs: 2003

Description	VHAP Pharmacy	VScript	VScript Expanded
Year Started	1996	1989	2000
Eligibility Requirement			
Eligibility Basis	Age 65 or Over/Disabled	Age 65 or Over/Disabled	Age 65 or Over/Disabled
Income Threshold (Percent of Poverty Level)	150	175	225
Asset Limit	None	None	None
Existing Drug Coverage Allowed	No	No	No
Vermont Resident	Yes	Yes	Yes
Citizen/Resident Alien	Yes	Yes	Yes
Coverage Drugs	All	Maintenance	Maintenance
Enrollee Cost Sharing	$3 for Generics $6 for Brand (Beneficiary Pays a Maximum of $50 Per Quarter)	$5 for Generics $10 for Brand (Beneficiary Pays a Maximum of $100 Per Quarter)	$275 Annual Deductible 41 Percent Coinsurance (Beneficiary Pays a Maximum of $2,500 Per Year)
Source of Funds	State/Federal	State/Federal	State
Program Enrollment	8,404	3,055	3,208

SOURCE: Vermont Joint Fiscal Office, February 2003 and April 2004.

original pharmacy assistance program was expanded to a higher income population. The new State program was referred to as VScript Expanded. By October 2003, 8,404 individuals were enrolled in VHAP Pharmacy, 3,055 in VScript, and 3,208 in VScript Expanded. At the time of our study, 1 out of every 6 Medicare beneficiaries in Vermont received assistance paying for their prescription drug purchases from the State, not counting those who already got drug coverage through the partially State-funded Medicaid Program.

Eligibility Requirements

Eligibility for VHAP Pharmacy, VScript, and VScript Expanded was based on a range of criteria including: age, disability, income, residency, and private pharmacy coverage. Enrollees were required to be age 65 or over receiving disability benefits from Social Security Old Age Survivors and Disability Insurance (OASDI), Medicare, or Railroad Retirement. Individuals were not allowed to be receiving assistance for prescription drug expenses at the time of enrollment.[1] However, those with a privately purchased supplemental pharmaceutical benefit could drop coverage without penalty or downgrade to a physician and hospital benefit only to qualify for State drug assistance. At the time of application, individuals were required to be U.S. citizens or resident aliens lawfully admitted for permanent residence and living in Vermont. Individuals who met these requirements, but who did not otherwise qualify for Medicare benefits because of the disability waiting period, citizenship, or lack of prior employment nonetheless remained eligible for the State drug assistance programs. The three programs also had

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[1] While enrollees are not allowed to have other drug coverage, a small proportion report having a second source of drug coverage through entitlement programs like the Veterans Affairs.

income (but not asset) requirements, which were expanded over time. At the time of our study, the income threshold was 150 percent of the Federal poverty level (FPL) for VHAP Pharmacy, 175 percent of FPL for VScript, and 225 percent of FPL for the State-funded VScript Expanded program.

Pharmacy Benefits

Given their traditional reliance on State-only funds, the priority of VScript and VScript Expanded was on prescription drugs considered essential for maintaining the health of seniors and disabled people suffering from chronic conditions, such as hypertension, asthma, and diabetes. Individuals who depend on prescription drugs to control their chronic conditions were considered most vulnerable to the lack of a Medicare drug benefit and, thus, most in need of public pharmacy assistance from the State. Thus, under VScript and VScript Expanded, only maintenance drugs were covered. Maintenance drugs were defined as all medications for which a single 60-day supply is prescribed, excluding those primarily used for the treatment of acute conditions. With the introduction of the 1115 waiver and access to Federal funds, VHAP Pharmacy covered all prescription drugs, including contraception medications and devices, insulin supplies, and needles and syringes. In April 1999, when VScript for individuals between 150 and 175 percent of FPL became absorbed into the waiver, coverage remained restricted to maintenance prescription drugs. Enrollees in all three programs were required to use a generic drug whenever available, unless a brand named drug was recommended by the prescribing physician.

Despite differences in benefits between the VHAP program and the VScript and VScript Expanded programs, an earlier analysis of drug claims data revealed

that enrollees in VHAP Pharmacy and VScript were equally likely to suffer from chronic illnesses and use similar types and amounts of prescription drugs (Gilman, Gage, and Mitchell, 2003). Our review of pharmacy claims found that the types of drugs most commonly purchased under both VHAP Pharmacy and VScript were used to treat the same set of chronic conditions, including stomach acids or ulcers, cholesterol, heart disease, diabetes, and mental disorders. In fact, the eight top ranking prescription medications in terms of both number of users and expenditures were the same for both programs. The authors found broad similarities in self-reported chronic disease prevalence and health status indicators across the three pharmacy assistance programs as well (Gilman et al., 2004a).

Enrollee Cost Sharing

VHAP Pharmacy, VScript, and VScript Expanded required enrollee cost sharing, which also underwent major changes since each program's inception. By 2003, the VHAP Pharmacy and VScript programs were using a two-tiered copayment system with a quarterly out-of-pocket maximum. For generic drugs, VHAP Pharmacy participants paid a $3 copayment and VScript enrollees paid a $5 copayment. For brand named drugs, VHAP Pharmacy and VScript participants paid a $6 and $10 copayment, respectively. Enrollee copayments were limited to $50 per quarter under VHAP Pharmacy and $100 per quarter under VScript. In contrast, the fully State-funded VScript Expanded program used a 41.25-percent coinsurance rate and a $275 annual deductible. Beneficiary out-of-pocket payments were limited to $2,500 per year under VScript Expanded.

DATA AND METHODS

Data Sources

We collected information on beneficiaries' demographic, socioeconomic, and health status characteristics from surveys of enrolleed and eligible or near-eligible nonenrolleed beneficiaries (Gilman, et al., 2004b).[2] Data were collected by telephone during a 12-week period between March and June 2004. A total of 2,680 18-minute interviews were completed. Of these interviews, 1,356 were completed with beneficiaries in the enrollee group and 1,324 were completed with beneficiaries in the eligible or near eligible but nonenrollee group. The unweighted response rate was 77 percent for the enrollee group and 72 percent for nonenrollee. The sampling weights were adjusted for survey nonresponse and post-stratified to population control totals. The surveys collected information on drug coverage prior to enrollment, drug utilization, access to prescription drugs, adequacy of drug coverage, and unmet drug needs. The surveys also collected information on self-reported health status, nine chronic diseases, sociodemographic characteristics (education, employment, income, and living arrangement), supplemental medical coverage, and drug coverage (among nonenrollees).

We obtained information on medical service use and expenditures from the 2003 Medicare claims files, including the inpatient, outpatient, and physician/supplier Standard Analytic Files. Details on program enrollment came from the State Medicaid eligibility files. State eligibility files provide a complete record of dates of enrollment by type of program, including VHAP Pharmacy, VScript, and VScript Expanded. State eligibility files were also

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[2] Copies of the enrollee and nonenrollee surveys are available on request from the author.

used to identify the program enrollee survey frame. We used the Medicare Enrollment Database (EDB) to collect information on additional beneficiary characteristics such as sex, age, and dual Medicaid eligibility status, and to identify the nonenrollee survey frame.

Study Sample

We drew the enrollee sample from a frame of all Medicare beneficiaries who were enrolled in any of the State pharmacy assistance programs on November 1, 2003. We divided the enrollee sample into three balanced strata, one for each of the pharmacy assistance programs, to allow within group comparisons based on the coverage benefits and copayment requirements. We drew the nonenrollee sample from a frame of elderly Medicare beneficiaries who were a resident of Vermont in November 2003, were not enrolled in any of the State pharmacy assistance programs, and had an annual income below 300 percent of FPL. We used a screener to identify low-income nonenrollees based on self-reported income. We also used Social Security income data provided by the Social Security Administration to identify beneficiaries who, on the basis of their monthly benefits, were likely to have annual incomes close to the eligibility thresholds for the pharmacy assistance programs and help narrow our nonenrollee frame. We excluded non-elderly beneficiaries from both the enrollee and nonenrollee samples.

Model

We used a cross-sectional evaluation design in which the impact of drug coverage is measured as the difference in average medical expenditures among a representative sample of enrollees in VHAP Pharmacy, VScript, and VScript Expanded and a representative sample of Medicare beneficiaries who were eligible or near eligible for but not enrolled in any of the State-sponsored assistance programs, after controlling for differences in health status and other potentially confounding factors such as supplemental medical coverage between the two groups.

The expenditure model can be summarized as follows:

$$Y_i = \alpha + X_i B_i + H_i B_2 + P_i B_3 + E_i B_4 + \varepsilon_i$$

where Y_i = annualized total expenditures for beneficiary i;

α = the intercept term;

X_i = a set of beneficiary-level sociodemographic characteristics;

H_i = a set of beneficiary-level health status characteristics;

P_i = a set of beneficiary-level health coverage characteristics;

E_i = an enrollment dummy that takes the value of one for all program enrollees and zero otherwise; and

ε = a random error term.

The model regresses total expenditures from all sources, including Medicare, third party payers, and beneficiary copayments, on a set of beneficiary-level sociodemographics, health status, and plan coverage characteristics, plus an enrollment variable that takes the value of one for all beneficiaries enrolled in any of the three State pharmacy assistance programs and zero for all eligible or near eligible, but nonenrolled beneficiaries without drug coverage. A positive sign on the estimated enrollment coefficient signifies that drug coverage and service use are complements; a negative coefficient indicates prescription drugs are a substitute for medical services.

Medicare beneficiaries are likely to enroll in subsidized programs precisely because they experience an acute episode

or suffer from chronic illnesses with extensive and persistent health care needs (Gilman, Gage, and Mitchell, 2003; Pauly and Zeng, 2003). Beneficiaries with greater health care needs are thus more likely to enroll in pharmacy assistance programs than beneficiaries with lower levels of need. To control for the potential bias caused by adverse selection, we include several health status measures, as well as a set of demographic and socioeconomic characteristics that are likely to be correlated with health status. The covariates include age (65-74 years, 75-84 years, and 85 years or over); sex; residency status (whether or not an individual lived alone); education (less than high school, high school only, and some post-high school); and income (less than 151 percent of FPL and between 151-300 percent of FPL). We also include self-reported health status (excellent/very good, good, and fair/poor), and a set of self-reported chronic conditions (hypertension or high blood pressure; heart disease or condition; emphysema, asthma or chronic obstructive pulmonary disease (COPD); cancer or other malignancy; diabetes or high blood sugar; arthritis; osteoporosis or fragile or soft bones; depression; and stomach ulcer, heartburn or reflux).

The model may also produce biased results if the enrollee and nonenrollee samples have differential rates of supplemental medical insurance or if the nonenrollee sample has drug coverage or a drug discount card. (All program enrollees are eligible for the Healthy Vermonters drug discount card program that entitles them to Medicaid prices on prescription drugs.) To control for the effect of supplemental medical and non-State drug coverage, we include a variable that takes the value of one if a beneficiary has supplemental medical insurance coverage and zero otherwise and another variable that takes the

value of one if a nonenrollee reports having drug coverage and zero otherwise. We also include an indicator variable for non-enrollees who report owning a drug discount card. These variables effectively create a second treatment arm of nonenrollees with drug coverage. Our program enrollment variable thus measures the difference in service use and expenditures between program enrollees and nonenrolled beneficiaries who do not have an alternative source of drug coverage or a drug discount card.

Statistical Methods

The model is estimated on logged Medicare payments to account for the skewness of drug expenditures. Because of the non-trivial proportion of beneficiaries without a claim, the results were estimated using a two-part model. The two-part model estimates the probability of any expenditure and the level of non-zero expenditures among claimants separately. The probability model is estimated using logistic regression and the conditional logged expenditure model is estimated using ordinary least squares. We use group- and service-specific smearing factors based on individual residuals to retransform the results to the original dollar scale and employ bootstrapping methods to estimate the standard errors from the two-part model. To control for differences in length of Medicare enrollment, we weight the observations by the proportion of the year a person is alive and entitled to both Parts A and B benefits. Since most enrollees are enrolled for 12 months, we did not adjust for partial year enrollment. Nor did we adjust for length of enrollment in the pharmacy assistance programs historically.

We estimate the model on total expenditures for inpatient, hospital outpatient, and physician services separately to measure

differences in the relationship between drug and nondrug care across individual service categories. Inpatient expenditures include facility payments for services provided in an acute care hospital, skilled nursing facility, or long-term care hospital setting. Outpatient expenditures include facility payments for services administered in a hospital outpatient department or a freestanding ambulatory care clinic. Physician expenditures consist of payments for professional services provided in any setting, including a physician's office. We hypothesize that drugs are more likely to substitute for acute care services administered in inpatient facilities, while pharmaceuticals are more likely to be complementary with services oriented toward disease prevention and maintenance that are administered in physicians' offices or outpatient clinics.

We re-estimate the models using program-specific enrollment variables to examine the differential effect of benefit design on medical service use and costs. Plans with more generous formularies and cost-sharing requirements might encourage greater use of and adherence to prescription medications and, thus, lead to greater substitution with inpatient services and complementarities with ambulatory services. Since VHAP Pharmacy covered more drugs and charged a lower copayment, we would expect to see a larger coverage effect under the more generous program.

Alternatively, the substitution of drug for nondrug medical services administered in an inpatient setting may be greater among beneficiaries with chronic diseases who rely on maintenance medications to control their conditions. Complementarities between drug and physician or outpatient services may be greater among those with chronic conditions as well. In this case, we would expect the impact of drug coverage on medical service use and spending to be greater among VScript and VScript Expanded enrollees. To test this hypothesis, we re-estimated the models separately on the three most prevalent chronic conditions in our sample: hypertension, arthritis, and heart disease or condition.

RESULTS

Descriptive Statistics

Table 2 shows the distribution of enrollee and nonenrollee samples by demographic, socioeconomic, health status, and insurance coverage attributes. The enrollee and nonenrollee samples consist of 1,310 and 1,295 elderly beneficiaries, respectively. Enrollees were more likely to be very old,

Table 2
Descriptive Characteristics of Pharmacy Assistance Program Enrollee and Nonenrollee Samples

Characteristic	Enrollee Sample[1]	Nonenrollee Sample[2]
	Percent	
Age	***	—
65-74 Years	39.4	46.9
75-84 Years	42.2	42.2
85 Years or Over	18.4	10.9
Female	68.9***	59.2
Living Alone	42.1***	30.3
Education	***	—
Less Than High School	41.2	23.6
High School Only	41.0	43.1
Some Post-High School	17.8	33.3

Refer to footnotes at the end of the table.

Table 2—Continued

Descriptive Characteristics of Pharmacy Assistance Program Enrollee and Nonenrollee Samples

Characteristic	Enrollee Sample[1]	Nonenrollee Sample[2]
	Percent	
Self-Reported Health Status	***	—
Excellent/Very Good	25.9	36.4
Good	35.0	36.6
Fair/Poor	39.2	27.1
Clinical Conditions		
Hypertension or High Blood Pressure	66.7***	57.5
Heart Disease or Condition	40.7***	31.5
Emphysema, Asthma, or COPD	17.0***	14.5
Cancer or Other Malignancy	19.0***	20.0
Diabetes or High Blood Sugar	23.0***	15.8
Arthritis	64.1***	53.1
Osteoporosis	22.4***	17.6
Depression	22.1***	15.9
Stomach Ulcer, Heartburn, or Reflux	32.9***	26.8
Insurance Status		
Supplemental Medical Coverage	60.0***	79.0
Other Drug Coverage	N/A	63.5
Drug Discount Card	N/A	28.9
Probability of Service Use		
Inpatient Services	16.0	15.7
Outpatient Services	90.8***	84.7
Professional Services	95.3***	93.0
Any Services	97.3***	94.4
Expenditures Over Claimants Only		
Inpatient Services	$12,529	$12,784
Outpatient Services	1,236	1,230
Professional Services	1,604	1,479
Any Services	4,785	4,689

[1] *N*=1,310.

[2] *N*=1,295.

*** Statistical significance at the 1-percent level.

** Statistical significance at the 5-percent level.

* Statistical significance at the 10-percent level.

NOTES: N/A is not applicable. COPD is chronic obstructive pulmonary disease. Proportions may not add up to 100 due to rounding.

SOURCES: Vermont Pharmacy Assistance Program Enrollee and Nonenrollee Surveys, Medicare Parts A and B claims, and Medicare Enrollment Database, 2003.

female, and living alone. They were also less likely to have graduated from high school or have some post high school education. In addition, enrollees had lower self-reported health status (fair/poor) and were more likely to suffer from chronic conditions such as hypertension, heart and lung disease, diabetes, arthritis, osteoporosis, mental depression, and stomach ulcers. Enrollees were also more likely to use prescription medications and, among those who did, to fill more prescriptions per year. Enrollees were also less likely to

have supplemental medical coverage. Over two-thirds of the nonenrollee sample had drug coverage and almost one-third had a drug discount card. Differences between the enrollee and nonenrollee samples are statistically significant.

Table 2 provides similar statistics for annual drug use and spending by service category. Enrollees were more likely to use outpatient and professional services, but no more likely to have a hospitalization than nonenrollees. The between-group differences in outpatient and professional

service use rates are statistically significant. However, there are no significant differences in mean annual expenditures conditional on using services between the two groups. When measured over claimants only, enrollees and nonenrollees averaged approximately $12,500 in inpatient services, $1,200 in outpatient services, and $1,500 in professional services. Enrollees incurred on average $4,785 in annual payments for all medical services compared with $4,689 among nonenrollees.

Logistic and Conditional Expenditure Results

Table 3 presents the estimated coefficients and standard errors from the logistic and conditional expenditure models separately. The results reveal that the odds of using inpatient services are positively correlated with age, and the odds of using outpatient services are positively associated with being female. The odds of using physician services are also significant and positively correlated with age, female, and income. Medical expenditures for physician services conditional on using those services were significant and positively correlated with age and education.

The findings also indicate that self-reported health status is positively correlated with the odds of using inpatient services and conditional expenditures for outpatient and professional services. A similar pattern of higher use rates and conditional expenditures holds true for most individual disease conditions as well, although the significance of the results varies depending on the number of beneficiaries who reported having the disease. Beneficiaries with heart and lung disease were more likely to use inpatient services, and those who suffered from arthritis, osteoporosis, and stomach ailments were more likely to use outpatient services.

Most of these conditions, together with hypertension and cancer, were also associated with a greater likelihood of visiting a physician or other professional service provider. Moreover, while having a medical condition has no discernible effect on inpatient expenditures, the impact on outpatient and professional expenditures is generally positive and significant.

Beneficiaries who had supplemental medical insurance were over 60 percent more likely to use outpatient services and over twice as likely to use professional services as those who did not have additional medical coverage. Elderly beneficiaries with a privately purchased or retiree drug benefit (those who were not enrolled in one of the State's subsidized drug programs) exhibited higher conditional expenditures for outpatient services than individuals without drug coverage. Ownership of a drug discount card had no observable effect on use or cost of Medicare services. Finally, the first-part results indicate that enrollment in a State-sponsored pharmacy assistance program has no observable impact on individual service use and costs. However, when aggregated over all service categories, subsidized drug coverage was associated with a marginally significant doubling of the odds of using Medicare covered services.

Two-Part Expenditure Results

Table 4 provides similar results from the two-part model. The results show that, when service use and intensity of care are measured jointly, Medicare spending for inpatient and professional services is positively associated with age, and expenditures for professional services is positively correlated with education. Poorer health status contributes to significantly higher spending across all service categories, while most chronic conditions are positively correlated

Table 3

Impact of Enrollment in Pharmacy Assistance Programs on Expenditures for Medicare Covered Services: First Stage Logistic and Conditional Ordinary Least Square Results

Characteristic	Inpatient Services		Outpatient Services		Professional Services		All Services	
	Probability of Any Expenditures	Level of Logged Expenditures	Probability of Any Expenditures	Level of Logged Expenditures	Probability of Any Expenditures	Level of Logged Expenditures	Probability of Any Expenditures	Level of Logged Expenditures
Intercept	—	9.039*** (0.314)	—	5.365*** (0.163)	—	5.522*** (0.140)	—	5.929*** (0.171)
Age								
75-84 Years	1.248 (0.230)	0.224 (0.144)	1.514 (0.301)	0.010 (0.086)	1.164 (0.297)	0.248*** (0.829)	1.669* (0.488)	0.198** (0.093)
84 Years or Over	2.056** (0.468)	-0.052 (0.133)	1.094 (0.358)	-0.309 (0.124)	3.590*** (2.323)	0.117 (0.149)	4.836* (4.157)	0.077 (0.182)
Female	0.885 (0.163)	0.061 (0.131)	1.547** (0.321)	0.045 (0.094)	2.422*** (0.730)	-0.087 (0.091)	2.105** (0.779)	-0.017 (0.104)
Living Alone	1.190 (0.213)	-0.118 (0.119)	1.032 (0.203)	-0.158* (0.089)	1.037 (0.291)	-0.090 (0.080)	0.806 (0.269)	0.002 (0.089)
Education								
High School Only	1.118 (0.424)	-0.157 (0.133)	1.042 (0.226)	0.051 (0.099)	1.206 (0.348)	0.161* (0.098)	1.311 (0.434)	0.149 (0.119)
Some High School	1.23 (0.245)	0.023 (0.151)	1.836 (0.451)	-0.075 (0.107)	1.267 (0.431)	0.209** (0.104)	1.888 (0.769)	0.142 (0.127)
Income								
Between 151-300 Percent of FPL	1.118 (0.215)	0.002 (0.122)	0.884 (0.158)	0.102 (0.085)	1.631* (0.395)	0.044* (0.079)	1.407 (0.392)	0.065 (0.091)
Health Status								
Good	1.934*** (0.426)	0.028 (0.160)	1.254 (0.261)	0.163* (0.092)	1.148 (0.294)	0.197** (0.094)	0.976 (0.289)	0.382*** (0.097)
Fair/Poor	2.306*** (0.584)	0.156 (0.173)	1.162 (0.292)	0.402*** (0.111)	1.617 (0.613)	0.365*** (0.102)	1.458 (0.613)	0.514*** (0.128)
Clinical Condition								
Hypertension or High Blood Pressure	1.171 (0.189)	-0.073 (0.112)	1.342 (0.248)	-0.069 (0.082)	2.339*** (0.560)	-0.072 (0.080)	2.325*** (0.647)	-0.016 (0.091)
Heart Disease or Condition	1.621*** (0.275)	0.147 (0.131)	1.319 (0.284)	0.253*** (0.087)	2.700*** (0.784)	0.187 (0.088)	2.062** (0.656)	0.376*** (0.104)
Emphysema, Asthma, or COPD	1.508** (0.303)	-0.143 (0.132)	1.853 (0.516)	-0.042 (0.115)	3.700*** (1.783)	0.010 (0.103)	4.291*** (2.593)	(0.111)
Cancer or Other Malignancy	1.068 (0.209)	0.091 (0.143)	1.480 (0.376)	0.460*** (0.111)	2.108** (0.707)	0.378*** (0.112)	1.840* (0.690)	0.432*** (0.128)

Refer to footnotes at the end of the table.

Table 3—Continued

Impact of Enrollment in Pharmacy Assistance Programs on Expenditures for Medicare Covered Services: First Stage Logistic and Conditional Ordinary Least Square Results

Variable	Inpatient Services		Outpatient Services		Professional Services		All Services	
	Probability of Any Expenditures	Level of Logged Expenditures	Probability of Any Expenditures	Level of Logged Expenditures	Probability of Any Expenditures	Level of Logged Expenditures	Probability of Any Expenditures	Level of Logged Expenditures
Diabetes or Blood Sugar	1.174 (0.232)	-0.093 (0.143)	1.577 (0.420)	0.231 (0.097)	1.321 (0.054)	0.262*** (0.092)	1.516 (0.555)	0.271*** (0.110)
Arthritis	1.415* (0.268)	0.009 (0.144)	2.324*** (0.428)	0.175** (0.086)	1.785 (0.434)	0.436*** (0.090)	1.744** (0.487)	0.436*** (0.095)
Osteoporosis or Fragile or Soft Bones	0.912 (0.180)	-0.054 (0.132)	2.987*** (0.902)	0.032 (0.091)	2.848 (1.330)	0.113 (0.100)	3.315** (1.959)	0.130 (0.095)
Depression	0.903 (0.189)	0.122 (0.146)	0.721 (0.197)	0.088 (0.109)	0.763 (0.295)	0.120 (0.104)	0.679 (0.316)	0.091 (0.434)
Stomach Ulcer, Heartburn, or Reflux	1.029 (0.191)	-0.058 (0.126)	1.853** (0.417)	0.306*** (0.094)	1.846* (0.640)	0.070 (0.084)	3.996*** (1.755)	0.130 (0.096)
Health Care Coverage								
Supplemental Medical Coverage	1.078 (0.206)	-0.053 (0.126)	1.645* (0.319)	0.128 (0.090)	2.236*** (0.590)	0.122 (0.081)	2.478*** (0.743)	0.167* (0.102)
Drug Coverage (Nonenrollees)	1.136 (0.250)	0.005 (0.154)	1.385 (0.304)	0.224** (0.107)	0.999 (0.305)	0.147 (0.104)	0.911 (0.318)	0.231* (0.122)
Drug Discount Card (Nonenrollees)	0.785 (0.172)	0.129 (0.172)	1.245 (0.262)	0.137 (0.113)	1.154 (0.347)	0.140 (0.098)	1.236 (0.431)	0.107 (0.114)
Program Enrollment	0.818 (0.191)	-0.008 (0.155)	1.863 (0.440)	0.060 (0.011)	1.425 (0.479)	0.155 (0.103)	2.048 (0.819)	-0.087 (0.129)
R^2	—	0.062	—	0.101	—	0.1240	—	0.134
Sample Size	2,329	369	2,329	2,062	2,329	2,195	2,329	2,231

*** Statistical significance at the 1-percent level.

** Statistical significance at the 5-percent level.

* Statistical significance at the 10-percent level.

NOTES: COPD is chronic obstructive pulmonary disease. FPL is Federal poverty level. Results from probability model are presented as odds ratios. Omitted observations are age 65-74, male, not living alone, less than high school education, income below 150 percent of FPL, in excellent or very good health status, and no prescription drug coverage. Standard errors are shown in parentheses.

SOURCES: Vermont Pharmacy Assistance Program Enrollee and Nonenrollee Surveys, Medicare Parts A and B claims, and Medicare Enrollment Database, 2003.

with higher expenditures for outpatient and professional services.

The two-part results also provide evidence that both supplemental medical and drug coverage (including both privately purchased and subsidized drug plans) are positively associated with higher Medicare spending for ambulatory services, after controlling for cross-sectional differences in health status. Elderly beneficiaries with supplemental medical coverage exhibited $194 (18 percent) higher costs for outpatient services and $229 (15 percent) higher costs for professional services than those without supplemental medical insurance. Similarly, beneficiaries with a privately purchased or retiree drug plan incurred $286 (26 percent) more in outpatient costs and $219 (14 percent) in professional costs than those without any drug coverage. Beneficiaries with a drug discount card exhibited higher spending for outpatient and professional services as well. Finally, enrollment in one of the State-sponsored pharmacy assistance programs was associated with a $263 (17 percent) increase in expenditures for professional services relative to beneficiaries without any drug coverage. Enrollment in a subsidized drug plan had no statistically significant effect on Medicare expenditures for hospital inpatient or outpatient services.

Table 5 presents the two-part results by type of pharmacy assistance program. Only the estimated coefficients and standard errors for the program enrollment variables are shown. Medicare spending for professional services was $486 higher among VScript enrollees and $527 higher among VScript Expanded enrollees relative to beneficiaries without any drug coverage. VScript Expanded enrollees also exhibited marginally significant higher costs ($264) for outpatient services. As a result of higher ambulatory costs, total spending over all service categories was $1,132 higher among VScript enrollees and $1,485 higher among VScript Expanded enrollees relative to those without drug coverage. None of the results for the VHAP Pharmacy program (across all service categories) and for inpatient services (across all pharmacy assistance programs) is statistically significant.

We also re-estimated the two-part model separately for beneficiaries who reported having hypertension, arthritis, and heart disease. The condition-specific results, presented in Table 5, reveal a marginally significant negative correlation between subsidized drug coverage and inpatient expenditures for beneficiaries with hypertension ($907) and a positive correlation between subsidized drug coverage and professional expenditures for those with hypertension ($207) and heart disease ($432), relative to noncovered beneficiaries with these diseases. Pharmacy assistance program enrollees with heart disease also exhibited marginally significant higher Medicare expenditures over all service categories ($1,266).

DISCUSSION

The results of this study suggest that outpatient prescription drugs may serve as a complement for professional services among the elderly. Enrollment in Vermont's pharmacy assistance programs was associated with a statistically significant 17 percent increase in annual expenditures for professional services compared with low-income beneficiaries without drug coverage after controlling for differences in health status. Similarly, beneficiaries covered under a privately purchased or retiree drug plan had 26 percent higher outpatient costs and 14 percent higher physician costs relative to individuals without drug coverage.

Table 4

Impact of Enrollment in Pharmacy Assistance Programs on Expenditures for Medicare Covered Services: Results From Two-Part Model

Characteristic	Inpatient Services	Outpatient Services	Professional Services	All Services
Age				
75-84 Years	880***	57	383***	1,055***
	(343)	(68)	(87)	(318)
84 Years or Over	1,271***	-299	240*	526
	(534)	(97)	(158)	(608)
Female	-77	98	-76	11
	(336)	(83)	(98)	(366)
Living Alone	48	-168	-131	-19
	(345)	(75)	(86)	(342)
Education				
High School Only	-62	61	255***	785**
	(329)	(87)	(104)	(385)
Some Post-High School	263	-22	341***	803**
	(440)	(100)	(126)	(452)
Income				
Between 151-300 Percent of FPL	194	100*	96	364
	(282)	(73)	(82)	(318)
Health Status				
Good	1,261***	213**	313***	2,031***
	(511)	(93)	(103)	(433)
Fair/Poor	1,978***	496***	607***	2,826***
	(561)	(114)	(122)	(507)
Clinical Condition				
Hypertension or High Blood Pressure	111	-44	-56	33
	(293)	(79)	(85)	(327)
Heart Disease or Condition	1,199***	323***	339***	2,024***
	(332)	(82)	(94)	(372)
Emphysema, Asthma, or COPD	397	12	69	1,026**
	(414)	(103)	(114)	(467)
Cancer or Other Malignancy	320	634**	670***	2,487***
	(356)	(124)	(135)	(541)
Diabetes or High Blood Sugar	71	330***	441***	1,514***
	(341)	(107)	(114)	(435)
Arthritis	599**	287***	647***	2,097***
	(292)	(72)	(77)	(301)
Osteoporosis or Fragile or Soft Bones	-266	132*	225**	789**
	(345)	(97)	(116)	(420)
Depression	91	59	167*	406
	(380)	(89)	(104)	(383)
Stomach Ulcer, Heartburn, or Reflex	-77	431***	139*	797***
	(333)	(90)	(93)	(356)
Health Care Coverage				
Supplemental Medical Coverage	15	194***	229***	915***
	(331)	(76)	(78)	(316)
Drug Coverage (Nonenrollees)	227	286**	219**	1,132**
	(482)	(123)	(133)	(538)
Drug Discount Card (Nonenrollees)	-136	173*	226**	575
	(609)	(129)	(131)	(538)
Program Enrollment	-348	132	263**	525
	(442)	(113)	(114)	(464)

*** Statistical significance at the 1-percent level.
** Statistical significance at the 5-percent level.
* Statistical significance at the 10-percent level.

NOTES: COPD is chronic obstructive pulmonary disease. FPL is Federal poverty level. Omitted observations are age 65-74, male, not living alone, less than high school education, with income below 150 percent of Federal poverty level, in excellent or very good health status, and no prescription drug coverage. Bootstrapped standard errors with 500 repetitions are shown in parentheses.

SOURCES: Vermont Pharmacy Assistance Program Enrollee and Nonenrollee Surveys, Medicare Part A and B claims and Medicare Enrollment Data Base, 2003.

Table 5

Impact of Enrollment in Pharmacy Assistance Programs on Incremental Expenditures for Medicare Covered Services: Results From Two-Part Model, by Program and Condition

Category	Inpatient Services	Outpatient Services	Professional Services	All Services
Program-Specific Enrollment				
VHAP Pharmacy Enrollees	-462 (566)	85 (157)	65 (149)	-121 (619)
VScript Enrollees	-47 (512)	103 (146)	486** (157)	1,132* (611)
VScript Expanded Enrollees	-365 (474)	264* (165)	527*** (164)	1,485** (668)
Disease-Specific Condition				
Hypertension or High Blood Pressure	-907* (679)	22 (135)	207* (155)	238 (538)
Arthritis	-726 (680)	91 (152)	71 (149)	-344 (578)
Heart Disease or Condition	86 (976)	185 (193)	432* (249)	1,266* (972)

*** Statistical significance at the 1-percent level.

** Statistical significance at the 5-percent level.

* Statistical significance at the 10-percent level.

NOTES: Estimates reflect differences in expenditures relative to nonenrollees after adjusting for sociodemographic and health status characteristics. Bootstrapped standard errors are shown in parentheses.

SOURCES: Vermont Pharmacy Assistance Program Enrollee and Nonenrollee Surveys, Medicare Parts A and B claims, and Medicare Enrollment Database, 2003.

The results suggest that greater access to outpatient prescription drugs lead to more time with physicians for prescribing medications, and may require more regular monitoring of treatment regimes and potential side effects by a physician or other professional provider. While some studies using MCBS data have suggested that prescription drugs may be a substitute for inpatient services, the negative offsets associated with inpatient services observable in our study were not statistically significant.

The complementarity effects appear strongest among beneficiaries who suffer from chronic conditions. Enrollees in VScript and VScript Expanded experienced the largest and most significant increase in Medicare payments for ambulatory services. Annual payments for professional services increased 26 percent for VScript enrollees and 18 percent VScript Expanded participants, relative to beneficiaries without drug coverage. In fact, participants in the maintenance medication-only programs experienced a large and statistically significant relative increase in total medical payments, suggesting that

the complementarities between drugs and physician services may outweigh the potential substitution between drugs and inpatient services among beneficiaries with chronic conditions. The complementarity between outpatient prescription drugs and professional services was further evidenced when estimated over beneficiaries with specific chronic conditions. Expenditures for professional services increased 19 percent for enrollees with hypertension and 24 percent for those with heart disease relative to beneficiaries with the same condition without drug coverage.

Evidence from Vermont's pharmacy assistance programs suggests that enhanced access to outpatient prescription drugs under Part D may not lead to discernible offsets in spending on other Medicare covered medical services, at least when measured across all low-income beneficiaries. While the findings from this natural experiment show a relative reduction in the use and cost of inpatient services among enrollees in State-sponsored programs, the results are not statistically significant. In fact, our study suggests that improvements in drug coverage under

Part D may in fact lead to increased spending for Part B services, particularly physician services and, to a lesser extent, hospital outpatient services, as patients with drug coverage become more likely to see a doctor for prescribing and monitoring their new medications. Complementarities in Part B and Part D services may be particularly significant for enrollees who rely on prescription medications for the long-term management of chronic conditions. The additional benefit outlays may, in fact, outweigh any potential offset in Part A expenditures.

Finally, with the implementation of Part D and the additional subsidies on cost-sharing requirements provided to low-income beneficiaries, pharmacy assistance programs no longer serve as the primary source of drug coverage for non-dually eligible low-income residents in many States. Instead, most existing pharmacy assistance programs, as well as some new ones implemented since 2006, have elected to use State resources to provide wrap around services to low-income beneficiaries by paying for some or all of their Part D premiums or cost-sharing requirements and covering drugs either excluded from coverage by Part D or not included in the formularies of individual plans (Cauchi et al., 2007; Fox and Schofield, 2006).

Contributions toward wraparound services for waivered enrollees no longer qualify for Federal matching funds, but count toward enrollee's true out-of-pocket spending costs, which helps individuals reach the catastrophic coverage threshold. The results of our study suggest that, while these wrap around programs may improve access to drugs among the near poor, they are unlikely to lower Medicare spending and may in fact increase expenditures for physician services.

ACKNOWLEDGMENTS

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