Supplemental Insurance and Use of Effective Cardiovascular Drugs Among Elderly Medicare Beneficiaries With Coronary Heart Disease

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AFTER YEARS OF INTENSE DEBATE, the pressure to implement a prescription drug plan for elderly persons has gained substantial momentum. However, lawmakers have not reached a consensus on a drug plan design. A major source of the disagreement lies in determining the extent of the financial burden to be placed on beneficiaries through cost-sharing. Cost-sharing strongly influences use of health care resources. Yet, cost-sharing in many proposals, which reflects cost-sharing in current sources of drug coverage, is high. For example, one leading proposal would require a $53 monthly premium, a $250 annual deductible, and a 50% co-payment until the recipient paid $3500 out-of-pocket each year.

Cost-sharing in drug coverage plans for elderly persons in the United States varies broadly. In 1996, approximately 27 million elderly persons received part or full-year drug coverage from 1 or more of 5 primary sources: current or past employers (49%); Medicaid (18%); Medicare-sponsored health maintenance organizations (HMOs), 16%; Medigap (14%); and miscellaneous.

Context Cost-sharing in US prescription drug coverage plans for elderly persons varies widely. Evaluation of prescription drug use among elderly persons by type of health insurance could provide useful information for designing a Medicare drug program.

Objective To determine use of effective cardiovascular drugs among elderly persons with coronary heart disease (CHD) by type of health insurance.

Design, Setting, and Patients Cross-sectional evaluation of 1908 community-dwelling adults, aged 66 years or older, with a history of CHD or myocardial infarction from the 1997 Medicare Current Beneficiary Survey, a nationally representative sample of Medicare beneficiaries.

Main Outcome Measures Use of 3-hydroxy-3-methylglutaryl coenzyme A reductase inhibitors (statins), β-blockers, and nitrates, and out-of-pocket expenditures for prescription drugs, stratified by type of health insurance: Medicare without drug coverage (Medicare only or self-purchased supplemental insurance) or with drug coverage (Medicaid, other public program, Medigap, health maintenance organization, or employer-sponsored plan).

Results Statin use ranged from 4.1% in Medicare patients with no drug coverage to 27.4% in patients with employer-sponsored drug coverage (P < .001). Less variation between these 2 types occurred for β-blockers (20.7% vs 36.1%; P = .003) and nitrates (20.4% vs 38.0%; P = .005). In multivariate analyses, statin use remained significantly lower for patients with Medicare only (odds ratio [OR], 0.16; 95% confidence interval [CI], 0.05-0.49) and β-blocker use was lower for Medicaid patients (OR, 0.55; 95% CI, 0.34-0.88) vs those with employer-sponsored coverage. Nitrate use occurred less frequently in persons lacking drug coverage (patients with Medicare only, P = .049; patients with supplemental insurance without drug coverage, P = .03). Patients with Medicare only spent a much larger fraction of income on prescription drugs compared with those with employer-sponsored drug coverage (7.9% vs 1.7%; adjusted P < .001).

Conclusion Elderly Medicare beneficiaries with CHD who lack drug coverage have disproportionately large drug expenditures and lower use rates of statins, a class of relatively expensive drugs that improve survival.

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See also p 1762.
Several medications that improve CHD outcomes are often underused, including β-adrenergic receptor blockers (β-blockers) and 3-hydroxy-3-methylglutaryl coenzyme A reductase inhibitors (statins). These drugs substantially reduce mortality and are cost-effective. The cost of these medications varies widely. Generic β-blockers and nitrates cost as little as $0.11 per starting dose in 1997. In contrast, without generic alternatives, statins cost a minimum of $1.25 per dose.

We hypothesized that fewer patients without supplemental insurance would use statins because of high cost compared with patients having supplemental insurance. We did not anticipate a similar finding for the generally lower cost β-blockers and nitrates. We also assessed the financial burden of drug expenditures for patients in different insurance plans.

**METHODS**

**Data Source and Study Population**

We used cross-sectional data from the 1997 Medicare Current Beneficiary Survey (MCBS), a nationally representative survey of randomly sampled Medicare beneficiaries conducted by the federal Centers for Medicare and Medicaid Services (formerly, the Health Care Financing Administration). Community-dwelling adults participated in a baseline interview and 9 follow-up interviews over 3 years. During follow-up, interviewers collected information on health care services and prescription drug use that occurred since the previous interview. Patients provided medication containers to interviewers to supplement self-reports of specific medication use. Third-party drug payments were determined through self-reports, benefits statements, pharmacy receipts, and Medicaid data (when applicable).

We included patients who reported a history of myocardial infarction (MI) or CHD at baseline, by responding affirmatively to at least 1 of the following questions: “Has a doctor ever told you that you had a myocardial infarction or heart attack?” and “Has a doctor ever told you that you had angina pectoris or coronary heart disease?” We excluded patients who were younger than 66 years, institutionalized, living in Puerto Rico, those with end-stage renal disease, or those with fewer than 12 months of Medicare Part B coverage (Figure 1). We also excluded individuals who enrolled too late in the MCBS to participate in the baseline and all follow-up interviews in 1997.

**Outcomes and Variables**

We determined the percentage of patients reporting any use of a β-blocker, statin, or nitrate (intermediate or long-acting) in 1997. We also examined total and out-of-pocket drug expenditures. As a measure of financial burden, we determined the percentage of household income spent out-of-pocket on all prescription drugs. In some cases, out-of-pocket expenditures exceeded self-reported income, indicating assistance from family members or other sources to help pay the cost of medications. If the ratio of out-of-pocket expenditures to income exceeded 1, the value was set at 1.

Our analysis focused on 7 insurance categories. The first 2 had no drug coverage and were traditional Medicare fee-for-service only (Medicare only) and self-purchased supplemental insurance (Medigap without drug coverage). Patients were included in the latter group if they had 1 or more months of nonprescription supplemental coverage in 1997 (97% were covered for 12 months).

Because patients may have had more than 1 source of drug coverage, we designated insurance status according to the supplemental insurance source paying the majority of each beneficiary’s drug costs. The 5 categories of drug coverage included Medicaid, other public pro-

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grams (eg, state-sponsored pharmacy assistance programs), self-purchased plans (Medigap with drug coverage), HMO plans, and employer-sponsored plans. We used a single indicator for HMO coverage because subjects enrolled in Medicare and non-Medicare HMO plans had similar demographic and health status characteristics and rates of cardiovascular drug use. Patients with Veterans Affairs or Medicare drug coverage were excluded because of small sample size (69).

In our analysis of drug use, we adjusted for patient characteristics that might contribute to use of cardiovascular medications or access to prescription drug coverage. Demographic variables included age, sex, race, income, education, number of household members, urban residence, and Census region. Since qualification for subsidized coverage under many proposed Medicare drug benefits is based on income as a percentage of the federal poverty level (<135%, 135%-150%, 151%-200%, >200%), we used income as a categorical variable in accordance with these percentages (adjusted for 1997 federal poverty levels).

For health status, we included self-reports of current smoking, general health (poor, fair, good, very good, excellent), and the number of limitations in instrumental activities of daily living (ADLs) telephone use, meal preparation, shopping, money management, housework) and basic ADLs (bathing, dressing, eating, rising from chairs, walking, using the toilet). Among comorbid conditions, we included hypertension, diabetes mellitus, stroke, and lung disease (emphysema, asthma, or chronic obstructive pulmonary disease). Finally, we included MI as a covariate because therapy for post-MI patients may differ from that of CHD patients without a history of MI.

**Statistical Analysis**

To account for the complex sampling design of the MCBS and to provide nationally representative population estimates, all analyses used patient-specific sampling weights and were performed using SUDAAN statistical software. We used $\chi^2$ tests and 1-way analysis of variance to examine differences in patient characteristics, drug use, and drug-related expenditures between different prescription drug coverage groups. We also calculated 95% confidence intervals (CIs) for unadjusted rates of drug use and expenditures. For all expenditure analyses, we included only those patients having drug expenditures greater than zero (96.9%) and log transformed the data to approximate the normal distribution.

We determined the odds ratios (ORs) and 95% CIs for drug use among patients in 6 insurance categories compared with patients with employer-sponsored drug coverage using weighted multivariable logistic regression. We selected employer-sponsored insurance as the reference category because it generally provides comprehensive and generous coverage and therefore may best enable access to needed medications. All analyses were adjusted a priori for age, sex, race, income, education, and history of MI. For parsimony, the remaining covariates were included in the models if they had $P<.25$ on univariate analysis. Covariates were similarly used in weighted ordinary least squares regression to obtain adjusted $P$ values for expenditure data.

Because low-income beneficiaries face relatively large financial obstacles to the purchase of prescription drugs while also experiencing relatively poor health, we conducted 2 sets of secondary analyses of medication use in this group. First, we compared drug use between insurance categories for patients with household incomes below 150% of the 1997 federal poverty level, a common criterion for subsidized drug coverage under proposed Medicare drug plans. Second, we examined publicly insured patients, comparing Medicaid enrollees and patients with non-Medicaid public drug coverage or Medicare only. The socioeconomic and health characteristics of individuals in these groups share greater similarity than the characteristics of the publicly and privately insured patients combined. An analysis limited to publicly insured patients may minimize unobserved differences between the groups, thereby having less bias than an analysis comparing privately and publicly insured patients.

**RESULTS**

The 1997 MCBS had 12511 subjects; 2632 reported a history of CHD (21%). After applying exclusion criteria, the final sample included 1908 subjects with CHD (15.3%) (Figure 1). Sixty patients (3.1%) reported no medication use and the group with Medicare only had the largest percentage of patients not taking medication (12.9%). Table 1 displays the demographic and clinical characteristics of patients in each insurance group. The mean age in the overall cohort was 76 years. Greater numbers of individuals with public drug coverage other than Medicaid were found in the Northeast (47.3%) vs the West (17.3%), South (22.3%), and Midwest (13.2%). This observation is consistent with the high concentration of states in the Northeast offering pharmaceutical assistance for elderly persons.

Patients with any form of public insurance had lower incomes and more often reported poor or fair health, deficiencies in instrumental ADLs and basic ADLs and tobacco use vs those with private supplemental insurance. Differences in income and self-reported health status were noted across all groups. The prevalence of hypertension, diabetes, and lung disease also varied (Table 1). However, there were no statistically significant differences in the prevalence of MI or stroke.

**Drug Expenditures**

Mean total and out-of-pocket drug expenditures varied markedly among the 7 insurance groups (Table 2). Patients with prescription drug coverage had greater total drug expenditures than those without coverage, yet their out-of-pocket expenditures were generally lower. Medigap patients with drug coverage, however, had both high total and out-of-pocket drug expenditures.
Patients without drug coverage faced the greatest financial burden associated with prescription drug use, spending the largest fractions of income out-of-pocket on all prescription drugs (Medicare only, 7.9%; Medigap without drug coverage, 6.3%) (Table 2). These values were roughly 4 times the magnitude of burden faced by patients with employer-sponsored plans (1.7%) and were also substantially higher than that of the other groups with drug coverage (P < .001 across all groups).

**Prescription Drug Use**

Similar to expenditures, use of cardiovascular drugs varied widely across insurance groups (Figure 2). The largest differential occurred for statins, ranging from 4.1% for patients with Medicare only to 27.4% for those with employer-sponsored coverage (P < .001 across all groups). A narrower range occurred for β-blockers (20.7% to 36.1%; P = .003 across all groups) and nitrates (20.4% to 38.0%; P = .005 across all groups).

The univariate analyses of drug use separately compared the employer-sponsored group with the other 6 insurance categories (Figure 2). Statin use in most groups was lower than in the

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**Table 1.** Weighted Demographic and Clinical Characteristics of Medicare Beneficiaries With Coronary Heart Disease by Supplemental Insurance Category*

<table>
<thead>
<tr>
<th></th>
<th>Without Drug Coverage</th>
<th>With Drug Coverage</th>
<th>P Value†</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Medicare Only (n = 108)</td>
<td>Medigap (n = 434)</td>
<td>Medicaid (n = 194)</td>
</tr>
<tr>
<td>Population estimate</td>
<td>307 782</td>
<td>1 319 934</td>
<td>537 309</td>
</tr>
<tr>
<td>Mean (SD) age, y</td>
<td>76.5 (8.3)</td>
<td>77.4 (6.1)</td>
<td>75.8 (6.5)</td>
</tr>
<tr>
<td>Women</td>
<td>52.3</td>
<td>51.9</td>
<td>71.1</td>
</tr>
<tr>
<td>White</td>
<td>77.9</td>
<td>94.0</td>
<td>56.2</td>
</tr>
<tr>
<td>Education &lt; 12 y</td>
<td>85.4</td>
<td>73.2</td>
<td>92.2</td>
</tr>
<tr>
<td>Married</td>
<td>39.3</td>
<td>58.0</td>
<td>27.5</td>
</tr>
<tr>
<td>≥2 Household members</td>
<td>65.4</td>
<td>71.1</td>
<td>53.3</td>
</tr>
<tr>
<td>Household income ≤ 150% of poverty</td>
<td>65.7</td>
<td>36.2</td>
<td>94.1</td>
</tr>
<tr>
<td>Urban residence</td>
<td>62.2</td>
<td>61.3</td>
<td>65.8</td>
</tr>
<tr>
<td>Fair-to-poor general health</td>
<td>44.0</td>
<td>34.4</td>
<td>55.5</td>
</tr>
<tr>
<td>≥1 Instrumental ADL limitation</td>
<td>26.2</td>
<td>26.7</td>
<td>40.8</td>
</tr>
<tr>
<td>≥1 Basic ADL limitation</td>
<td>10.7</td>
<td>12.9</td>
<td>21.7</td>
</tr>
<tr>
<td>Current smoker</td>
<td>21.8</td>
<td>7.7</td>
<td>20.6</td>
</tr>
<tr>
<td>Myocardial infarction</td>
<td>68.0</td>
<td>68.9</td>
<td>66.8</td>
</tr>
<tr>
<td>Coronary heart disease</td>
<td>57.3</td>
<td>64.8</td>
<td>68.3</td>
</tr>
<tr>
<td>Hypertension</td>
<td>65.5</td>
<td>67.1</td>
<td>80.4</td>
</tr>
<tr>
<td>Diabetes</td>
<td>18.9</td>
<td>19.4</td>
<td>29.9</td>
</tr>
<tr>
<td>Stroke</td>
<td>24.0</td>
<td>18.9</td>
<td>28.1</td>
</tr>
<tr>
<td>Lung disease</td>
<td>16.4</td>
<td>17.8</td>
<td>36.5</td>
</tr>
</tbody>
</table>

*Values are expressed as percentages unless otherwise indicated. HMO indicates health maintenance organization; ADL, activities of daily living.† Test for differences across all groups.

**Table 2.** Weighted Total and Out-of-Pocket Prescription Drug Expenditures and Percentage of Household Income Spent Out-of-Pocket on Prescription Drugs in 1997*

<table>
<thead>
<tr>
<th></th>
<th>Total, Mean (95% CI), $</th>
<th>P Value†</th>
<th>Out-of-Pocket, Mean (95% CI), $</th>
<th>P Value†</th>
<th>Household Income Spent Out-of-Pocket, Mean (95% CI), %</th>
<th>P Value†</th>
</tr>
</thead>
<tbody>
<tr>
<td>Without drug coverage</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medicare only</td>
<td>702 (107)</td>
<td>&lt;.001</td>
<td>680 (105)</td>
<td>&lt;.001</td>
<td>7.9 (2.4)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Medigap</td>
<td>952 (80)</td>
<td>&lt;.001</td>
<td>919 (76)</td>
<td>&lt;.001</td>
<td>6.3 (1.0)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>With drug coverage</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medicaid</td>
<td>1361 (141)</td>
<td>.91</td>
<td>204 (47)</td>
<td>.60</td>
<td>2.9 (0.8)</td>
<td>.34</td>
</tr>
<tr>
<td>Other public</td>
<td>1427 (259)</td>
<td>.88</td>
<td>409 (67)</td>
<td>&lt;.001</td>
<td>3.7 (1.0)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Medigap</td>
<td>1218 (167)</td>
<td>.78</td>
<td>718 (92)</td>
<td>&lt;.001</td>
<td>4.4 (0.8)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Health maintenance organization</td>
<td>1038 (120)</td>
<td>&lt;.001</td>
<td>381 (49)</td>
<td>.07</td>
<td>2.6 (0.4)</td>
<td>.02</td>
</tr>
<tr>
<td>Employer-sponsored</td>
<td>1271 (94)</td>
<td>NA†</td>
<td>337 (29)</td>
<td>NA†</td>
<td>1.7 (0.2)</td>
<td>NA†</td>
</tr>
</tbody>
</table>

*Excludes 60 subjects with zero expenditures. Means are unadjusted. CI indicates confidence interval.† Comparison with employer-sponsored drug coverage and adjusted for demographic and health characteristics. NA† indicates not applicable because employer-sponsored drug coverage was the reference group.

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employer-sponsored group, most strikingly so for patients with Medicare only (4.1% vs 27.4%; P<.001). Only the other public and Medigap with drug coverage groups had comparable rates. In contrast, just 2 groups had significantly lower β-blocker use compared with the employer-sponsored patients, Medicare only (23.6% vs 33.4%; P=.01), and Medicaid (20.7% vs 33.4%; P=.001). No group had significantly lower nitrate use than the employer-sponsored group (27.0%). Rather, individuals with Medicaid and other public drug coverage used nitrates more frequently than employer-sponsored patients (37.1% [P =.01] and 38.0% [P =.01], respectively).

Several comparisons remained significant after accounting for socioeconomic and health factors that might influence treatment of CHD. Figure 3 shows the adjusted ORs for use of each drug class. Patients with Medicare only were the only group that was significantly less likely to use statins than patients with employer-sponsored coverage (OR, 0.16; 95% CI, 0.05-0.49). Significantly lower ORs were evident for nitrate use among patients with Medicare only (OR, 0.19; 95% CI, 0.05-0.78). Nitrate use in this analysis was significantly greater among patients with other public drug coverage relative to employer-sponsored coverage (OR, 2.13, 95% CI, 1.01-4.48); no other comparison attained statistical significance. β-Blocker use did not differ significantly for any group (all P>.05). The multivariate subgroup analysis of publicly insured patients compared Medicaid coverage to Medicare only and non-Medicaid public drug coverage. Once again, patients with Medicare only had markedly lower adjusted rates of statin use (OR, 0.20; 95% CI, 0.06-0.68) while β-blocker and nitrate use were not significantly different. No other comparisons were significant.

In a post-hoc analysis, we examined the impact of sex on the association between drug use and coverage. We found no material differences in the association of these 2 factors between men and women.

COMMENT

This study examined the association of supplemental insurance and use of specific types of drugs among elderly patients with CHD. Our findings show that use of effective drugs among elderly Medicare beneficiaries with CHD varies widely with coverage type as well as drug class. Although we could not determine which patients had a specific indication for statin therapy, we found that fewer patients without supplemental drug coverage used statins than those with supplemental coverage. This finding remained significant after adjustment for socioeconomic and health characteristics and may be explained by the higher cost of statins relative to β-blockers and nitrates. Patients with Medicare only had high out-of-pocket drug expenditures and paid the largest fraction of household income on prescription medications. Thus, patients with Medicare only may have chosen to purchase nitrates and β-blockers over statins, despite the growing importance of statins in CHD management.

Unlike patients with Medicare only, enrollees in Medicaid and other public drug assistance programs face little cost-sharing, as reflected in their relatively low out-of-pocket drug expenditures. These patients used statins and nitrates at rates comparable with patients with employer-sponsored insurance, a generally comprehensive and generous form of drug coverage. Similarly, patients with Medicare HMO drug coverage in our study had low out-of-pocket drug expenditures, and they also had a higher rate of statin use than patients with Medicare only.

We found that significantly fewer Medicaid patients than patients with employer-sponsored drug coverage had taken β-blockers. One study has also reported low rates of β-blocker use among Medicaid and state pharmacy assistance program enrollees. In addi-
tion, this prior study observed greater use of calcium-channel blockers than β-blockers, suggesting that physicians may substitute these medications in Medicaid populations. In our cohort, a large number of Medicaid recipients used calcium-channel blockers as well (44%), the second highest rate after patients with other public drug coverage (range, 24%-45.8%). The substantial reduction in CHD-related mortality associated with β-blockers underscores the importance of ensuring their use among all eligible patients while avoiding potentially ineffective or harmful substitutes, such as calcium-channel blockers.

Enrollees of self-purchased supplemental insurance plans (Medigap), with or without drug coverage, had high rates of statin and β-blocker use. However, individuals in both groups paid significantly more of their household income out-of-pocket for prescription medications, consistent with drug expenditures by elderly patients with hypertension in these groups. Large out-of-pocket expenditures by Medigap beneficiaries result, in part, from heavy cost-sharing. Standard Medigap plans with drug coverage require a $250 deductible and a 50% co-payment on prescriptions, and they cover only $1250 to $3000 in drug expenses per year. In addition, Medigap premiums are expensive: $106 to $124 per month for plans without drug coverage, and $286 to $314 for plans with drug coverage in Massachusetts during 2001. Expensive premiums, heavy cost-sharing, and low reimbursement caps may offset the savings from Medigap reimbursement of drug purchases for many patients. Both groups of patients with Medigap plans in our study may have been able to afford most or all of their medications despite high insurance costs because of their relatively high average incomes.

Lower income Medicare beneficiaries may be unable to afford this expensive coverage. Although proposed Medicare drug plans typically set higher limits on reimbursements, their deductible and copayment structures otherwise resemble those of Medigap drug plans. Thus, while most proposed plans would improve access to medications for the majority of individuals without drug coverage, heavy cost-sharing might sharply restrict this access for many low-income beneficiaries, especially those with multiple chronic diseases. Indeed, use of medications by low-income elderly persons is exquisitely sensitive to even modest variations in cost-sharing, as is use of other health services and health outcomes.

Our study has several notable limitations. Cross-sectional analyses of insurance coverage and use of goods and services are susceptible to bias through adverse selection. Adverse selection is more prominent among Medicare beneficiaries with Medigap who pay large premiums for drug coverage, and not have had access to employer-sponsored coverage. Adverse selection is more prominent among Medicare beneficiaries with Medigap who pay large premiums for drug coverage.

Figure 3. Adjusted Odds Ratios for Cardiovascular Drug Use by Elderly Medicare Beneficiaries With Coronary Heart Disease

This is a weighted analysis. Employer-sponsored drug coverage is the reference group. Odds ratios are adjusted for demographic and health status variables. Vertical bars represent 95% confidence intervals.
Supplemental Insurance and Coronary Heart Disease Medications

Supplemental insurance and employer-sponsored or Medicaid drug coverage, respectively, may have important implications for the health status of elderly patients, those with major chronic illnesses, and Medicare beneficiaries. In this article, the authors discuss the importance of supplemental insurance for patient health and the implications of a Medicare drug coverage benefit.

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References


SUPPLEMENTAL INSURANCE AND CORONARY HEART DISEASE MEDICATIONS


