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# Cost-Related Medication Nonadherence Among Elderly and Disabled Medicare Beneficiaries

## *A National Survey 1 Year Before the Medicare Drug Benefit*

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**Background:** Prior to implementation of the Medicare drug benefit, we estimated the prevalence of cost-related medication nonadherence (CRN) among Medicare enrollees, including elderly and nonelderly disabled beneficiaries.

**Methods:** In the fall of 2004, detailed measures of CRN (skipping or reducing doses or not filling prescriptions because of cost) were added to the Medicare Current Beneficiary Survey. We examined the prevalence of CRN nationally and by Medicare eligibility subgroups (elderly vs nonelderly disabled beneficiaries), drug coverage status, socioeconomic status, self-rated health, and number of chronic medical conditions.

**Results:** In a national sample of 13 835 noninstitutionalized Medicare enrollees, 29% of the disabled and 13% of the elderly beneficiaries reported CRN; those in fair to poor health with multiple comorbidities and without coverage were most at risk. Among the disabled enrollees with 4 or more morbidities, 52% (95% confidence in-

terval [CI], 43.3%-60.3%) without drug coverage skipped prescriptions or doses compared with 26% (95% CI, 17.7%-34.8%) with Medicaid drug coverage. Those with partial drug coverage through Medigap policies or Medicare health maintenance organizations reported intermediate rates of CRN. The adjusted odds ratio of CRN among disabled enrollees in poor (vs good) health was 3.9 (95% CI, 1.7-9.2), whereas for those with 4 or more (vs <4) comorbidities, the odds ratio of CRN was 2.7 (95% CI, 1.7-4.1).

**Conclusions:** One year before Medicare Part D implementation, Medicare beneficiaries reported high rates of CRN. Rates are highest among nonelderly disabled beneficiaries, but among both elderly and disabled beneficiaries, CRN is exacerbated by poor health, multiple morbidities, and limited drug coverage. Given the high cost sharing under Part D, it is important to closely monitor CRN in high-risk subgroups.

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**R**ECENT RESEARCH CORROBORATES anecdotal reports of elderly Americans stretching or not filling prescription medications owing to unaffordable out-of-pocket drug costs, a problem that contributed to the Congressional passage of a Medicare drug benefit.<sup>1-3</sup> Such cost-related medication nonadherence (CRN), previously estimated to occur in about one fourth of the elderly,<sup>1</sup> is associated with reductions in health status, increased risks of adverse cardiac events,<sup>4</sup> and increased use of emergency and institutional services.<sup>5,6</sup> No equivalent data exist for the approximately 6.3 million nonelderly disabled Americans eligible for coverage under Medicare,<sup>7</sup> despite their higher burden of illness and use of medications, higher prevalence of poverty, and lower rates of drug coverage.<sup>8-11</sup> In addition, little is known about how often disabled and elderly Americans engage in other drug cost reduction behaviors such as using

generic drugs instead of brand name drugs, receiving free drug samples, shopping to compare drug prices, or buying medications on the Internet or from Canada.<sup>1,12,13</sup> Information on the relationships between the burden of chronic illnesses, generosity of prescription drug coverage, and CRN is also limited. Prior to implementing the Medicare drug benefit, which aims to ameliorate financial access barriers faced by beneficiaries, obtaining baseline estimates of CRN will enable us to gauge the success of the program in the near and longer term.<sup>14</sup>

**See also pages 1802, 1822, 1836, 1842, 1848, and 1855**

The Medicare Current Beneficiary Survey (MCBS) is a continuous face-to-face panel survey of a national sample of approximately 16 000 Medicare beneficiaries conducted by the Centers for Medicare and Medicaid Services (CMS) since

**Table 1. Prevalence of Specific Indexes of Cost-Related Medication Nonadherence (CRN) and Drug Cost Reduction Strategies\***

Variable	Nonelderly Disabled Medicare Enrollees		Elderly Medicare Enrollees	
	No.	% (95% CI)	No.	% (95% CI)
CRN				
Any CRN	2321	29.4 (26.5-32.3)	11 514	12.6 (11.1-14.1)
Taken a smaller dose of medicine	2321	24.0 (21.1-26.8)	11 514	9.9 (8.4-11.4)
Skipped dose of medicine to make last	2321	22.2 (19.4-25.0)	11 514	8.5 (7.1-10.0)
Drug cost reduction strategies				
Spent less on basic needs to buy medicine	2321	23.7 (20.9-26.5)	11 512	8.1 (6.7-9.5)
Any cost reduction strategy	2321	70.7 (67.7-73.7)	11 514	72.7 (71.1-74.4)
Used generics instead of brand name drugs	2311	52.3 (48.4-56.1)	11 467	47.3 (45.1-49.6)
Asked for or received free samples from physician or health provider	2320	49.5 (46.2-52.8)	11 507	48.0 (46.3-49.8)
Purchased prescription drugs through the mail or on the Internet	2321	18.3 (15.6-21.0)	11 508	28.9 (26.9-31.0)
Purchased prescription drugs from outside of the United States	2321	6.2 (4.6-7.8)	11 508	7.9 (6.5-9.3)
Compared prices or shopped around for the best price	2321	27.1 (24.1-30.3)	11 505	24.9 (23.2-26.5)

Abbreviation: CI, confidence interval.

\*All of the tables and figures in this article exclude respondents with missing values for CRN and drug coverage measures (approximately 660 respondents). For all tables, numbers of enrollees (N = 13 835) represent the actual sample sizes in the Medicare Current Beneficiary Survey (MCBS); however, all analyses used provided MCBS sampling weights and the Taylor series linearization technique to obtain estimates and standard error.

1991. In 2004, the MCBS incorporated a detailed and well-validated module of questions on CRN developed by the study team, which will enable longitudinal assessments of the impact of the new Medicare drug benefit on CRN.

Using these newly added MCBS measures of CRN, we examined (1) the prevalence of CRN among elderly and nonelderly disabled Medicare beneficiaries approximately 1 year prior to implementation of the Medicare drug benefit and (2) the associations of socioeconomic status (SES), prescription drug coverage, and the burden of chronic illness with CRN, controlling for demographic characteristics. We also assessed the extent of several drug cost-reducing strategies measured in the MCBS. Because of the higher rates of poverty and morbidity of younger disabled beneficiaries compared with other Medicare enrollees, we stratified all analyses according to disability status.

## METHODS

### DATA SOURCE AND SAMPLE

The multistage MCBS sample is drawn from the national Medicare enrollment files from the CMS, using geographic primary sampling units (n=107), which consist of groups of counties that are representative of the nation as a whole and ZIP codes within them. Systematic random samples are selected within age strata in each sampled ZIP code.

Respondents are interviewed in person 3 times a year using computer-assisted personal interviewing, resulting in high response rates (initially, approximately 85%). The typical MCBS interview lasts approximately 1 hour. Annual interview cycles begin with the fall interview, which includes questions on demographic and household composition, income, health behaviors, access to medical care, health insurance, health status, and health care utilization.

The measures of CRN presented herein were collected in the fall 2004 MCBS, which included 14 500 noninstitutionalized elderly and nonelderly disabled Medicare beneficiaries.<sup>15</sup>

### MEASURES OF HEALTH STATUS, SES, AND DRUG COVERAGE

To measure health status, we used data on the number of self-reported categories of chronic medical conditions collected in the MCBS, including cardiovascular disease, hypertension, stroke, cancer, diabetes, arthritis, dementia, psychiatric disorder (including depression), neurological conditions (other than stroke), pulmonary illness (including asthma and chronic obstructive pulmonary disease), as well as the existing MCBS measure of self-rated health status (excellent, very good, good, fair, and poor), which strongly predicts mortality and other health outcomes.<sup>16</sup> We also measured the number of limitations in activities of daily living (ADL) (0, 1-2, and  $\geq 3$ ).<sup>17,18</sup>

We reported income in the following categories: lower than \$10 000; \$10 001 to \$20 000; \$20 001 to \$40 000; and higher than \$40 000. The 2 lowest income categories roughly correspond to the 100% and 200% federal poverty thresholds.<sup>19</sup> We also reported race (African American, white, or other); whether Hispanic; education level (less than high school or high school or more); and type of health insurance coverage for prescription drugs in the last year.<sup>1,20</sup> We defined 3 levels of drug coverage: no coverage, partial coverage (Medicare health maintenance organization, self-purchased Medicare supplement with drug coverage, or state-sponsored low-income plans), and generous drug coverage (employer-sponsored coverage or Medicaid drug coverage). Plans classified "partial coverage" have been consistently found to offer more limited benefits, including higher cost sharing and lower spending allowances,<sup>1,20-22</sup> compared with Medicaid and employer-sponsored plans, which have been shown to be fairly similar in their coverage generosity and breadth.<sup>3,20</sup> We separately categorized those with Medicaid and employer-sponsored coverage because of differences in population and coverage characteristics.

### MEASURES OF CRN AND COST REDUCTION STRATEGIES

We collaborated with CMS staff to develop, pilot test, and integrate into the MCBS 3 measures of CRN based on the following previously validated measures<sup>1</sup>: (1) did not fill a prescription because it was too expensive, (2) skipped doses to

make the medicine last longer, and (3) took less medicine than prescribed to make the medicine last longer. All items were asked with reference to the current survey year. The first item was only asked of respondents who reported having not obtained 1 or more of the medicines prescribed for them during the current survey year. This subgroup was asked how many times they did not fill a prescription because it was too expensive. For the other 2 CRN items, response options were “often,” “sometimes,” and “never.” We analyzed these as binary variables (ie, 1 if often or sometimes and 0 if never).

Finally, we analyzed updated MCBS measures of several drug cost reduction strategies, including using generic drugs, purchasing prescriptions via mail or on the Internet; receiving prescription samples from a physician; comparing prices/shopping for best prices; purchasing prescriptions from outside the United States, and spending less on food, heat, or other basic needs to afford medicines. Possible responses were “often,” “sometimes,” and “never,” and analyses were based on binary indicators (often/sometimes vs never).

## STATISTICAL ANALYSIS

We conducted all analyses separately for nonelderly disabled enrollees vs elderly enrollees (65 years and older). First, we described the demographic and health characteristics of the study population and determined rates of CRN and drug cost reduction behaviors by demographic, SES, insurance, and health variables. To appropriately construct national estimates, MCBS sampling weights were applied using methods prescribed in the MCBS technical documentation.<sup>23</sup> We used logistic regression to construct adjusted confidence intervals (CIs) for each study outcome and stratum and to estimate the influence of each variable, controlling for demographic characteristics.<sup>24</sup> The *c* statistics for these logistic regressions ranged from 0.6 to 0.7, indicating adequate goodness of fit.

## RESULTS

The fall 2004 study sample included 2321 nonelderly disabled and 11 514 elderly Medicare enrollees (**Table 1**). Women comprised 47.2% of the disabled enrollees, compared with 57.1% of the seniors (**Table 2**). Compared with the elderly enrollees, nonelderly disabled enrollees were more predominantly male, nonwhite, and significantly poorer. Nearly half of the disabled enrollees (47.4%) had household incomes below \$10 000, compared with 16.7% of the elderly. Disabled enrollees were also much more likely than the elderly to be in fair to poor health (58.0% vs 21.2%). Compared with the elderly enrollees, the disabled enrollees were equally likely to have no prescription drug coverage (35.5% vs 35.3%), half as likely to have employer coverage (18.6% vs 34.9%, respectively), and 5.5 times more likely to have Medicaid coverage.

Approximately 29% of the disabled and 13% of the elderly enrollees reported CRN, predominantly based on measures of skipping doses or taking smaller doses to delay a new fill (Table 1). Overall, 4.4% of respondents reported failing to obtain 1 or more medications prescribed for them in the previous year; concern about cost was the predominant reason reported (79.4% of these respondents) for not filling prescriptions. The likelihood of CRN was strongly related to both health and functional status (Table 2).

About 70% of all Medicare enrollees engaged in 1 or more drug cost reduction strategies (Table 1), most of-

**Table 2. Prevalence of Cost-Related Medication Nonadherence (CRN) by Demographic and Socioeconomic Characteristics Among Disabled and Elderly Medicare Enrollees\***

Characteristic	Nonelderly Disabled Enrollees		Elderly Enrollees	
	No.	% With CRN (95% CI)	No.	% With CRN (95% CI)
Sex				
Male	1225	27.1 (24.1-30.1)	4941	10.9 (9.4-12.4)
Female	1096	31.7 (27.2-36.2)	6573	13.9 (12.2-15.6)
Age, y				
≤55	1657	28.8 (25.3-32.2)	NA	NA
55-64	664	30.1 (26.0-34.2)	NA	NA
65-74	NA	NA	5205	13.1 (11.5-14.7)
75-84	NA	NA	4602	12.4 (10.8-14.0)
≥85	NA	NA	1707	10.8 (8.5-13.1)
Income, \$				
≤10 000	1056	25.0 (21.3-28.7)	1795	14.5 (12.3-16.7)
10 001-20 000	605	35.5 (29.7-41.3)	3061	15.1 (12.9-17.4)
20 001-40 000	387	31.2 (25.1-37.3)	3725	11.8 (10.2-13.4)
≥40 001	182	23.5 (15.6-31.3)	2147	8.7 (7.1-10.2)
Race				
African American	423	26.0 (20.5-31.6)	918	17.9 (14.4-21.4)
White	1665	29.6 (26.1-33.1)	9931	12.2 (10.7-13.6)
Other†	226	33.6 (25.6-41.7)	638	12.1 (8.9-15.3)
Hispanic or Latino				
Hispanic	248	23.0 (16.7-29.3)	830	11.5 (8.7-14.3)
Non-Hispanic	2071	30.2 (27.0-33.3)	10 669	12.7 (11.2-14.3)
Education				
Above high school	806	33.7 (28.9-38.5)	4678	11.1 (9.5-12.7)
High school	764	26.1 (21.4-30.8)	3426	12.9 (11.2-14.5)
No high school	726	27.7 (23.0-32.3)	3364	14.4 (12.3-16.6)
Morbidity categories				
Cardiac disease	778	34.7 (29.7-39.7)	5039	14.3 (12.6-15.9)
Hypertension	1078	33.8 (30.0-37.5)	7320	13.6 (12.1-15.2)
Cerebrovascular disease	258	29.9 (23.2-36.7)	1340	13.8 (11.3-16.4)
Cancer	246	36.6 (29.6-43.5)	2158	12.5 (10.5-14.5)
Diabetes mellitus	505	33.0 (27.7-38.3)	2339	14.6 (12.5-16.7)
Arthritis	1163	34.7 (30.6-38.8)	6980	14.0 (12.4-15.6)
Dementia‡	...	...	426	12.1 (8.6-15.7)
Psychiatric disorder	1299	34.1 (30.0-38.3)	1506	18.8 (16.2-21.4)
Neurological condition other than dementia	279	30.3 (22.6-38.0)	504	14.7 (12.0-17.4)
Lung disease	530	38.6 (33.0-44.2)	1687	14.7 (12.7-16.6)
Functional status, ADL				
0	1338	22.8 (19.4-26.2)	8193	11.0 (9.5-12.5)
1-2	584	33.5 (27.9-39.1)	2277	16.9 (14.8-18.9)
≥3	323	47.5 (40.6-54.4)	867	17.5 (14.1-20.8)
Drug coverage				
None	824	36.2 (30.8-41.6)	4067	16.3 (13.6-19.0)
Partial coverage	192	32.7 (22.4-43.0)	2642	12.8 (11.5-14.1)
Employer	432	26.5 (21.7-31.3)	4019	9.6 (8.0-11.2)
Medicaid	873	21.6 (17.3-25.9)	786	9.2 (7.1-11.3)

Abbreviations: ADL, activities of daily living; CI, confidence interval; NA, not applicable.

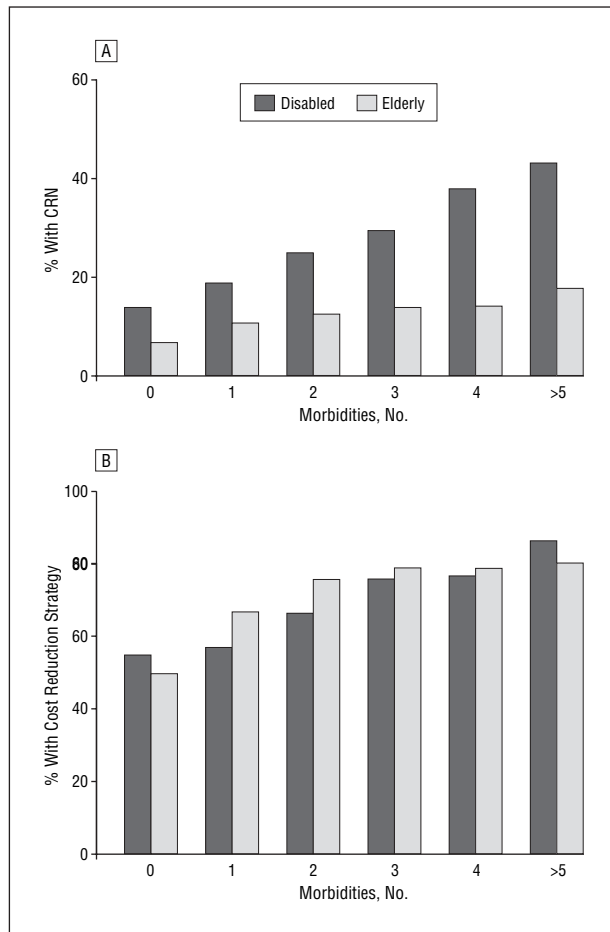
\*See Table 1 footnotes for exclusions and numbers of enrollees.

†Other includes other, American Indian/Alaskan Native, and Asian.

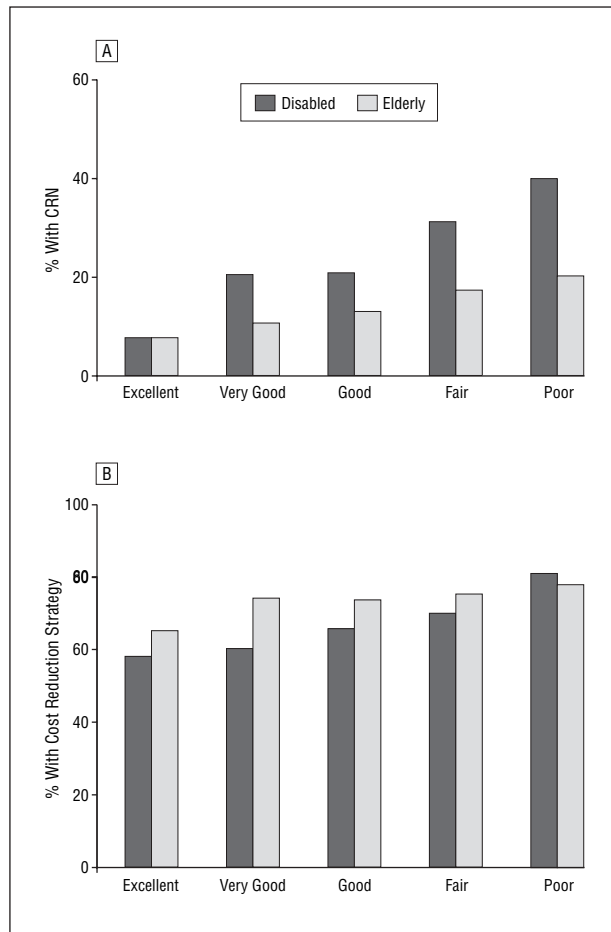
‡n<30 for disabled enrollees (data not shown).

ten by using generic drugs (approximately 50%) or free samples (approximately 50%). Three times as many disabled enrollees reported spending less on basic needs to buy medicine compared with seniors (23.7% [95% CI, 20.9%-26.5%] vs 8.1% [95% CI, 6.7%-9.5%]).

The prevalence of CRN did not differ significantly across morbidity categories (Table 2), although seniors with a psychiatric disorder had somewhat higher reported rates of CRN (18.8%) compared with those with



**Figure 1.** Prevalence of any cost-related medication nonadherence (CRN) (A) or drug cost-reduction strategies (B) by number of morbidity categories. See Table 1 footnote for exclusions.



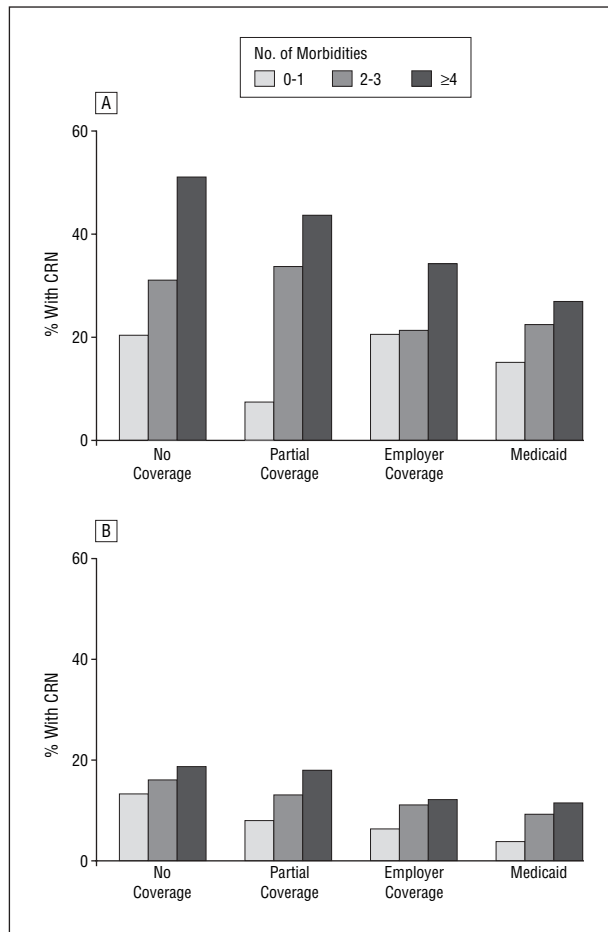
**Figure 2.** Prevalence of any cost-related medication nonadherence (CRN) (A) or drug cost reduction strategies (B) by self-rated general health status. See Table 1 footnote for exclusions.

other chronic illnesses (12.1% to 14.7%). However, the total burden of morbidity strongly predicted the likelihood of CRN. Among the disabled enrollees, 43.1% of those with 5 or more morbidities reported CRN compared with 13.7% of those with no reported morbidities ( $P < .001$ ) (**Figure 1**); among seniors, corresponding rates were 17.6% and 6.7% ( $P < .001$ ), respectively. Similarly, the number of morbidities reported was strongly associated with the prevalence of drug cost reduction strategies (Figure 1). Poor self-rated health status was also strongly associated with CRN (**Figure 2**). Among the disabled enrollees, 40.1% of those in poor health reported CRN compared with 8.0% of those in excellent health; among seniors, 20.6% of those in poor health reported CRN compared with 7.9% of those in excellent health.

**Figure 3** suggests that the availability of more generous prescription drug coverage (ie, through employers or Medicaid) tended to attenuate the large differences in the prevalence of CRN associated with the high burden of morbidity among both disabled and elderly enrollees. For example, among disabled enrollees with 4 or more morbidities, reported rates of CRN were twice as high for those with no coverage (51.8%) than for those with Medicaid coverage (26.2%); however, among those with 0 to 1 reported morbidities, this disparity in re-

ported CRN was greatly reduced (20.1% vs 15.7%, respectively). Among the elderly, the reductions in reported CRN due to more generous coverage were smaller for those with multiple morbidities. As shown in Table 2, prevalence of CRN is also positively associated with functional limitations.

**Table 3** reports the adjusted odds of CRN among the disabled and elderly enrollees by SES, health insurance status, and health status variables, controlling for demographic characteristics. For the elderly population, younger age, female sex, black race, lower income, poor health, more morbidities, and less generous drug coverage resulted in significantly higher odds of CRN. Compared with those with Medicaid drug coverage, which has the lowest levels of cost sharing, the adjusted odds ratios (ORs) of CRN were 2.8 (95% CI, 2.0-3.8) among those with no drug coverage, 2.0 (95% CI, 1.5-2.7) for those with partial coverage, and 1.6 (95% CI, 1.2-2.2) for enrollees with employer coverage. Similarly, for disabled people, poor health, more morbidities, and less generous drug coverage were also associated with significantly higher odds of CRN. As observed in the univariate analyses, controlling for demographic factors, both poor general health and multiple morbidities were among the strongest predictors of CRN for the disabled enrollees (OR for poor health, 3.9 [95% CI, 1.7-9.2] com-



**Figure 3.** Prevalence of any cost-related medication nonadherence (CRN) by the number of morbidities and level of drug coverage in nonelderly disabled (A) and elderly (B) Medicare enrollees. See Table 1 footnote for exclusions.

pared with those in excellent health; and OR for  $\geq 4$  morbidities, 2.7 [95% CI, 1.7-4.1] compared with enrollees with 0-1 morbidity).

### COMMENT

Out-of-pocket drug costs continue to outpace the incomes of vulnerable elderly and disabled Americans with chronic disease.<sup>25,26</sup> Although millions of elderly and disabled are likely to benefit from the new Part D drug coverage, its high cost-sharing provisions nearly guarantee that cost-related nonadherence will represent a continuing problem for many Medicare enrollees.<sup>14,27-29</sup> This study provides nationally representative data on CRN and drug cost reduction strategies from the largest face-to-face panel survey of Medicare enrollees 1 year before the implementation of Part D. The study underlines the high rates of economic barriers to adherence among both elderly and nonelderly disabled Medicare beneficiaries, especially those with multiple morbidities. Cost-related medication nonadherence rates were highest among disabled beneficiaries, suggesting the particular importance of monitoring how this group, previously described as the “forgotten population,”<sup>11</sup> fares in Part D plans. Those dually enrolled in Medicare and Medicaid were required to

**Table 3. Adjusted Predictors of Any Cost-Related Medication Nonadherence From Multivariate Logistic Regression\***

Predictor	Nonelderly Disabled Enrollees	Elderly Enrollees
Age, y		
≤55†	1.0	NA
55-64	0.8 (0.6-1.1)	NA
65-74†	NA	1.0
75-84	NA	<b>0.8 (0.7-0.9)</b>
≥85	NA	<b>0.6 (0.5-0.8)</b>
Sex		
Male†	1.0	1.0
Female	<b>1.2 (0.9-1.6)</b>	<b>1.2 (1.1-1.4)</b>
Race		
White†	1.0	1.0
Black	0.8 (0.6-1.2)	<b>1.4 (1.1-1.7)</b>
Other	1.0 (0.6-1.5)	1.0 (0.7-1.4)
Education		
Above high school†	1.0	1.0
No high school	0.8 (0.6-1.2)	1.0 (0.8-1.1)
High school	0.9 (0.6-1.2)	1.0 (0.8-1.2)
Income, \$		
≥40 001†	1.0	1.0
≤10 000	<b>1.5 (0.9-2.6)</b>	<b>1.5 (1.1-2.0)</b>
10 001-20 000	<b>1.8 (1.1-2.9)</b>	<b>1.5 (1.2-1.9)</b>
20 001-40 000	1.4 (0.8-2.5)	<b>1.2 (1.0-1.5)</b>
Self-rated health		
Excellent†	1.0	1.0
Very good	2.3 (1.0-5.5)	<b>1.4 (1.1-1.7)</b>
Good	<b>2.6 (1.1-5.9)</b>	<b>1.6 (1.3-2.1)</b>
Fair	<b>3.4 (1.5-7.7)</b>	<b>1.9 (1.5-2.5)</b>
Poor	<b>3.9 (0.7-9.2)</b>	<b>2.4 (1.7-3.3)</b>
No. of morbidities		
0-1†	1.0	1.0
2-3	<b>1.7 (1.1-2.6)</b>	<b>1.4 (1.2-1.6)</b>
≥4	<b>2.7 (1.7-4.1)</b>	<b>1.2 (1.1-1.7)</b>
ADL		
0†	1.0	1.0
1-2	1.4 (1.0-1.9)	<b>1.4 (1.2-1.6)</b>
≥3	<b>2.3 (1.6-3.3)</b>	1.3 (1.0-1.7)
Drug coverage		
Medicaid†	1.0	1.0
None	<b>2.1 (1.5-3.1)</b>	<b>2.8 (2.0-3.8)</b>
Partial coverage	1.8 (0.9-3.4)	<b>2.0 (1.5-2.7)</b>
Employer	1.4 (0.9-2.0)	<b>1.6 (1.2-2.2)</b>

Abbreviation: ADL, activities of daily living.

\*Data are given as odds ratio (95% confidence interval). Numbers in boldface are statistically significant at  $P < .05$ . See Table 1 footnotes for exclusions and numbers of enrollees.

†Indicates the reference group.

select a Part D plan for prescription coverage, with the cessation of Medicaid drug coverage for this group. This group, too, will be important to monitor under Part D plans, many of which have higher cost sharing and more restrictive formulary limitations than Medicaid did.<sup>14</sup> Of low-income beneficiaries not eligible for Medicaid, most will qualify for the low-income subsidy program, which provides substantial help with medication costs, but low-income subsidy enrollment has thus far been limited.<sup>30</sup>

For the elderly, 12.6% reported nonadherence owing to cost and 72.7% reported drug cost-reducing strategies such as buying on the Internet or from Canada or using generics or free samples. However, among the nonelderly dis-

abled enrollees, 29.4% reported stretching or not filling medications owing to cost concerns and 70.7% attempted to cut drug costs. The greater rates of CRN among disabled individuals may reflect the severity of the disabilities that qualify them for Medicare eligibility (eg, schizophrenia, AIDS, or kidney dialysis), poorer general health, lower incomes, or less generous drug coverage. High rates of cognitive impairments and neurological illnesses may interact with low discretionary incomes and poor insurance to further exacerbate this problem.<sup>11</sup>

Unfortunately, enrollees with poorer self-rated health status, greater burden of chronic illness, and more functional limitations were found to be at the higher risk of CRN. Such cost-related barriers may undermine the management of chronic illness because of nonadherence to medication regimens. Generosity of drug coverage substantially reduces the rate of CRN among those with the highest burden of morbidity. This is most apparent among the disabled enrollees; half of those with 4 or more morbidities and no drug coverage skipped doses or prescriptions compared with one quarter of similar individuals with Medicaid coverage. Nevertheless, both disease burden and coverage level appear to independently affect rates of CRN.

Among elderly Medicare enrollees, the findings in this study are generally consistent with previous studies of cost-related medication skipping, though rates are slightly lower than those reported by studies relying on self-administered questionnaires.<sup>1-3,31,32</sup> An earlier study of disabled Americans in 1995 found a prevalence of CRN of less than 5%<sup>8</sup>; however, that study included a large number of privately insured and younger disabled individuals who were not as poor or sick as disabled Medicare enrollees, and the open-ended question regarding cost likely resulted in underestimates of rates of CRN.

A unique strength of this study is that it used well-validated measures to provide the most detailed estimates of CRN among nonelderly disabled Medicare beneficiaries and was the first direct comparison, to our knowledge, of CRN between nonelderly and elderly Medicare beneficiaries. The data also provide evidence of the importance of drug cost reduction strategies to a majority of enrollees—some favorable and some more concerning. For example, about half of respondents reported using generic instead of brand name drugs or comparing drug prices, both generally considered to be positive and proactive strategies for reducing the burden of medication costs. However, a substantial proportion of enrollees and almost one quarter of the disabled beneficiaries reported cutting back on basic needs to be able to afford their medications, and many beneficiaries reported receiving free drug samples from their physicians, who often provide unreliable supplies of more expensive brand name drugs.<sup>33</sup>

The study has several relevant limitations. First, the results may actually underestimate the true level of CRN because 1 aspect of CRN, failing to fill a medication because of cost, was only asked of respondents who had earlier reported not obtaining a prescribed medication. Previous studies suggest that rates of CRN may have been 3 to 5 percentage points higher if the question about “not filling because of cost” were asked of all respondents.<sup>1,3</sup>

In addition, since 8% of beneficiaries take no prescription medicines, our rates may somewhat understate CRN rates among those who do.<sup>10</sup> The current MCBS data cannot identify which medications respondents reported reducing because of cost, since MCBS questions on medication-specific CRN have not yet been administered. However, available evidence suggests that patients’ cost-based choices among their medicines may not be well-aligned with clinical priorities.<sup>34</sup> Another limitation of the available data is that we are unable to quantify the extent to which higher medication costs and poor health independently or jointly predict higher rates of CRN.

What are the implications of these findings for the Medicare drug benefit? Ultimately, many enrollees will be substantially helped by lower drug cost sharing under the Medicare Modernization Act, including low-income enrollees without Medicaid coverage who receive subsidies. In addition, those who previously had insurance with high cost sharing will experience lower copayments under Part D. However, enrollees who transitioned from Medicaid plans may experience greater risk of CRN under Part D, which often requires higher cost sharing and more formulary restrictions than in Medicaid. Future studies will need to monitor those who transitioned from Medicaid coverage in January 2006 to determine whether the new Part D coverage sustains the relatively high rates of medication adherence in this vulnerable group. Our data support previous evidence that individuals with Medicaid/Medicare dual eligibility had lower rates of CRN compared with other beneficiaries before automatic enrollment in Part D.<sup>1,3</sup>

The Medicare drug benefit is a complex program expansion with many unknown consequences. Much of the focus of the legislation has been on low-income individuals. Interestingly, health status proved to be at least as important as income in predicting CRN. Burden of chronic illness was strongly associated with CRN, but this relationship was attenuated by generous drug coverage. This study highlights the urgency of carefully monitoring the impacts of Part D coverage on CRN and on the use of other cost reduction strategies, especially in specific high-risk groups. Data from the first several years of implementation can help to identify ways to modify the program to maximize access to essential medications for the most vulnerable Medicare enrollees.

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