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Use of Preventive Services by Men Enrolled in Medicare+Choice Plans

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Delivery of clinical preventive services to older adults can reduce premature morbidity and mortality while preserving functioning and enhancing quality of life.¹ Currently, the US Preventive Services Task Force recommends annual influenza vaccinations starting at the age of 65 years and colorectal cancer (CRC) screening starting at 50 years.^{2,3} Although not universally endorsed, annual prostate-specific antigen (PSA) testing is increasingly used by physicians to screen for prostate cancer.⁴ Most major medical organizations recommend that physicians discuss with patients the potential benefits and harms of PSA testing and individualize the decision to screen.⁵ The most appropriate candidates for PSA screening are men older than 50 years with a life expectancy of 10 years.

Previous studies have shown that race and socioeconomic status are important determinants of the use of preventive services by Medicare beneficiaries enrolled in traditional fee-for-service Medicare.^{6–12} For example, one study showed that Black beneficiaries in fee-for-service Medicare were 39% less likely than White beneficiaries to receive an influenza vaccination.⁶ Other studies have shown that low-income beneficiaries are 26% to 39% less likely than high-income beneficiaries to receive an influenza vaccination and that poor elderly men are 29% less likely than more affluent seniors to undergo prostate cancer screening.^{6,7}

Overall, Medicare beneficiaries enrolled in HMOs are more likely than those enrolled in fee-for-service plans to undergo cancer screening or receive an influenza vaccination.^{8,13,14} However, only a few studies have assessed socioeconomic and racial disparities in the use of preventive services in Medicare HMOs.

Schneider et al.⁹ found disparities in breast cancer screening by race, education, and income in their study of a national sample of Medicare HMOs. Scott et al.¹⁰ found that, among Medicare HMO enrollees, race/ethnicity and inadequate health literacy were indepen-

Objectives. We examined the effect of demographic and socioeconomic factors on use of preventive services (prostate-specific antigen testing, colorectal cancer screening, and influenza vaccination) among elderly men enrolled in 2 Medicare+Choice health plans.

Methods. Data were derived from administrative files and a survey of 1915 male enrollees. We used multivariate logistic regression to assess the effects of enrollee characteristics on preventive service use.

Results. Age, marital status, educational attainment, and household wealth were associated with receipt of one or more preventive services. However, the effects of these variables were substantially attenuated relative to earlier studies of Medicare.

Conclusions. Some Medicare HMOs have been successful in attenuating racial and socioeconomic disparities in the use of preventive services by older men. (*Am J Public Health.* 2004;94:796–802)

dently associated with never having received an influenza vaccination. Schneider et al.⁸ found that White Medicare beneficiaries were substantially more likely than Blacks to receive an influenza vaccination and that there were no differences in terms of racial disparities between Medicare HMOs and traditional Medicare fee for service.

In the present study, we investigated the effects of racial and socioeconomic factors on the use of 3 preventive services (PSA testing, CRC screening, and influenza vaccination) among elderly men enrolled in 2 Medicare+Choice HMOs.

METHODS

Conceptual Framework

We adopted Andersen's behavioral model of health care use to guide our selection of variables for this study.¹⁵ Previous researchers have applied this model to the use of preventive services in various patient populations.^{16,17} The model posits that use of care is a function of predisposing, enabling, and need factors. Predisposing factors include characteristics such as age, gender, education, ethnicity, and health beliefs (e.g., health locus of control). Enabling factors include having a usual source of care, insurance status, income, and wealth. Finally, need factors are indicators of health

status, either as perceived by the individual or as evaluated by health care providers.

Setting

Both of the health plans assessed here have Medicare risk contracts and participate in the Medicare+Choice program.¹⁸ Both plans are based on the independent practice association model and contract with health care providers in their communities. One plan is located in a northeastern metropolitan area, and the other is located in the Midwest. Enrollees in the northeastern plan are required to select a primary care physician (PCP), whereas enrollees in the midwestern plan are not required to do so. At the time of the study, copayments for office visits were \$15 in the northeastern plan and \$10 in the midwestern plan. Other benefits were similar in the 2 plans, and each provided limited coverage for prescription drugs. Both plans participated in the national reminder program focusing on influenza vaccination, which consisted of a reminder letter to enrollees.

Participants

The target population for our study consisted of 19 285 elderly Medicare beneficiaries (i.e., 65 years or older) enrolled in the 2 study plans. We used stratified random sampling to increase the number of low-income

enrollees in the study sample. For each study plan, one stratum consisted of enrollees who were eligible for Medicaid in addition to Medicare. The remaining enrollees in each plan were assigned to a low-income stratum if they resided in a zip code area where the majority of households had incomes less than twice the federal poverty level, according to the 1990 census, and to a high-income stratum otherwise.

We oversampled dually eligible (Medicaid and Medicare) beneficiaries and beneficiaries in the low-income strata, selecting sampling probabilities to obtain roughly equal numbers of enrollees from each plan. The resulting initial sample consisted of 6996 enrollees from the 2 plans: 942 dually eligible enrollees, 700 enrollees in low-income zip code areas, and 5354 enrollees in high-income zip code areas.

Data Sources

Data were derived from study plan administrative files and a telephone survey of plan enrollees. The administrative data consisted of provider and facility claims for all services provided to enrollees in the study sample between January 1 and December 31, 2000. We identified services using codes from the Centers for Medicare and Medicaid Services Common Procedure Coding System (HCPCS). (HCPCS codes are similar to Current Procedural Terminology codes.¹⁹)

The survey included modules on demographic and socioeconomic characteristics, health status, family and household structure, attitudes and beliefs regarding medical care, and experience with health insurance and health care. The module focusing on demographic and socioeconomic characteristics elicited information on gender, race/ethnicity, educational attainment, household income, and household wealth (calculated, for each respondent, as the sum of current worth of real estate; checking and savings accounts; certificates of deposit, government savings bonds, and treasury bills; individual retirement accounts and Keogh plans; and stocks and mutual funds).²⁰

Health status was assessed with the Medical Outcomes Study 12-Item Short-Form Health Survey, which yields summary measures of physical health (Physical Component Summary) and mental health (Mental Component

Summary) that range from 0 to 100, with means of 50 and standard deviations of 10 in the general population.²¹ The module on family and household structure elicited information on marital status, number and gender of children, and number of people residing in the household.

The attitudes and beliefs module used a 3-item scale to assess respondents' perceived "health locus of control," a social learning theory construct that refers to whether health and health outcomes are under respondents' control or the control of medical care providers.^{22,23} Each item was scored on a scale ranging from 1 to 3, with higher scores reflecting a stronger belief in the efficacy of formal medical care versus self-care. The module focusing on lifetime experience with health insurance and health care elicited information on respondents' cumulative years of insurance coverage and whether they had a usual source of medical care before Medicare.

The survey was conducted between April and October 2000. Five hundred twenty-eight enrollees in the initial study sample were ineligible because they were no longer enrolled in a study plan when they were contacted. Of the remaining 6468 enrollees, 4613 completed the survey, for a 72% response rate. The analyses described here were restricted to the 1915 male survey respondents (962 in the northeastern plan and 953 in the midwestern plan).

Regression Models

We used multivariate regression models to assess the effects of socioeconomic and demographic factors on use of preventive services.

Dependent variables. The dependent variables used in the regression models were 3 binary variables indicating receipt of each preventive service during calendar year 2000. We used a claim with an HCPCS code of 84153 or 84154 to identify PSA testing and a claim with an HCPCS code of 90657, 90658, 90659, 90660, 90724, or G0008 to identify an influenza vaccination. We defined CRC screening as fecal occult blood testing (FOBT), sigmoidoscopy, colonoscopy, or double contrast barium enema (DCBE). HCPCS codes were 82270 for FOBT; 45330, 45331, 45333, 45338, or 45339 for sigmoidoscopy; 45378, 45380, 45383, 45384,

or 45385 for colonoscopy; and 74280 for DCBE. In addition, we defined a dependent variable indicating the total number of preventive services received by each enrollee (range: 0 to 3).

Independent variables. The independent variables in our main analyses included indicator variables for 5 age categories, 3 race/ethnicity categories, 4 marital status categories, 5 educational attainment categories, 5 categories of household income based on percentage of federal poverty level, and 5 categories of household wealth based on percentiles of the distribution of wealth across the men and women in the sample. The Physical Component Summary and Mental Component Summary scores and the scores for the attitudes and beliefs items were entered as continuous variables. All models also included an indicator variable for whether a proxy respondent was used during the interview. In addition, analyses of pooled data from both plans (as described subsequently) included an indicator variable for the northeastern plan.

In secondary analyses, we included several indicator variables (one at a time) as additional independent variables. These variables were as follows: dual Medicaid eligibility, having had a usual source of care before Medicare, having had health insurance before Medicare, having been in an HMO before Medicare, having living children, having children living at home, and living with an adult partner regardless of marital status.

Estimation. We conducted separate analyses for each study plan as well as analyses involving the pooled sample. We estimated regression models for receipt of each preventive service as binary logistic models, and we estimated the models for the total number of preventive services received as ordinal logistic models.²⁴ In addition to tests of statistical significance for individual independent variables, we conducted joint significance tests on sets of related indicator variables (e.g., the set of indicator variables for income categories). We weighted analyses using weights that reflected both the sample design and survey nonresponse; the Stata SVY suite of commands, which accounts for complex sampling designs, was used in conducting all analyses.²⁵ Nonresponse weights were based on cells defined according to gender, age, and

the stratification variables. A *P* value of .05 or less was considered statistically significant.

RESULTS

Fifty-eight percent of the men were 65 to 74 years old, whereas only 6% were 85 years old or older (Table 1). Seventy-three percent were married, and 89% were non-Hispanic Whites. Thirty-seven percent had failed to finish high school, while 31% had completed at least some college. Eleven percent had household incomes below 125% of the poverty level, and 21% had incomes above 400% of the poverty level.

Overall, 49% of the men underwent PSA testing, 32% underwent CRC screening, and 49% received an influenza vaccination. The mean number of preventive services received by the men was 1.27 (range: 0–3).

Regression Results: Pooled Analyses

Prostate-specific antigen. Age, marital status, race, and household wealth were statistically significantly associated with PSA testing according to joint tests of related variables ($P < .05$). Tests of individual variables showed that men aged 80 to 84 years and aged 85 years or older were less likely than men aged 65 to 69 years to have undergone PSA testing (Table 2), and men who had never been married were more likely than married men to have undergone testing. Men in the higher wealth categories were more likely than men in the lowest category to have undergone testing. Finally, better physical health was associated with a higher probability of receiving PSA testing.

Colorectal cancer screening. Only age was significantly associated with CRC screening in joint tests of related variables. Tests of individual variables showed that men aged 85 years or older were less likely than men aged 65 to 69 years to have undergone CRC screening (Table 2). In addition, men in the northeastern plan were more likely than men in the midwestern plan to have undergone screening. In secondary analyses, we failed to find any sociodemographic subgroup differences in rates of FOBT alone or in the receipt of any one of the more expensive screening tests, including sigmoidoscopy, colonoscopy, and DCBE (data not shown).

TABLE 1—Characteristics of the Sample

Characteristic	Unweighted No.	Weighted % (or Mean)
Age, y		
65–69	512	27
70–74	580	31
75–79	449	23
80–84	263	13
≥85	111	6
Marital status		
Married	1367	73
Widowed	292	15
Separated/divorced	180	8
Never married	76	3
Race/ethnicity		
Non-Hispanic White	1649	89
Non-Hispanic Black	186	7
Other	80	4
Educational attainment		
No high school	311	16
Some high school	390	21
High school	622	32
Some college	307	16
College	285	15
Household wealth (percentile)		
<0–25	335	16
≥25–<50	447	22
≥50–<75	507	27
≥75–<90	338	20
≥90–100	288	15
Household income (% of poverty level)		
<100	115	5
≥100–<125	134	6
≥125–<200	516	27
≥200–<400	775	42
≥400	375	21
Attitudes and beliefs (mean scores)		
Doctors' care not needed	...	2.29
Home remedies better	...	2.44
Recovery depends on self	...	1.32
Physical Component	...	44.50
Summary score (mean)		
Mental Component	...	54.70
Summary score (mean)		

Note. Scores on the attitudes and beliefs about medical care variable ranged from 3 to 9, with higher scores reflecting a stronger belief in the efficacy of formal medical care (vs self-care).

Influenza vaccination. According to joint tests of related variables, marital status, education, and wealth were significantly associated with receipt of influenza vaccination. Tests of individual variables showed that men who were separated or divorced were less likely than married men to have received an influenza vaccination, and men who had never married were more likely than married men to have been vaccinated (Table 2). Men with some college and college graduates were more likely than men with less than a high school education to have received the vaccination.

In addition, men in the highest wealth category were more likely than men in the lowest category to have received an influenza vaccination. A stronger belief that a doctor's care was needed when one was sick was associated with a higher probability of receiving a vaccination. Finally, men in the northeastern plan were more likely than men in the midwestern plan to have received the vaccine.

Adjusted preventive service rates. To assist readers in interpreting the odds ratios shown in Table 2, we present adjusted rates of preventive service use for the race/ethnicity, education, income, and wealth variables in Table 3 (unadjusted rates are also presented in Table 3 for comparison).

Number of preventive services received. As mentioned, the average number of preventive services received by the men was 1.27, with means of 1.38 in the northeastern plan and 1.02 in the midwestern plan (data not shown). Marital status, household wealth, and health plan (northeastern vs midwestern) were significantly associated with number of preventive services received according to joint tests of independent variables. Tests of individual variables showed that widowed men and men who were separated or divorced received fewer preventive services than married men, whereas men who had never been married received more services than married men (Table 4). Men in the highest wealth category received more preventive services than men in the lowest wealth category. Finally, men in the northeastern plan received more preventive services on average than men in the midwestern plan.

In secondary analyses, having had a usual source of care before Medicare was positively

TABLE 2—Pooled Analyses of Preventive Service Use: Logistic Regression Results

Characteristic	Prostate-Specific Antigen Testing		Colorectal Cancer Screening		Influenza Vaccination	
	Odds Ratio	95% Confidence Interval	Odds Ratio	95% Confidence Interval	Odds Ratio	95% Confidence Interval
Age, y						
65–69	1.00		1.00		1.00	
70–74	1.05	0.81, 1.37	1.13	0.85, 1.50	0.97	0.74, 1.28
75–79	1.07	0.79, 1.43	1.24	0.90, 1.69	1.26	0.94, 1.70
80–84	0.66	0.46, 0.94*	0.94	0.64, 1.39	1.02	0.71, 1.46
≥85	0.59	0.35, 1.00*	0.51	0.26, 0.98*	1.28	0.77, 2.13
Marital status						
Married	1.00		1.00		1.00	
Widowed	0.75	0.55, 1.02	0.88	0.62, 1.24	0.79	0.58, 1.08
Separated/divorced	0.75	0.51, 1.10	0.77	0.50, 1.18	0.57	0.38, 0.85**
Never married	1.79	1.02, 3.12*	1.54	0.87, 2.73	1.82	1.08, 3.08*
Race/ethnicity						
Non-Hispanic White	1.00		1.00		1.00	
Non-Hispanic Black	1.38	0.96, 1.98	0.76	0.47, 1.22	0.69	0.46, 1.04
Other	0.56	0.32, 0.98*	0.60	0.32, 1.13	0.68	0.39, 1.17
Education						
No high school	1.00	0.73, 1.48	1.00		1.00	
Some high school	1.04	0.87, 1.70	1.02	0.69, 1.49	1.36	0.95, 1.97
High school	1.21	0.74, 1.64	1.16	0.81, 1.67	1.37	0.97, 1.93
Some college	1.10	0.83, 1.87	0.91	0.59, 1.40	1.85	1.24, 2.75**
College or more	1.24	0.73, 1.48	1.04	0.67, 1.62	1.59	1.04, 2.41*
Household wealth (percentile)						
<0–25	1.00		1.00		1.00	
≥25–<50	1.39	0.98, 1.97	0.82	0.56, 1.20	1.08	0.76, 1.54
≥50–<75	1.81	1.27, 2.58**	0.88	0.60, 1.30	1.16	0.80, 1.66
≥75–<90	1.22	0.82, 1.81	1.05	0.69, 1.61	1.06	0.71, 1.59
≥90–100	1.67	1.06, 2.61*	1.36	0.85, 2.18	1.62	1.03, 2.54*
Household income (% of poverty level)						
<100	1.00		1.00		1.00	
≥100–<125	1.30	0.71, 2.40	1.43	0.71, 2.89	1.22	0.66, 2.26
≥125–<200	1.00	0.60, 1.66	1.47	0.82, 2.61	1.03	0.62, 1.69
≥200–<400	0.99	0.60, 1.64	1.52	0.85, 2.74	0.91	0.55, 1.51
≥400	1.23	0.70, 2.16	1.52	0.80, 2.87	0.81	0.46, 1.42
Attitudes and beliefs						
Doctors' care not needed	1.03	0.90, 1.18	1.06	0.92, 1.23	1.17	1.02, 1.34*
Home remedies better	0.96	0.82, 1.11	0.90	0.77, 1.07	1.02	0.87, 1.19
Recovery depends on self	0.96	0.81, 1.14	0.98	0.81, 1.18	1.02	0.85, 1.21
Physical Component	1.01	1.00, 1.02*	1.00	0.99, 1.02	0.99	0.98, 1.00
Summary score						
Mental Component	1.01	1.00, 1.02	1.01	0.99, 1.02	1.00	0.99, 1.02
Summary score						
Health plan						
Midwestern	1.00		1.00		1.00	
Northeastern	1.16	0.95, 1.41	2.05	1.64, 2.55**	2.16	1.76, 2.65**

Note. Regression analyses included controls for proxy respondents.
* $P < .05$; ** $P < .01$ (for test of null hypothesis that odds ratio is 1.00).

and significantly associated with probability of undergoing PSA testing and with number of preventive services received ($P < .05$), but findings for socioeconomic and demographic characteristics were unaffected when we included this variable. None of the other variables examined in the secondary analyses were associated with use of preventive services.

Regression Results: Stratified Analyses

In stratified analyses conducted for each study plan, we found that the effects of most socioeconomic and demographic factors were similar in the 2 plans with the exception of household income, which was associated with greater PSA testing and CRC screening among men in the midwestern plan but not among men in the northeastern plan. Higher household income was also positively associated with number of preventive services received in the midwestern plan but not the northeastern plan. Data supporting these results are available from the authors on request.

DISCUSSION

We found a number of demographic and socioeconomic characteristics that were associated with PSA testing, CRC screening, and influenza vaccination among men enrolled in 2 Medicare+Choice plans. Age, marital status, educational attainment, and household wealth were all associated with the use of one or more of the 3 preventive services we studied. Qualitatively, these results are consistent with the literature on racial and socioeconomic disparities in the use of preventive services in traditional fee-for-service Medicare^{6,7,11,12,26,27} and in Medicare HMOs.^{8–10} However, the effects of socioeconomic and racial factors were substantially attenuated in our study relative to previous studies, particularly with respect to racial disparities in influenza vaccination rates.

Schneider et al.,⁸ for example, found a 19% difference in influenza vaccination rates between Black and White Medicare beneficiaries after adjusting for age, education, income, and health status, and Carrasquillo et al.²⁸ found a 20% difference in influenza vaccination rates between Black and White Medicare beneficiaries. Scott et al.¹⁰ found that Blacks were 60% more likely than

TABLE 3—Unadjusted and Adjusted Rates of Preventive Service Use, by Race/Ethnicity and Socioeconomic Group

Characteristic	Prostate-Specific Antigen Testing		Colorectal Cancer Screening		Influenza Vaccination	
	Unadjusted %	Adjusted % ^a	Unadjusted %	Adjusted % ^a	Unadjusted %	Adjusted % ^a
Race/ethnicity						
Non-Hispanic White ^b	50	49	35	31	46	42
Non-Hispanic Black	50	56	19**	26	26**	34
Other	35*	35*	24	21	36	34
Educational attainment						
No high school ^b	41	46	29	29	36	34
Some high school	47	47	32	29	44	41
High school	51*	50	35	32	44*	41
Some college	50**	48	31	27	51**	48**
College	57**	51	37	30	49**	44**
Household wealth (percentile)						
<0-25 ^b	38	41	31	30	39	38
≥25-<50	47*	48	27	26	40	40
≥50-<75	55**	55**	32	28	46	41
≥75-<90	48*	45	37	31	45	39
≥90-100	58**	53*	42*	37	53**	49*
Household income (% of poverty level)						
<100 ^b	42	47	23	23	38	43
≥100-<125	48	54	29	29	44	47
≥125-<200	44	47	31	30	44	43
≥200-<400	50	47	34*	31	45	40
≥400	57*	52	37*	31	47	38

^aAdjusted for age, marital status, race/ethnicity, education, wealth, income, attitudes, Physical Component Summary and Mental Component Summary scores, health plan, and proxy respondent.

^bReference category for statistical tests of differences in rates.

P* < .05; *P* < .01 (for test of null hypothesis that rate is equal to rate in reference category).

TABLE 4—Pooled Analyses of Number of Preventive Services Used: Ordinal Logistic Regression Results

	Odds Ratio	95% Confidence Interval
Age, y		
65-69	1.00	
70-74	1.06	0.83, 1.36
75-79	1.26	0.96, 1.65
80-84	0.81	0.59, 1.11
≥85	0.72	0.50, 1.05
Marital status		
Married	1.00	
Widowed	0.74	0.57, 0.97*
Separated/divorced	0.61	0.43, 0.87**
Never married	2.03	1.27, 3.24**
Race/ethnicity		
Non-Hispanic White	1.00	
Non-Hispanic Black	0.91	0.64, 1.29
Other	0.52	0.32, 0.85**
Education		
No high school	1.00	
Some high school	1.15	0.82, 1.61
High school	1.34	0.98, 1.84
Some college	1.38	0.96, 1.98
College or more	1.39	0.94, 2.05
Household wealth (percentiles)		
<0-25	1.00	
≥26-<50	1.07	0.79, 1.47
≥51-<75	1.31	0.96, 1.79
≥76-<90	1.15	0.80, 1.66
≥91-100	1.78	1.20, 2.64**
Household income (% of poverty level)		
<100	1.00	
≥100-≤125	1.44	0.80, 2.60
≥125-≤200	1.20	0.75, 1.92
≥200-≤400	1.16	0.72, 1.86
≥400	1.19	0.70, 2.01
Attitudes and beliefs		
Doctors' care not needed	1.11	0.98, 1.25
Home remedies better	0.95	0.83, 1.09
Recovery depends on self	0.99	0.85, 1.15
Physical Component Summary score	1.01	1.00, 1.01
Mental Component Summary score	1.01	1.00, 1.02
Health plan		
Midwestern	1.00	
Northeastern	1.96	1.65, 2.34**

Note. Regression analyses included controls for proxy respondents.

P* < .05; *P* < .01 (for test of null hypothesis that odds ratio is 1.00).

Whites to report never having had an influenza vaccination. By contrast, we did not find a racial disparity in influenza vaccination rates after adjusting for confounding variables. It is important to note that our results may differ from those of previous studies (1) because we used administrative data to measure preventive service use, whereas many other studies have relied on patient self-reports, and (2) because the rates we report for influenza vaccination and CRC screening were based only on men.

On the other hand, we did find disparities according to educational attainment and wealth. Specifically, we found a 14% difference in influenza vaccination rates between men with less than a high school education and men with some college and a 10% differ-

ence between men with less than a high school education and men who were college graduates. We also found an 11% difference in influenza vaccination rates between men in the lowest and highest wealth categories. These results are consistent with those of previous studies. In particular, Schoen et al.⁷ found that Medicare beneficiaries at higher income levels were 15% more likely than beneficiaries at lower income levels to receive an influenza vaccination. Scott et al.¹⁰ found that Medicare beneficiaries at inadequate levels of health literacy were 40% more likely than those with adequate health literacy to report never having had an influenza vaccination. Schneider et al.⁸ found that Medicare beneficiaries who had not completed high school were 10% less likely than those who

had completed high school or college to receive an influenza vaccination.

We found no significant disparities in CRC screening rates according to race, income, wealth, or educational attainment after adjusting for confounding variables. These findings are consistent with those of previous research on disparities with respect to race but not with respect to income or education. For example, Breen et al.²⁷ reported a 7% difference in CRC screening between Blacks and Whites, and a 6% difference was reported in *Healthy People 2010*.²⁹ However, a 15% difference in FOBT rates according to educational attainment and a 16% difference according to income level were also reported in *Healthy People 2010*.²⁹ In contrast, we found no statistically significant disparities in CRC screening according to educational attainment or income level after adjusting for confounding variables.

Relatively few studies have examined disparities in prostate cancer screening rates. Overall, we found few differences in PSA screening rates according to race, education, income, or wealth in the 2 HMOs we studied. We were reassured by our finding that PSA testing diminished among men 80 years or older relative to men in younger age groups, as one would expect on the basis of screening recommendations that only men with a 10-year life expectancy be screened.

Our findings raise the possibility that requiring plan enrollees to select a PCP may attenuate socioeconomic disparities in use of preventive services. Our plan-specific analyses revealed income-related differences in PSA testing, CRC screening, and number of preventive services used in the midwestern plan, which does not require enrollees to choose a PCP, but not in the northeastern plan, which does include this requirement. Mandatory enrollment with a PCP may foster regular patient-provider relationships, which in turn may promote use of preventive services, especially among low-income people.³⁰ Williams et al.³¹ found that Black patients who are able to access primary care receive preventive services at rates similar to those observed among White patients. Our finding regarding differences between the study plans in regard to the effects of income must be regarded cautiously, however, because we included only

one HMO of each type in our study; additional research should include more plans of multiple types.

Notably, the 2 Medicare HMOs we studied had low overall rates of preventive service delivery in comparison with national benchmarks. Overall, 32% of enrolled men underwent CRC screening, 49% received an influenza vaccination, and 49% underwent PSA testing. By comparison, a Medicare report³² indicated that 66% of beneficiaries received influenza vaccinations in 1998, the Centers for Disease Control and Prevention³³ reported that 53% of adults older than 50 years underwent CRC screening by either FOBT or lower endoscopy in 2001, and Love et al.³⁴ found that 67% of men 50 years or older seen in urban primary care practices had undergone PSA testing. Low screening rates, however, should not have biased our results in regard to disparities within the plans assessed here.

Our study involved several limitations. First, we constructed a measure of CRC screening using only 1 year of data by combining screening modalities whose recommended intervals varied. Current guidelines recommend annual FOBT, annual FOBT in conjunction with sigmoidoscopy every 5 years, sigmoidoscopy alone every 5 years, DCBE every 5 years, or colonoscopy every 10 years.³⁵ Because sigmoidoscopy alone, DCBE, or colonoscopy may substitute for FOBT for the duration of the screening interval, our use of 1 year of data may have resulted in underestimates of the true CRC screening rate. Some people who did not undergo FOBT or any other screening test in a given year may have been in compliance with screening guidelines but were classified as unscreened.

We may have also underestimated screening rates as a result of incomplete recording of these services in claims data, especially in regard to influenza vaccination. There is no published research assessing the use of claims data to identify influenza vaccinations, in contrast to studies showing excellent sensitivity and specificity of claims data for ascertaining CRC screening³⁶ and PSA testing.¹¹

Second, because we used administrative data to identify preventive service use, we were unable to distinguish between tests or

procedures performed for screening and those performed for monitoring disease progression, diagnosis, or treatment. However, some of these concerns are obviated because we were investigating subgroup differences defined by factors not known to influence the underlying pathology of colorectal or prostate cancer. Finally, we cannot exclude the possibility that our findings were attributable to unobserved characteristics of the Medicare beneficiaries who chose to enroll in the study plans rather than attributable to features of the plans themselves.

Our study suggests that some Medicare+Choice HMOs have been effective in reducing socioeconomic and racial disparities in use of preventive services endemic to Medicare. This finding stands apart from the many shortcomings of Medicare managed care recently noted, including reductions in the benefits offered by Medicare managed care plans and increased inequities in the benefits offered by plans in various areas of the country.³⁷ Additional research is needed to provide a better understanding of the effects of PCPs on disparities in preventive service use, identify other plan features that may attenuate disparities, and assess the extent to which the findings described here are generalizable to other Medicare HMOs. ■

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Contributors

L. S. Morales and J. J. Escarce led the analysis for this study, with assistance from S. L. Wickstrom and J. L. Adams. L. S. Morales led the writing of the article. J. Rogowski, V. A. Freedman, and J. J. Escarce conceived the study and supervised all aspects of its implementation. All of the authors helped conceptualize ideas and interpret findings and reviewed drafts of the article.

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Human Participation Protection

The RAND institutional review board reviewed all procedures, forms, and materials used in this study. Study participants provided informed consent.

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