

HEALTH CARE REFORM

Impact of Medicare Part D on Seniors' Out-of-pocket Expenditures on Medications

Christopher Millett, PhD; Charles J. Everett, PhD; Eric M. Matheson, MD; Andrew B. Bindman, MD; Arch G. Mainous III, PhD

Background: Medicare Part D, introduced in January 2006, was intended to decrease beneficiaries' out-of-pocket expenditures on medications.

Methods: We examined whether this policy was successful in achieving this goal, including effects on Medicare beneficiaries without previous drug coverage and those who previously received coverage through Medicaid, in a longitudinal study of out-of-pocket expenditures on medications in 1504 Medicare beneficiaries 65 years and older participating in the 2005 and 2006 waves of the Medical Expenditure Panel Survey.

Results: Mean annual out-of-pocket expenditures on medications decreased by 32% (\$320; 95% confidence interval [CI], \$250-\$391), from \$1011 to \$691, in the year after Part D was implemented for all Medicare beneficiaries in the Medical Expenditure Panel Survey. Mean annual out-of-pocket expenditures on medications decreased by 49% (\$748; 95% CI, \$600-\$897), from \$1533

to \$784, in beneficiaries without previous drug coverage who enrolled in a Part D plan. Beneficiaries who did not enroll experienced a mean reduction of 32% (\$353; 95% CI, \$188-\$518), from \$1116 to \$763. Mean annual out-of-pocket expenditures on medications remained similar in dual Medicare and Medicaid beneficiaries.

Conclusions: The introduction of Medicare Part D was associated with reductions in Medicare beneficiaries' out-of-pocket expenditures on medications, particularly in beneficiaries without previous drug coverage, and did not substantially change expenditures for Medicare beneficiaries who previously received pharmacy coverage through Medicaid. However, a question remains about whether the high public cost of providing pharmacy coverage through Medicare is worth the substantially lower financial benefit derived by beneficiaries.

Arch Intern Med. 2010;170(15):1325-1330

THE MEDICARE PART D DRUG benefit was enacted as part of the Medicare Prescription Drug, Improvement, and Modernization Act of 2003 and was implemented in January 2006. Described as the "most significant improvement to senior health care in

See also page 1317

Author Affiliations: Division of General Internal Medicine, San Francisco General Hospital, University of California, San Francisco (Drs Millett and Bindman); Department of Primary Care and Public Health, Imperial College, London, United Kingdom (Dr Millett); and Department of Family Medicine, Medical University of South Carolina, Charleston (Drs Everett, Matheson, and Mainous).

nearly 40 years,¹ the main purpose of the benefit is to reduce out-of-pocket expenditures and improve access to medications in seniors and other Medicare beneficiaries. Medicare Part D is delivered by numerous private insurance companies and involves beneficiaries choosing among many drug plans with premiums and benefit packages that vary considerably. The projected overall cost of the benefit is approximately \$800 billion for 2004 through 2015.² In 2006, Medicare Part D accounted for 12% of total Medicare spending, with a per capita expenditure of \$1742.³

The implementation of Medicare Part D was driven by concerns that cost sharing for prescription medications was placing an increasing financial burden on seniors and by documented evidence that cost sharing has negative effects on adherence to therapy and health care utilization. For example, a recent systematic review found that increased cost sharing for prescription medications was associated with lower rates of drug treatment, worse adherence by existing users, and more frequent discontinuation of therapy.⁴ These negative effects have been demonstrated in seniors,^{5,6} who are likely to be more vulnerable to the effects of cost sharing because they have more chronic conditions and lower-than-average household incomes than the general population.^{7,8}

A few previous studies^{9,10} examined the effect of Part D on out-of-pocket expenditures and found reductions across all Medicare beneficiaries of 13.1% to 18.4%. However, these studies relied on dispensing data from selected pharmacy chains that may not

be nationally representative and did not isolate the impact of Medicare Part D on the one-third of beneficiaries without previous drug coverage who are likely to benefit most from this policy.¹¹ A recently published study¹² found that the impact of the benefit on previously uninsured beneficiaries was positive, with 3% to 37% increases in drug use and 37% to 58% decreases in out-of-pocket expenditures, depending on drug class. However, this study had several limitations, including that the sample involved only patients who were continuous users of the same pharmacy chain, that changes in total out-of-pocket expenditures were not examined, and that enrollment status was assigned using an indirect method. There is also limited information on the impact of this policy on dual Medicare and Medicaid beneficiaries, who were required to switch to Medicare Part D from state-administered programs that may have had lower cost-sharing arrangements.¹³

We used the Medical Expenditure Panel Survey (MEPS), which provides nationally representative estimates of health care use and expenditures, to evaluate the impact of the introduction of Medicare Part D on out-of-pocket expenditures on all medications. As part of this evaluation, we tested the hypothesis that Medicare beneficiaries without previous drug coverage who enroll in Part D will gain most from this benefit and that beneficiaries with previous drug coverage, such as dual Medicare and Medicaid beneficiaries, will not experience a change in out-of-pocket expenditures on medications. We also anticipated that Medicare beneficiaries without coverage before the introduction of Medicare Part D who did not enroll in it when it became available would not have a change in their out-of-pocket expenditures on medications.

METHODS

The MEPS is conducted to provide nationally representative estimates of health care use, expenditures, sources of payment, and insurance coverage for the US civilian noninstitutionalized population. The methods of the survey are described in detail elsewhere.^{14,15} In brief, we used the Household Component of the survey, which involves an overlapping panel design in which data are collected in a series of 6 rounds of face-to-face interviews. Data on medical expenditures and health care use for 2 calendar years are collected from each household. To overcome the problem of recall bias and potential underreporting associated with self-reporting, the MEPS obtains information on out-of-pocket expenditures directly from pharmacy providers rather than from respondents themselves. This process involves respondents authorizing the MEPS to contact their pharmacy provider and authorizing their pharmacy provider to release their records to the MEPS. Information about the amount and source of payment for medications is extracted from computerized printouts and written data forms provided by pharmacies. These data were imputed when this information was not provided by pharmacies.

We undertook a longitudinal study of respondents who reported that they were Medicare beneficiaries 65 years and older during the 2005 and 2006 survey waves. This period covers the year before and the year after implementation of Medicare Part D.

The main outcome measure was annual out-of-pocket expenses for all medications. Secondary measures included annual out-of-pocket expenses and the number of prescriptions each year for 5 medications commonly prescribed to seniors (statins, β -blockers, antiglycemic agents, antidepressants, and

respiratory inhalants). We calculated mean expenditures with standard errors in 2005 and 2006 and the difference in expenditures between years within 4 groups defined by their coverage status during December 2005 and December 2006: (1) those without drug coverage in 2005 who enrolled in Medicare Part D in 2006; (2) those without drug coverage in 2005 and 2006, indicating that they did not enroll in Medicare Part D in 2006; (3) dual Medicare and Medicaid beneficiaries who had drug coverage in both years but provided through Medicaid in 2005 and Medicare Part D in 2006; and (4) those who had drug coverage (private or other public, excluding Medicaid) in both years. We calculated median out-of-pocket expenditures with the interquartile range (IQR) in 2005 and 2006 in the 4 groups.

We identified "no drug coverage in 2005 and 2006" in the following way. First, the MEPS validates Medicare coverage by showing the respondents a Medicare card. "Let me first ask about Medicare. People covered by Medicare usually have a card that looks like this. At any time since [START DATE], has anyone in the family been covered by Medicare?" Then the questionnaire proceeds to identify specific individuals in the household. Once the sample was selected, the responses for individuals were linked across the 2 years in the MEPS. We combined a variable from 2005 indicating that the individual had Medicare in 2005 with one from 2006 indicating that the individual had Medicare in 2006. In both years, no coverage was defined by the self-report of "no prescription drug coverage" in each panel set. All the panel sets had to have the same answer, "no prescription drug coverage," to be included in the "no coverage in 2005 and 2006" group. Having Part D coverage or no coverage in 2006 was based on self-report of Part D coverage. Medicare and Medicaid coverage in 2005 and 2006 was determined using questions and variables similar to those for Medicare indicating Medicaid coverage in both years and Medicare Part D coverage in 2006. Non-Medicaid drug coverage was determined in much the same way using variables indicating prescription drug coverage in one of the panels in 2005 and Medicare Part D or other drug coverage in one of the panels in 2006.

We applied survey weights in all the analyses to generate nationally representative findings. All the expenditures were converted to 2006 US dollars using the Medical Care Consumer Price Index to adjust for the 4% inflation rate during the study period. To account for the complex survey design and allow for population estimates of the US population, we used the SUDAAN statistical software package (RTI International, Research Triangle Park, North Carolina).

RESULTS

The overall response rate for the MEPS used in this study was 60.3% in 2005 and 58.5% in 2006. Of the 1504 respondents in both the 2005 and 2006 MEPS who were Medicare beneficiaries 65 years and older, 666 (44.3%) were without drug coverage during the 2005 wave. There were 198 respondents 65 years and older who were dually enrolled in Medicare and Medicaid in both years. There were 491 Medicare beneficiaries 65 years and older who reported having other drug coverage (private or other public) in both years. An additional 149 older Medicare beneficiaries had Medicare coverage throughout both periods but did not meet the criteria for the previously described categories, for example, beneficiaries with Medicaid coverage during 2005 or 2006 only. We did not separately examine the impact of Medicare Part D in this heterogeneous subgroup.

More than half of the respondents (57.1%) who were without drug coverage in 2005 enrolled in Medicare Part

Table 1. Characteristics of the Medicare Sample by Drug Coverage Status

Variable	Part D Coverage in 2006 Without Previous Coverage (n=380)	No Coverage in 2005 and 2006 (n=286)	Medicare and Medicaid Coverage in 2005 and 2006 (n=198)	Non-Medicaid Drug Coverage in 2005 and 2006 (n=491)	P Value ^a
Weighted No.	3 580 454	2 935 674	985 237	5 386 768	
Age, mean (SE), y	75.9 (0.4)	76.3 (0.4)	76.2 (0.5)	74.1 (0.3)	<.01
Female sex, %	61.6	59.8	75.2	50.7	<.01
Race/ethnicity, %					
Non-Hispanic white	83.9	86.8	39.2	87.6	<.01
Non-Hispanic black	6.9	7.0	22.1	5.2	
Asian	3.2	3.2	9.4	1.9	
Hispanic	5.0	2.2	24.3	4.1	
Other	0.9	0.8	5.2	1.1	
Education, %					
≤11th grade	28.4	22.8	66.7	20.0	<.01
12th grade	35.7	40.2	18.9	32.8	
Some college or college degree	35.9	37.0	14.4	47.2	
Income <\$25,000/y, %	70.8	63.6	95.6	50.3	<.01
No. of chronic conditions, mean (SE)	2.4 (0.1)	2.2 (0.1)	2.9 (0.1)	2.3 (0.1)	<.01
Hospital discharges, %					
0	85.5	85.7	79.1	81.7	.18
≥1	14.5	14.3	20.9	18.3	

^aBased on χ^2 test and *t* test results.

Table 2. Medicare Beneficiaries' Annual Out-of-pocket Expenditures on All Medications in 2005 and 2006^a

Variable	All Medicare Beneficiaries in the MEPS (n=1504)	Part D Coverage in 2006 Without Previous Coverage (n=380)	No Coverage in 2005 and 2006 (n=286)	Medicare and Medicaid Coverage in 2005 and 2006 (n=198)	Non-Medicaid Drug Coverage in 2005 and 2006 (n=491)
Weighted No.	14 267 725	3 580 454	2 935 674	985 237	5 386 768
2005 expenditures, mean (SE), \$	1011 (47)	1533 (110)	1116 (116)	600 (79)	752 (55)
2006 expenditures, mean (SE), \$	691 (26)	784 (56)	763 (73)	582 (78)	668 (38)
Change, mean (95% CI), \$	320 (250 to 391)	748 (600 to 897)	353 (188 to 518)	18 (-204 to 241)	84 (-9 to 177)
Change, %	31.6	48.8	31.6	3.0	11.2

Abbreviations: CI, confidence interval; MEPS, Medical Expenditure Panel Survey.

^aAll expenditures were converted to 2006 US dollars using the Medical Care Consumer Price Index to adjust for the 4% inflation rate during the study period.

D in 2006. This group did not differ from respondents who did not enroll in Part D with respect to age, sex, race/ethnicity, number of chronic conditions, or health care utilization (**Table 1**). Respondents who enrolled in a Part D plan had lower educational attainment and were more likely to have a personal annual income of less than \$25 000 compared with those who did not enroll. Individuals dually enrolled in Medicare and Medicaid were more likely to be female, to be from a nonwhite racial/ethnic group, and to have lower educational attainment and less personal income compared with those who did not enroll. They also had more chronic conditions than did those who did not enroll. Individuals who had drug coverage in both years were more likely to be male and to have higher educational attainment and personal income compared with those who did not enroll in Medicare Part D.

CHANGES IN TOTAL OUT-OF-POCKET EXPENDITURES ON MEDICATIONS

Mean out-of-pocket annual expenditures on all medications decreased by 32% (\$320; 95% confidence interval [CI], \$250-\$391), from \$1011 to \$691, in the year after

Medicare Part D was implemented compared with the year before in all Medicare beneficiaries participating in the MEPS (**Table 2**). Median expenditures decreased from \$494 (IQR, \$185-\$1251) to \$405 (IQR, \$147-\$907) in all Medicare beneficiaries participating in the MEPS. Mean annual out-of-pocket expenditures on all medications decreased by 49% (\$748; 95% CI, \$600-\$897), from \$1533 to \$784, in Medicare beneficiaries without pharmacy coverage in 2005 who enrolled in a Part D plan in 2006. Median expenditures decreased from \$963 (IQR, \$323-\$2142) to \$517 (IQR, \$203-\$1001) in this group. There was a corresponding 32% reduction (\$353; 95% CI, \$188-\$518), from \$1116 to \$763, in pharmacy-related out-of-pocket costs among Medicare beneficiaries who did not enroll in a Part D plan. Median expenditures decreased from \$533 (IQR, \$176-\$1576) to \$382 (IQR, \$118-\$972) in this group. Mean out-of-pocket annual expenditures on all medications did not decrease significantly in dual Medicare and Medicaid beneficiaries (\$600 in 2005 and \$582 in 2006) or in beneficiaries who had drug coverage in both years (\$752 in 2005 and \$668 in 2006). Median expenditures increased from \$214 (IQR, \$84-\$619) to \$253 (IQR, \$58-\$838) in dual beneficiaries but decreased from \$426

Table 3. Annual Out-of-pocket Expenditures and Number of Prescriptions for Specific Drug Classes in 2005 and 2006^a

Variable	All Medicare Beneficiaries in the MEPS		Part D Coverage in 2006 Without Previous Coverage		No Coverage in 2005 and 2006		Medicare and Medicaid Coverage in 2005 and 2006		Non-Medicaid Drug Coverage in 2005 and 2006	
	2005	2006	2005	2006	2005	2006	2005	2006	2005	2006
Statins, %	41.1	42.0	37.6	40.6	38.0	37.4	43.9	46.3	43.9	44.3
Expenditures, mean (SD), \$	277 (18) ^b	190 (12) ^b	480 (52) ^b	259 (28) ^b	317 (42) ^b	221 (34) ^b	130 (44)	260 (49)	190 (20) ^b	150 (12) ^b
No. of prescriptions, mean (SD)	5.4 (0.2)	5.3 (0.2)	5.7 (0.4)	6.0 (0.4)	5.2 (0.4)	4.6 (0.4)	7.7 (0.7)	8.2 (0.7)	4.9 (0.3)	4.8 (0.3)
β-Blockers, %	31.9	33.3	32.6	34.8	28.2	31.2	39.8	41.6	32.6	32.8
Expenditure, mean (SD), \$	143 (11) ^b	93 (8) ^b	232 (30) ^b	107 (15) ^b	148 (22)	140 (31)	43 (8)	51 (11)	109 (14) ^b	81 (8) ^b
No. of prescriptions, mean (SD)	6.2 (0.2)	6.1 (0.2)	7.2 (0.4)	7.4 (0.4)	6.0 (0.5)	5.7 (0.5)	7.4 (0.8)	7.5 (0.6)	5.3 (0.3)	5.2 (0.3)
Antiglycemics, %	17.0	18.3	19.7	21.6	14.4	16.0	27.8	28.6	15.1	16.1
Expenditures, mean (SD), \$	424 (43) ^b	250 (22) ^b	682 (95) ^b	265 (42) ^b	476 (91)	303 (46)	165 (55)	183 (50)	308 (67)	252 (39)
No. of prescriptions, mean (SD)	10.6 (0.6) ^b	11.7 (0.5) ^b	13.0 (1.3)	13.1 (0.8)	8.9 (1.5) ^b	10.6 (1.4) ^b	12.6 (1.6)	12.3 (1.1)	9.6 (1.0) ^b	11.4 (0.9) ^b
Antidepressants, %	14.5	15.5	16.3	17.8	13.2	14.1	13.4	13.2	15.2	16.2
Expenditures, mean (SD), \$	194 (23) ^b	145 (18) ^b	332 (61) ^b	165 (26) ^b	292 (52) ^b	172 (50) ^b	17 (6)	44 (13)	105 (17)	151 (34)
No. of prescriptions, mean (SD)	5.6 (0.4)	6.0 (0.4)	6.1 (0.7)	6.8 (0.6)	5.5 (0.9)	6.0 (1.0)	6.4 (1.3)	6.8 (1.2)	5.3 (0.6)	5.8 (0.7)
Respiratory inhalants, %	9.9	10.1	11.0	9.5	NA	NA	NA	NA	10.9	10.8
Expenditures, mean (SD), \$	270 (52)	168 (25)	218 (39) ^b	126 (34) ^b	NA	NA	NA	NA	382 (94)	262 (54)
No. of prescriptions, mean (SD)	6.8 (0.7)	7.4 (0.8)	6.5 (1.2)	6.4 (1.5)	NA	NA	NA	NA	8.7 (1.4)	9.2 (1.2)

Abbreviations: MEPS, Medical Expenditure Panel Survey; NA, not available.

^aAll expenditures were converted to 2006 US dollars using the Medical Care Consumer Price Index to adjust for the 4% inflation rate during the study period. The sample size was too small to examine changes in out-of-pocket expenditures and use of respiratory inhalants in beneficiaries without coverage in both years and in dual beneficiaries.

^bStatistically significant ($P < .05$) changes between 2005 and 2006.

(IQR, \$188-\$927) to \$410 (IQR, \$160-\$878) in beneficiaries with coverage in both years.

CHANGES IN UTILIZATION AND OUT-OF-POCKET EXPENDITURES ON COMMONLY PRESCRIBED MEDICATIONS

There were statistically significant reductions in mean annual out-of-pocket expenditures on statins (\$87; from \$277 to \$190), β-blockers (\$50; from \$143 to \$93), antiglycemic agents (\$174; from \$424 to \$250), and antidepressants (\$49; from \$194 to \$145) between 2005 and 2006 in all Medicare beneficiaries participating in the MEPS (**Table 3**). There were significant reductions in mean annual out-of-pocket expenditures on statins (\$221; from \$480 to \$259), β-blockers (\$125; from \$232 to \$107), antiglycemic agents (\$417; from \$682 to \$265), antidepressants (\$167; from \$332 to \$165), and respiratory inhalants (\$92; from \$218 to \$126) between 2005 and 2006 in beneficiaries without previous coverage who enrolled in Medicare Part D. Annual out-of-pocket expenditures decreased to a lesser degree in each drug class in beneficiaries who did not enroll in Part D. The associated reductions were statistically significant only for statins (\$96; from \$317 to \$221) and antidepressants (\$120; from \$292 to \$172). Mean annual out-of-pocket expenditures on selected drug classes did not change significantly in dual Medicare and Medicaid beneficiaries but decreased significantly for statins and β-blockers in beneficiaries who had drug coverage in both years.

There were small increases in the use of antiglycemic agents, antidepressants, and respiratory inhalants between 2005 and 2006 in all Medicare beneficiaries participating in the MEPS, but these increases were statistically significant only for antiglycemic agents. There were

small but nonsignificant increases in the use of statins, β-blockers, antiglycemic agents and antidepressants between 2005 and 2006 in beneficiaries without previous drug coverage who enrolled in Medicare Part D. Utilization increased for antiglycemic agents and antidepressants in beneficiaries without previous drug coverage who did not enroll in Part D, but these changes were statistically significant only for antiglycemic agents. There were small increases in the use of antiglycemic agents, antidepressants, and respiratory inhalants between 2005 and 2006 in beneficiaries with drug coverage in both years, but these increases were statistically significant only for antiglycemic agents.

COMMENT

Although the introduction of Medicare Part D was associated with reductions in out-of-pocket expenditures on medications overall, the impact of this benefit varied considerably among the different groups of Medicare beneficiaries studied. As would be expected in a voluntary program, the magnitude of the reduction was greater in beneficiaries without previous drug coverage who enrolled in Part D than in beneficiaries who did not enroll. The difference in these 2 groups may be explained by differences in health-related selection. However, the finding that those who did not enroll also experienced a reduction in their out-of-pocket expenses across time reflects the secular trend and suggests that the net effect of this program may have been modest.

The estimate of the reduction in out-of-pocket expenditures across all older Medicare beneficiaries in the MEPS of 32% is higher than that reported previously (13%-18%).^{9,10} Previous studies may have underestimated the benefits of Part D because they were based on

data from a single pharmacy chain and may have captured a younger, urban-dwelling group than is typical for Medicare beneficiaries, including fewer beneficiaries without previous drug coverage. For example, a related study by Schneeweiss et al¹² found that only 14% of elderly Medicare beneficiaries receiving their drugs from pharmacies had no drug coverage in 2005. This figure is considerably below the 1 in 3 estimate published in previous studies and by the Centers for Medicare & Medicaid Services.¹⁶

We did not identify a significant change in out-of-pocket expenditures on medications in dual Medicare and Medicaid beneficiaries, suggesting that the transition of responsibility for drug coverage from the states to the federal government did not have an adverse financial consequence on this group. However, note that dual beneficiaries and Medicare beneficiaries with other drug coverage in 2005 and 2006 did not benefit from the same reductions in out-of-pocket expenditures experienced by beneficiaries without insurance during the study period. A previous study¹⁷ that used data from a single pharmacy chain found that the introduction of Medicare Part D was associated with small reductions in out-of-pocket expenditures on clopidogrel, proton pump inhibitors, warfarin, and statins but with increases in out-of-pocket expenditures on benzodiazepines in dual Medicare and Medicaid beneficiaries.

Half of the Medicare beneficiaries who were without drug coverage in 2005 enrolled in a Part D plan. This finding is consistent with that of a previous study.¹² Although we did not identify any differences in health status between beneficiaries without previous coverage who enrolled in Part D and those who did not, the group who enrolled in Part D had higher baseline out-of-pocket expenditures on medications. This may suggest that Medicare beneficiaries with low out-of-pocket expenditures on medications are uncertain about how they will personally benefit from this program. Two-thirds of those who did not enroll in a Part D plan had an annual household income of less \$25 000. This finding suggests that additional efforts may be required to improve enrollment in the benefit's low-income subsidy scheme, which provides premium and cost-sharing assistance. Recent data suggest that 63% of beneficiaries who are entitled to the low-income subsidy and who are not automatically enrolled have not received this.¹⁸

The present study has several strengths and limitations. The MEPS provides nationally representative estimates of health care use, expenditures, sources of payment, and insurance coverage and contains detailed information about the type, frequency, and cost of prescription medications. The precision of national estimates of medical expenditures became a priority and data collection procedures have been improved during the past decade to increase the overall accuracy of these measures.¹⁹ Nevertheless, the percentage of Medicare beneficiaries participating in the MEPS who were without drug coverage before the introduction of Part D was higher than estimates for the general Medicare population (44% vs 33%).¹⁶ The response rate for the MEPS is modest (60%), and information about out-of-pocket expenditures was unavailable or not complete in some respondents owing to nonresponse by some pharmacy providers.¹⁵ Because the MEPS is a panel survey, we used a longitudinal study de-

sign, which overcomes the bias inherent in comparing cross-sectional surveys involving respondents who may systematically differ. The study design meant that we excluded approximately 50% of Medicare beneficiaries who participated in the MEPS during the study period. We assigned beneficiaries to 1 of 4 groups on the basis of their drug coverage status in the last month of 2005 and 2006. Although this may not reflect their coverage status for the entire year, this approach ensured that we could examine the impact of Part D in beneficiaries who enrolled in this benefit during and after the penalty-free period in 2006 (January-May). Some of the comparisons of expenditures and medicine use may not have reached statistical significance due to the small numbers in the subgroups. Furthermore, estimates for utilization and out-of-pocket expenditures on antiglycemics, antidepressants, and respiratory inhalants in all the groups and all individual drug class estimates in dual beneficiaries should be treated with caution because they are based on samples of fewer than 100. Although the MEPS includes questions about cost-related nonadherence, the sample size was too small to examine whether this changed during the study period. The data used for this study are 4 years old, and these findings may not reflect the current impact of Medicare Part D on out-of-pocket expenditures on medications. We examined the aggregate effects of this policy by insurance status, which may not reflect the experiences of individual beneficiaries, some of whom may have experienced an increase in out-of-pocket expenditures after the introduction of Part D (eg, an uninsured individual who did not fill a needed prescription for a medication but does so after enrolling in Part D because he or she decides that the co-pay is "worth it"). This study focused on the impact of this policy on seniors rather than on all beneficiaries. Owing to the small sample size, we could not examine the effects of Part D in additional drug classes or the contribution of the coverage gap ("doughnut hole"), where beneficiaries are required to meet all prescriptions costs after they have reached a threshold of \$2700 in a given year before catastrophic coverage begins at \$6154, to out-of-pocket expenditures. Whereas early studies indicated that the percentage of beneficiaries reaching this threshold was small,^{20,21} more recent data from 2007 suggest that 14% of all Part D enrollees are affected by this coverage gap.²²

Medicare Part D has considerable potential to improve senior health and reduce overall health care expenditures by increasing uptake of effective secondary prevention interventions.²³ Key to this is reducing out-of-pocket expenditures and associated cost-related nonadherence. Although the implication of these findings is that Medicare Part D has achieved some of its intended effect of reducing Medicare beneficiaries' out-of-pocket expenditures on medications, a question remains about whether the financial gain derived by beneficiaries is sufficient given the high public cost of the program. This is highlighted by the considerable gap between the reduction in out-of-pocket expenditures experienced by all Medicare beneficiaries in this study and the per capita investment in this program in 2006 (\$320 vs \$1742). Moreover, this figure may overestimate the impact of Medicare Part D on out-of-pocket expenditures for 2 reasons. First, out-of-pocket expenditures on medications decreased by a simi-

lar amount (\$353) in beneficiaries who did not enroll in Part D. This finding is consistent with those of previous studies that have found reductions in out-of-pocket expenditures on medications during this period and suggests that part of this decrease may be attributable to other factors, including the increased availability and use of generic drugs and the introduction of discount prices by large supermarket chains.²⁴ Second, this evaluation does not consider beneficiary expenditures on Part D premiums, data which are unavailable in the MEPs. Although we could not examine the impact of Medicare Part D on cost-related nonadherence, previous research²⁵ suggests that the percentage of Medicare beneficiaries reporting not taking medications owing to cost declined only marginally during the first year of this benefit.

Future research should examine the longer-term impact of Medicare Part D on medication use, health care utilization, cost, and health outcomes and the extent to which vulnerable groups, including those with low income and racial/ethnic minorities, who report higher levels of cost-related nonadherence, are benefiting.²⁶

In conclusion, the introduction of Medicare Part D was associated with reductions in Medicare beneficiaries' out-of-pocket expenditures on medications, particularly in beneficiaries without previous drug coverage. Although this insurance program may have improved the protection of seniors from large financial risk, associated reductions in out-of-pocket expenditures were modest and a question remains about whether the financial benefit for beneficiaries is adequate given the high public cost of providing pharmacy coverage through Medicare. The provision of direct consumer subsidies for medications may prove more cost-effective in reducing out-of-pocket expenditures in seniors than the current market-based approach.

Accepted for Publication: January 26, 2010.

Correspondence: Christopher Millett, PhD, Senior Lecturer in Public Health, Department of Primary Care and Public Health, Imperial College Faculty of Medicine, Reynolds Bldg, St Dunstan's Road, London W6 8RP, England (c.millett@imperial.ac.uk).

Author Contributions: *Study concept and design:* Millett, Everett, Matheson, and Mainous. *Acquisition of data:* Millett. *Analysis and interpretation of data:* Millett, Everett, Bindman, and Mainous. *Drafting of the manuscript:* Millett. *Critical revision of the manuscript for important intellectual content:* Everett, Matheson, Bindman, and Mainous. *Statistical analysis:* Everett and Mainous. *Obtained funding:* Millett. *Administrative, technical, and material support:* Millett and Matheson. *Study supervision:* Bindman and Mainous.

Financial Disclosure: None reported.

Funding/Support: This research was supported in part by The Commonwealth Fund.

Role of the Sponsor: The Commonwealth Fund had no role in the design and conduct of the study; in the collection, analysis, or interpretation of the data; or in the preparation, review, or approval of the manuscript.

Disclaimer: The views presented herein are those of the authors and should not be attributed to The Commonwealth Fund or its directors, officers, or staff.

REFERENCES

- Centers for Medicare & Medicaid Services. Prescription drug coverage: general overview. <http://www.cms.hhs.gov/PrescriptionDrugCovGenIn>. Accessed February 26, 2009.
- Congressional Budget Office Letter to the chairman of the Committee on Energy and Commerce: February 16, 2005. <http://www.cbo.gov/ftpdocs/61xx/doc6113/BartonLtr2-16-05.pdf>. Accessed February 26, 2009.
- 2008 Annual report of the boards of trustees of the Federal Hospital Insurance and Federal Supplementary Medical Insurance Trust Funds. Centers for Medicare & Medicaid Services Web site. <http://www.cms.hhs.gov/reportstrustfunds/downloads/tr2008.pdf>. Accessed March 9, 2009.
- Goldman DP, Joyce GF, Zheng Y. Prescription drug cost sharing: associations with medication and medical utilization and spending and health. *JAMA*. 2007;298(1):61-69.
- Mojtabai R, Olsson M. Medication costs, adherence, and health outcomes among Medicare beneficiaries. *Health Aff (Millwood)*. 2003;22(4):220-229.
- Kennedy J, Tuleu I, Mackay K. Unfilled prescriptions of Medicare beneficiaries. *J Manag Care Pharm*. 2008;14(6):553-560.
- Wolff JL, Starfield B, Anderson G. Prevalence, expenditures, and complications of multiple chronic conditions in the elderly. *Arch Intern Med*. 2002;162(20):2269-2276.
- US Census Bureau. Current population survey 2007: annual social and economic (ASEC) supplement. http://pubdb3.census.gov/macro/032008/hhinc/new02_001.htm. Accessed February 26, 2009.
- Yin W, Basu A, Zhang J, Rabbani A, Meltzer DO, Alexander GC. The effect of the Medicare Part D prescription benefit on drug utilization and expenditures. *Ann Intern Med*. 2008;148(3):169-177.
- Lichtenberg FR, Sun SX. The impact of Medicare Part D on prescription drug use by the elderly. *Health Aff (Millwood)*. 2007;26(6):1735-1744.
- Pauly MV. Medicare drug coverage and moral hazard. *Health Aff (Millwood)*. 2004;23(1):113-122.
- Schneeweiss S, Patrick AR, Pedan A, et al. The effect of Medicare Part D coverage on drug use and cost sharing among seniors without prior drug benefits. *Health Aff (Millwood)*. 2009;28(2):w305-w316.
- Elliott RA, Majumdar SR, Gillick MR, Soumerai SB. Benefits and consequences for the poor and the disabled. *N Engl J Med*. 2005;353(26):2739-2741.
- Cohen J. Design and methods of the Medical Expenditure Panel Survey Household Component: MEPS Methodology Report No. 1. 1997. AHCPR publication 97-0026. http://www.meps.ahrq.gov/mepsweb/data_files/publications/mr1/mr1.pdf. Accessed February 24, 2009.
- Moeller JF, Stagnitti MN, Horan E. Outpatient prescription drugs: data collection and editing in the 1996 Medical Expenditure Panel Survey (HC-010A): MEPS Methodology Report No. 12. 2001. AHRQ publication 01-0002. http://www.meps.ahrq.gov/data_files/publications/mr12/mr12.shtml. Accessed February 24, 2009.
- Neuman P, Strollo MK, Guterman S, et al. Medicare prescription drug benefit progress report: findings from a 2006 national survey of seniors. *Health Aff (Millwood)*. 2007;26(5):w630-w643.
- Shrank WH, Patrick AR, Pedan A, et al. The effect of transitioning to Medicare Part D drug coverage in seniors dually eligible for Medicare and Medicaid. *J Am Geriatr Soc*. 2008;56(12):2304-2310.
- Kaiser Family Foundation. Medicare Part D 2009 data spotlight: low-income subsidy plan availability. November 2008. <http://www.kff.org/medicare/upload/7836.pdf>. Accessed March 3, 2009.
- Cohen SB. Design strategies and innovations in the Medical Expenditure Panel Survey. *Med Care*. 2003;41(7)(suppl):III5-III12.
- Berkowitz SA, Gerstenblith G, Anderson GF. Medicare prescription drug coverage gap: navigating the "doughnut hole" with patients. *JAMA*. 2007;297(8):868-870.
- Raebel MA, Delate T, Ellis JL, Bayliss EA. Effects of reaching the drug benefit threshold on Medicare members' healthcare utilization during the first year of Medicare Part D. *Med Care*. 2008;46(10):1116-1122.
- Kaiser Family Foundation. The Medicare Part D coverage gap: costs and consequences in 2007. <http://www.kff.org/medicare/7811.cfm>. Accessed June 16, 2009.
- Choudhry NK, Patrick AR, Antman EM, Avorn J, Shrank WH. Cost-effectiveness of providing full drug coverage to increase medication adherence in post-myocardial infarction Medicare beneficiaries. *Circulation*. 2008;117(10):1261-1268.
- Catlin A, Cowan C, Hartman M, Heffler S; National Health Expenditure Accounts Team. National health spending in 2006: a year of change for prescription drugs. *Health Aff (Millwood)*. 2008;27(1):14-29.
- Madden JM, Graves AJ, Zhang F, et al. Cost-related medication nonadherence and spending on basic needs following implementation of Medicare Part D. *JAMA*. 2008;299(16):1922-1928.
- Gellad WF, Haas JS, Safran DG. Race/ethnicity and nonadherence to prescription medications among seniors: results of a national study. *J Gen Intern Med*. 2007;22(11):1572-1578.