

SPECIAL ARTICLE

Trends in the Quality of Care and Racial Disparities in Medicare Managed Care

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ABSTRACT

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BACKGROUND

Since 1997, all managed-care plans administered by Medicare have reported on quality-of-care measures from the Health Plan Employer Data and Information Set (HEDIS). Studies of early data found that blacks received care that was of lower quality than that received by whites. In this study, we assessed changes over time in the overall quality of care and in the magnitude of racial disparities in nine measures of clinical performance.

METHODS

In order to compare the quality of care for elderly white and black beneficiaries enrolled in Medicare managed-care plans who were eligible for at least one of nine HEDIS measures, we analyzed 1.8 million individual-level observations from 183 health plans from 1997 to 2003. For each measure, we assessed whether the magnitude of the racial disparity had changed over time with the use of multivariable models that adjusted for the age, sex, health plan, Medicaid eligibility, and socioeconomic position of beneficiaries on the basis of their area of residence.

RESULTS

During the seven-year study period, clinical performance improved on all measures for both white enrollees and black enrollees ($P < 0.001$). The gap between white beneficiaries and black beneficiaries narrowed for seven HEDIS measures ($P < 0.01$). However, racial disparities did not decrease for glucose control among patients with diabetes (increasing from 4 percent to 7 percent, $P < 0.001$) or for cholesterol control among patients with cardiovascular disorders (increasing from 14 percent to 17 percent; change not significant, $P = 0.72$).

CONCLUSIONS

The measured quality of care for elderly Medicare beneficiaries in managed-care plans improved substantially from 1997 to 2003. Racial disparities declined for most, but not all, HEDIS measures we studied. Future research should examine factors that contributed to the narrowing of racial disparities on some measures and focus on interventions to eliminate persistent disparities in the quality of care.

DESPITE DECADES OF IMPRESSIVE SCIENTIFIC and clinical innovations, substantial deficiencies persist in the quality of health care in the United States,¹⁻³ and troubling disparities exist in the quality of care for racial and ethnic minorities.⁴⁻⁸ Efforts to improve the quality of health care and attempts to reduce disparities in treatment may be connected, because variations in appropriate care that are not caused by clinical factors or by the informed preferences of patients are, by definition, indicators of suboptimal care.⁹

Recently, signs of an improved quality of care have been evident both within and outside managed-care settings.¹⁰⁻¹² These improvements may be related to efforts to measure and report clinical performance. However, little is known about whether general improvements in the quality of care are also accompanied by reductions in racial and ethnic disparities. Quality-improvement efforts may reduce such disparities, but they also may have no effect or even increase disparities.

A recent study of patients with end-stage renal disease suggested that broadly targeted interventions to improve the quality of care were associated with reduced racial disparities in hemodialysis dosing.¹³ However, an analysis of the administration of influenza vaccine to Medicare beneficiaries showed that higher rates of vaccination in managed-care plans, as compared with the rates in fee-for-service plans, were not associated with reduced disparities on the basis of race.⁷

Within the Medicare program, managed-care plans provide an opportune setting to examine the relation between improvements in the quality of health care and changes in racial disparities. Health plans are particularly well positioned to improve care, because they finance and monitor the provision of health services to enrollees.^{12,14} Since 1997, all health plans participating in Medicare have been required to submit publicly reported performance measures from the Health Plan Employer Data and Information Set (HEDIS) developed by the National Committee for Quality Assurance (NCQA). In previous studies of HEDIS measures, black enrollees were less likely to receive beta-blockers after myocardial infarction, eye examinations after receiving a diagnosis of diabetes, follow-up care after hospitalization for mental illness, and influenza vaccinations.^{6,8}

In this study, we report on trends in the quality of care provided to enrollees in Medicare managed-care plans from 1997 to 2003 and assess whether

racial disparities in quality changed during this period. Evaluation of HEDIS performance trends by race can provide important information about whether broad improvements are associated with narrowed or widened racial disparities in the quality of medical care.¹⁵

METHODS

STUDY POPULATION

We obtained HEDIS data for Medicare managed-care plans from the Centers for Medicare and Medicaid Services (CMS) covering seven reporting years (1998 to 2004) with information regarding clinical care that was delivered from 1997 to 2003. These data contained 2,691,482 observations for enrollees who were eligible for at least one of the nine HEDIS indicators described in Table 1. Each observation included the patient's health identification code and health plan, as well as variables indicating eligibility for and adherence to each HEDIS measure.

NCQA developed detailed specifications for measures that define criteria for inclusion in the sample and the method for the calculation of adherence to each HEDIS quality indicator. To ensure that health plans prepared data in accordance with NCQA specifications and that the data would be valid for use in health plan comparisons, the CMS conducted two audits of HEDIS reporting by Medicare managed-care plans during 1998. The audits included a review of data systems, interviews with health plan personnel, and a centralized review of medical records. In the initial phase of these audits, 90.3 to 96.6 percent of health plans that reported data were fully compliant with the technical specifications of the three HEDIS measures of effectiveness of care. After completion of the audit, all plan-reported rates were within 1 percentage point of audit-derived rates.¹⁶

Using the health identification code, we matched each enrollee with HEDIS data on at least one measure with the file of Medicare enrollees for the corresponding year to obtain demographic information on the race, age, sex, and ZIP Code of residence of beneficiaries and to ascertain whether they also had Medicaid coverage. We achieved a match rate of 96 percent, or 2,573,166 observations. We excluded 229,938 observations for enrollees who were under the age of 65 years, 201,323 observations for enrollees who were of a race or ethnic background other than black or white, and 44,150 observations

Table 1. Description of HEDIS Measures of Quality of Care.*

Measure	Description	Years
Breast-cancer screening		
Mammogram	Mammography within the past two years for women 65–69 yr	1997–2003
Diabetes care		
Eye examination	Retinal examination by an eye care professional within the past year	1999–2003
Testing of glycosylated hemoglobin level	Testing of glycosylated hemoglobin within past year	1999–2003
Control of glycosylated hemoglobin level	Levels of glycosylated hemoglobin below 9.5%	1999–2002†
Testing of LDL cholesterol level	Testing for LDL cholesterol within past year	1999–2003
Control of LDL cholesterol level	Level of LDL cholesterol below 130 mg/dl	1999–2003
Cardiovascular care		
Beta-blocker use	Receipt of a prescription for a beta-blocker within seven days after discharge from hospital for treatment of acute myocardial infarction	1997–2002†
Testing of LDL cholesterol level	Testing of LDL cholesterol after discharge from hospital for treatment of acute myocardial infarction, coronary-artery bypass graft, or percutaneous transluminal coronary angioplasty	1998–2003
Control of LDL cholesterol level	Level of LDL below 130 mg/dl after discharge from hospital for treatment of acute myocardial infarction, coronary-artery bypass graft, or percutaneous transluminal coronary angioplasty	1999–2002†‡

* LDL denotes low-density lipoprotein.

† Data for 2003 were excluded because NCQA changed its specifications for measurement, which prevented a comparison with rates in previous years. For the measure of glycosylated hemoglobin levels, the adherence threshold was lowered to less than 9.0 percent in 2003. For the beta-blocker measure, the exclusion criteria of congestive heart failure, left ventricular dysfunction, and diabetes were removed and chronic obstructive pulmonary disease was added for the denominator population. For the measure of LDL cholesterol after myocardial infarction or a coronary procedure, the adherence threshold was lowered to a level of less than 100 mg per deciliter.

‡ Data from 1998 were excluded for the initial year, since health plans reported incomplete data. Information for this measure was not publicly reported by NCQA for this year.

for enrollees who died during the year of measurement (with some overlap of enrollees in these three exclusion categories). This process yielded a total study sample of 2,122,809 observations, of which 9.2 percent were for black enrollees. To reduce the likelihood that trends in performance and disparities might be a result of the entrance and exit of health plans from Medicare, our primary analysis excluded 319,358 observations from health plans with less than five years of continuous participation in Medicare managed care. (In a secondary analysis, we did not exclude health plans with less than five years of participation and instead included observations for eligible patients from all health plans that participated in Medicare managed care for at least one year during the study period. Results were similar and are not shown.)

The primary study sample included 1,803,451 observations (9.4 percent for black enrollees) from 183 health plans for the nine HEDIS indicators. The sample size of observations over the entire study period ranged from 79,133 for the beta-blocker measure to 1,035,946 for the breast-cancer-screening measure.

STUDY VARIABLES

Our dependent variables were the receipt of each HEDIS indicator (Table 1) by eligible enrollees. Our chief independent variable was black or white race, and these designations are highly accurate in Medicare enrollment data.¹⁷ Covariates included age, sex, enrollment in Medicaid, the percentage of persons 65 years of age or older within the enrollee's ZIP Code with an income of less than the federal poverty level, the percentage of persons 65 years of age or older in the enrollee's ZIP Code who had attended college, and urban residence. Data on poverty, educational level, and urban residence within a particular ZIP Code were obtained from the 2000 U.S. Census.

STATISTICAL ANALYSIS

We assessed demographic and socioeconomic characteristics of the population that was eligible for each HEDIS measure. For white enrollees and black enrollees in each year, we calculated the performance for each HEDIS measure as the percentage of eligible enrollees who were reported to have achieved the performance measure.

Table 2. Demographic Characteristics of the Study Population as Measured by HEDIS, by Year.*

Measure (Initial Year–Final Year)	Whites		Blacks	
	Initial Year	Final Year	Initial Year	Final Year
	<i>no. of patients</i>			
Breast-cancer screening (1997–2003)				
Sample size	92,894	148,577	6,775	11,494
Mean age — yr	67	67†	67	67†
Medicaid recipient — %	2	4†	9	10†
Below poverty level — %	8	8†	16	14†
Some college or above — %	39	36†	29	30†
Urban residence — %	91	84†	97	97†
Diabetes care (1999–2003)				
Sample size	77,154	61,998	12,663	8,647
Mean age — yr	69	70†	69	69†
Female sex — %	48	48	59	59
Medicaid recipient — %	4	6†	12	13
Below poverty level — %	8	8†	16	14†
Some college or above — %	36	36†	28	30†
Urban residence — %	87	87†	95	97†
Beta-blocker prescribed after myocardial infarction (1997–2003)				
Sample size	8,864	8,686	510	686
Mean age — yr	74	75†	73	74†
Female sex — %	42	45†	51	50
Medicaid recipient — %	3	5†	12	15
Below poverty level — %	8	8†	17	17†
Some college or above — %	36	34†	27	26†
Urban residence — %	89	88†	98	97†
Cholesterol management after myocardial infarction or coronary procedure (1999–2002)				
Sample size	18,326	20,029	1,048	1,414
Mean age — yr	70	70†	70	70†
Female sex — %	34	34	49	50
Medicaid recipient — %	3	5†	13	16†
Below poverty level — %	8	8†	16	16†
Some college or above — %	36	35†	27	27†
Urban residence — %	88	87†	97	97†

* Classification regarding patients' socioeconomic level, educational attainment, and residence in an urban area was performed on the basis of ZIP-Code data from the 2000 U.S. Census.

† The number is significantly different from that in the initial year (P<0.05).

To determine adjusted rate differences between white enrollees and black enrollees, we fitted separate linear models predicting receipt of each HEDIS measure to each year's data. To assess trends, we fitted models to combined data from the first and last usable year for each measure. We assessed the overall trend in the quality of care by testing the sig-

nificance of the year effect in the model without a race-by-year interaction. To assess changes in racial disparity on the risk-difference scale, we tested the significance of a race-by-year interaction term.

In order to determine the adjusted effect of variables regarding demographic characteristics, health plan, and socioeconomic factors on racial dispari-

ties in the quality of care, we fitted three versions of each of these linear regression models. Adjusted rates and differences then corresponded to those predicted at the mean values of the adjuster variables. The first model adjusted for age and sex. The second model added to the first model variables for rural residence and health plan (defined as a Medicare managed-care contract). Because each contract is typically limited to a specific state (except for a few health plans that serve contiguous areas in adjacent states) and the addition of variables by state did not significantly alter regression results after controlling for health plan, we did not include further geographic controls. The third model added to the second model variables for Medicaid eligibility and ZIP-Code-level variables for income and education. All analyses were performed using SAS statistical software (version 9.1) and are reported with two-tailed P values. Our study protocol was approved by the Human Studies Committee of Harvard Medical School and the CMS Privacy Board.

RESULTS

The demographic and socioeconomic characteristics of the enrollees who were eligible for each of

the four categories of HEDIS measures during the initial and final years of measurement are shown in Table 2. As compared with the proportion of white enrollees, a higher proportion of black enrollees was female, eligible for Medicaid, and living in urban areas that had higher rates of poverty and lower rates of educational attainment. Black enrollees made up a higher proportion of the sample for diabetes-related measures — a finding that probably reflects the higher prevalence of this disease among blacks. The demographic characteristics of white enrollees and black enrollees were very stable during the seven-year study period, except for an increase in the percentage of Medicaid recipients and a decrease in the percentage of white women in urban areas who were eligible for the breast-cancer-screening measure.

The quality of care improved during the study period on all measures for both blacks and whites ($P < 0.001$ for all time trends) (Table 3). For black enrollees, the absolute improvement ranged from 6 percent (for the completion of mammography) to 43 percent (for a level of low-density lipoprotein [LDL] cholesterol < 130 mg per deciliter for patients with diabetes). For white enrollees, the absolute improvement ranged from 3 percent (for comple-

Table 3. Adherence to HEDIS Measures by Race and Year.*

Measure (Initial Year–Final Year)	Initial Rates			Final Rates			Change in Disparity
	White	Black	Disparity	White	Black	Disparity	
				<i>percent</i>			
Breast-cancer screening							
Mammogram (1997–2003)	74	69	5	77	75	2	-3†
Diabetes care							
Eye examination (1999–2003)	64	55	9	72	70	2	-7‡
Testing of glycosylated hemoglobin level (1999–2003)	75	71	4	90	88	2	-2‡
Control of glycosylated hemoglobin level (1999–2002)	71	67	4	82	75	7	+3‡
Testing of LDL cholesterol level (1999–2003)	70	61	9	94	92	2	-7‡
Control of LDL cholesterol level (1999–2003)	36	23	13	73	66	7	-6‡
Cardiovascular care							
Beta-blocker prescribed (1997–2002)	76	64	12	94	93	1	-11‡
Testing of LDL cholesterol level (1998–2003)	58	40	18	84	75	9	-9‡
Control of LDL cholesterol level (1999–2002)	47	33	14	68	51	17	+3

* LDL denotes low-density lipoprotein.

† $P = 0.002$.

‡ $P < 0.001$.

tion of mammography) to 37 percent (for LDL cholesterol <130 mg per deciliter for enrollees with diabetes).

The disparity between blacks and whites narrowed significantly for seven of the nine measures in the study (P<0.01). However, for control of levels of glycosylated hemoglobin, the disparity between blacks and whites increased from 4 percent to 7 percent (P<0.001). For the measure of the percentage of enrollees who achieved an LDL cholesterol level of less than 130 mg per deciliter after a myocardial infarction or a coronary procedure, racial disparities were statistically unchanged (P=0.72).

Table 4 summarizes the results of the multivariable models. Adjustment of the HEDIS performance rates for age and sex (model 1) had little effect on estimated disparities. Additional adjustment for the enrollee's health plan and rural residence (model 2) reduced the disparities between

blacks and whites in the initial and final year for six of the nine HEDIS measures and rendered the race-by-year interaction for control of glycosylated hemoglobin levels no longer statistically significant. Additional adjustment for the socioeconomic indicators of Medicaid coverage and residence in high-poverty and low-education areas (model 3) further reduced the magnitude of disparities between blacks and whites in both the initial and the final year. In all models, however, the decrease between the initial and the final year in the magnitude of disparities remained statistically significant for seven of the nine HEDIS measures we studied (P<0.01 for all race-by-year interaction terms).

Figure 1 illustrates two patterns of time trends in the quality of care for blacks and whites who were enrolled in Medicare managed care. For the testing of LDL cholesterol among enrollees with diabetes (Fig. 1A), improvements for white enrollees and

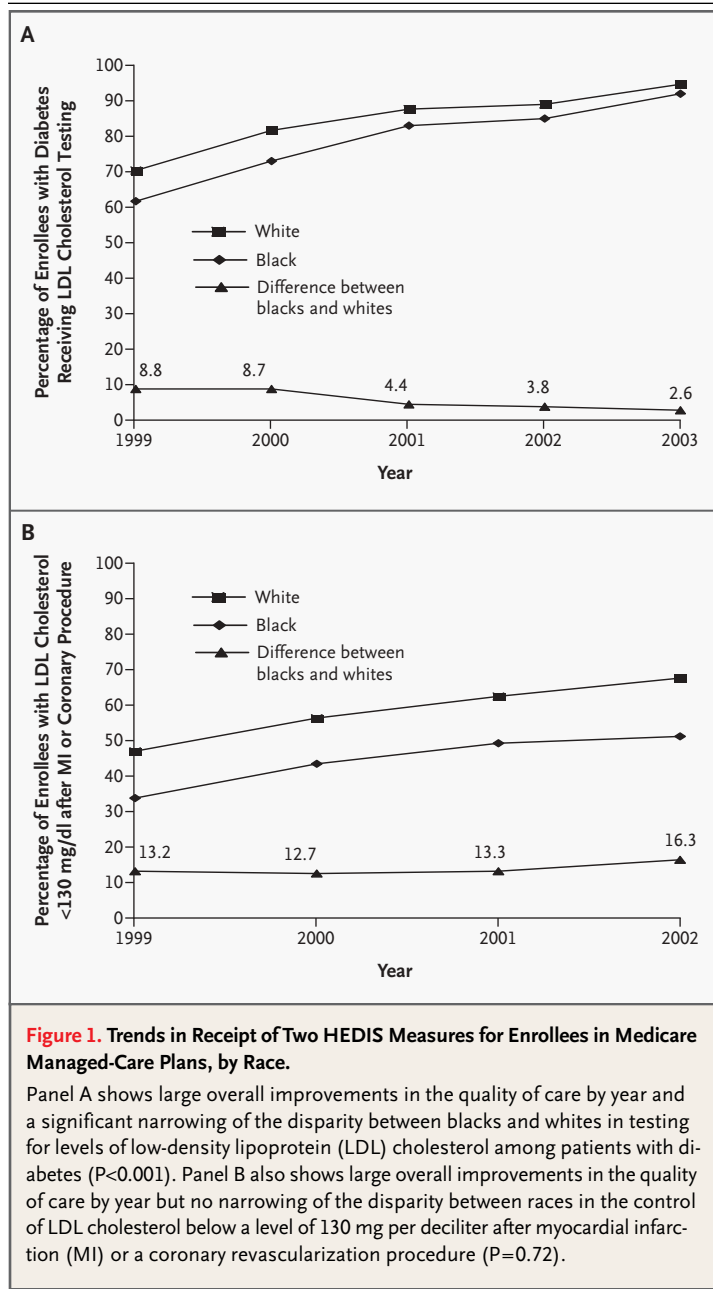
Table 4. Racial Differences in HEDIS Performance Adjusted for Demographic, Socioeconomic, and Health-Plan Effects.*

Measure	Racial Disparity								
	Model 1			Model 2			Model 3		
	Initial Year	Final Year	Change in Disparity	Initial Year	Final Year	Change in Disparity	Initial Year	Final Year	Change in Disparity
<i>percent</i>									
Breast-cancer screening									
Mammogram†	5.5	1.5	-4.0‡	2.8	-0.7	-3.5‡	-0.2	-2.6	-2.4‡
Diabetes care									
Eye examination	9.0	2.2	-6.8‡	1.8	-0.3	-2.1‡	4.7	-1.4	-6.1‡
Testing of glycosylated hemoglobin level	4.8	2.2	-2.6‡	3.7	1.3	-2.4‡	2.2	0.8	-1.4‡
Control of glycosylated hemoglobin level	3.6	6.5	2.9‡	4.7	5.2	0.5	3.8	4.3	0.5
Testing of LDL cholesterol level	8.8	2.7	-6.1‡	9.0	2.4	-6.6‡	7.0	1.8	-5.2‡
Control of LDL cholesterol level	12.3	6.6	-5.7‡	8.4	7.3	-1.1‡	7.2	6.6	-0.6‡
Recent myocardial infarction									
Beta-blocker prescribed	11.8	0.4	-11.4‡	5.0	-0.4	-5.4‡	4.1	-1.6	-5.7‡
Recent myocardial infarction or coronary procedure									
Testing of LDL cholesterol level	17.9	9.2	-8.7‡	12.7	7.2	-5.5‡	11.3	6.0	-5.3‡
Control of LDL cholesterol level	13.2	16.3	3.1	10.6	12.2	1.6	7.3	8.8	1.5

* Racial difference is defined as the rate for white patients minus the rate for black patients. Model 1 is adjusted for age and sex; model 2 is adjusted for all characteristics in model 1, plus the type of health plan and residence in a rural area; model 3 is adjusted for all characteristics in model 2, plus the level of income and education and eligibility for Medicaid. LDL denotes low-density lipoprotein.

† Models predicting receipt of mammography did not include terms regarding age and sex, since the eligible population was restricted to women between 65 and 69 years of age.

‡ P<0.01 for race-by-year interaction term in models predicting adherence to HEDIS measures.



black enrollees were accompanied by a reduction in the racial disparity between these two groups from 1999 to 2003. In contrast, for the control in levels of LDL cholesterol below 130 mg per deciliter after a myocardial infarction or a coronary procedure (Fig. 1B), clinical performance improved substantially for both white enrollees and black enrollees but with no reduction in the disparity between blacks and whites from 1999 to 2002.

DISCUSSION

In this time-trend analysis of nine clinical performance measures for enrollees in Medicare managed-care plans from 1997 to 2003, quality of care improved on all nine measures and was accompanied by a significant reduction in the disparities between blacks and whites on seven of the measures. Both trends were substantial and were not explained by changes in the sociodemographic characteristics of enrollees or in the health plans that participated in the Medicare managed-care program during the study years. In contrast, racial disparities did not decrease over time for two HEDIS measures assessing clinical outcomes for diabetes and heart disease.

An adjustment for rural residence and health plan narrowed the observed magnitude of racial disparities for most HEDIS measures — a finding suggesting that part of the racial disparity was related to the disproportionate enrollment of black beneficiaries in health plans or in regions with lower performance on these measures. Even the adjusted models, however, showed decreased racial disparities over time.

In spite of observed improvements, performance as measured by HEDIS indicators approached or exceeded 90 percent on only three measures (testing of glycosylated hemoglobin and LDL cholesterol for patients with diabetes and the frequency of prescribing beta-blockers for patients with cardiovascular disorders). On the other six measures, performance was less than 82 percent for both white enrollees and black enrollees. For these important clinical services, gaps between actual and optimal care remained substantial.²

Although racial disparities decreased to 2 percent or less for five of the six process measures, disparities remained at 7 percent or greater for the three measures assessing clinical outcomes (control of LDL cholesterol for enrollees with either diabetes or heart disease and control of glycosylated hemoglobin) in the most recent study years. Although we controlled for socioeconomic variables, the financial burden of the use of lipid-lowering and glucose-lowering medications may have contributed to the greater disparity we observed on these outcome measures, which often require sustained therapy in addition to intermittent testing.^{18,19}

Our findings are consistent with the proposition that improvements in the quality of care are as-

sociated with reductions in racial disparities.⁹ By increasing the consistency of the delivery of care, interventions such as the use of reminder systems, disease management programs, and feedback to health care providers may decrease variation on the basis of nonclinical factors such as race.²⁰⁻²⁴ A greater awareness among beneficiaries or their health care providers about appropriate services for breast-cancer screening, diabetes control, and cardiovascular care could also explain our results.

We believe that the observed declines in racial disparities were unlikely to have resulted from specific health plan programs tailored to improve care for black enrollees. The representatives of nearly half of the health plans who responded to a recent survey did not collect data regarding race and ethnic background of enrollees.²⁵ In addition, efforts by health plans to develop programs to eliminate disparities in the quality of care on the basis of racial and ethnic factors are relatively recent.²⁶ Since late 2003, the CMS has provided data regarding enrollees' race and ethnic background to participating health plans and has required that they conduct at least one project to reduce disparities.²⁷ However, the reduction in disparities we observed largely preceded these efforts.

The strengths of this study were the inclusion of a large, nationally representative sample of enrollees and the use of quality measures that have been audited and publicly reported by health plans for several years. Since all health plans participating in Medicare were required to report data regarding the quality of care, we avoided the selection bias associated with voluntary reporting programs.²⁸ We were able to adjust for health plan effects and several measures of socioeconomic position that may have confounded or mediated the relationship between race and the quality of care. By limiting our primary analysis to plans with five or more consecutive years of participation in Medicare, we addressed the possibility that changes in the quality of care or reductions in disparities might be an artifact of health plans' selectively entering or exiting the Medicare program.

Our study had several limitations. It was not designed to address the factors that may have caused the observed results or to determine whether similar trends would have been observed for aspects of the quality of care beyond those assessed by the public reporting of HEDIS measures. Furthermore, patients in Medicare fee-for-service and non-Medi-

care settings were not included in the HEDIS data set. Previous studies have shown similar racial disparities in fee-for-service and managed-care settings,^{7,29} but whether our finding of decreasing racial disparities over time extends beyond Medicare managed care remains an open question.

Because enrollment data for Medicare did not reliably identify enrollees who were Hispanic, Asian, or Native American during our study years,¹⁷ we chose not to analyze trends among these ethnic and racial groups. Such studies are clearly needed. The data also lacked detailed clinical information to provide risk-adjusted outcome measures. Although unmeasured clinical factors might partially explain cross-sectional differences in outcome measures by race, such factors would be less likely to explain changes in racial disparities over time.

Several studies have suggested that racial differences in the quality and outcomes of care may be related to differences in the site of care between white and minority patients.^{30,31} Although we were able to analyze the contribution of health plans to racial variation in the quality of care, the current HEDIS reporting protocol does not collect information on providers and practices within plans. In addition, the attitudes of patients about health in general or about their ability to modify their diet or physical activity^{32,33} may contribute to racial disparities in clinical outcomes, but these variables were not available in our analysis.

Our findings have two important policy implications. For policymakers, health plan leaders, purchasers, and providers who are concerned with improving the quality of care and with reducing disparities, appropriate data are essential to gauge progress on each of these objectives. Measures of quality should be stratified by race, ethnic background, and socioeconomic position — an approach that is now rarely possible with publicly reported data on the quality of care.^{9,34,35} Second, although racial disparities decreased on some measures of quality, interventions that are focused on black enrollees or their health care providers may still be necessary to eliminate the disparities that remain.

In summary, improvements in the quality of care among enrollees in Medicare managed-care plans since 1997 have been accompanied by reduced racial disparities in most, but not all, measures of clinical performance we studied. Effective collaborative efforts by policymakers, health-plan administrators,

clinicians, and patients may be needed to eliminate these disparities entirely.

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