

# Racial Variation in the Control of Diabetes Among Elderly Medicare Managed Care Beneficiaries

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**OBJECTIVE** — To examine racial variation in the poor control of GHb, a GHb value >9.5%, or GHb not tested in 1999 among Medicare beneficiaries aged 65–75 years enrolled in managed care plans.

**RESEARCH DESIGN AND METHODS** — The National Committee on Quality Assurance provides person-level data regarding diabetes care services and control for Medicare beneficiaries enrolled in managed care to the Centers for Medicare and Medicaid Services (CMS). We merged this information with information on each individual's race, as well as other person-level and plan-level characteristics obtained from CMS. Bivariate and multivariate analyses were performed.

**RESULTS** — The overall rate of poor GHb control was 32.7%. The age- and sex-adjusted rate of poor control among whites was 32.0%. This rate was significantly higher than the rate among Asians (24.7%) but significantly lower than the rate among blacks (40.6%) and Hispanics (36.5%) ( $P < 0.001$ ). An increase in the number of comprehensive diabetes care measures received by an individual was associated with a significantly lower percentage of individuals with poor GHb control in all race groups. After controlling for the individual-level, plan-level, and diabetes care measure variables, the difference in GHb control between Asians and whites disappeared. However, blacks and Hispanics continued to have significantly higher rates of poor control than whites.

**CONCLUSIONS** — There is room for significant reduction in the number of patients with poor control of GHb among all races, particularly among blacks and Hispanics.

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The results of the Diabetes Control and Complication Trial (DCCT) (1), the U.K. Prospective Diabetes Study (UKPDS) (2), and other studies and consensus meetings have led to the development of guidelines for the treatment of

type 1 and type 2 diabetes (3–5). An example is the Diabetes Quality Improvement Project (DQIP) guidelines (4), which have been largely incorporated into the Health Plan and Employer Data and Information Set (HEDIS) measures

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**Abbreviations:** DCCT, Diabetes Control and Complication Trial; CMS, Centers for Medicare and Medicaid Services; HEDIS, Health Plan and Employer Data and Information Set; NCQA, National Commission for Quality Assurance; NHANES III, National Health and Nutrition Examination Survey III; UKPDS, U.K. Prospective Diabetes Study.

A table elsewhere in this issue shows conventional and Système International (SI) units and conversion factors for many substances.

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used by the National Committee on Quality Assurance (NCQA) for evaluating the performance of managed care plans.

Since 1997, the Centers for Medicare and Medicaid Services (CMS) has received from NCQA individual-level information for each of the HEDIS measures from almost all managed care plans providing services to Medicare beneficiaries. Schneider et al. (6) and Virnig et al. (7) linked individuals to Medicare enrollment information and other databases to obtain the race of the individual as well as other person-level and plan-level information. In 1999, 67.3% of Medicare managed care beneficiaries with diabetes underwent an annual eye examination, 79.9% underwent GHb determination, and 73.5% underwent LDL cholesterol determination (7). They found significantly lower rates of these three care measures among black Medicare beneficiaries (61.6, 74.6, and 64.5%, respectively) compared with white beneficiaries (67.4, 80.2, and 73.7%, respectively). Whites and Hispanics had similar rates for all three services, and Asians had the highest rates.

Less information is available on the HEDIS measure of poor glucose control among managed care beneficiaries. NCQA website information for 2000 indicates that among Medicare beneficiaries of all ages with diabetes, 33.4% have GHb values >9.5% (8). Because plans are not required by NCQA to report information by race, no information is presented by race.

We report our analysis of poor GHb control among Medicare beneficiaries aged 65–75 years with diabetes who were enrolled in managed care plans in 1999 using the individual-level HEDIS data provided to Medicare. We compare the rates between the four race groups: whites, blacks, Asians, and Hispanics; controlling for available individual-level and plan-level information as well as diabetes care services, which might explain these differences.

## RESEARCH DESIGN AND METHODS

### Data and data sources

We received the HEDIS information for 1999 from CMS. The individual-level data contained each individual's Health Insurance Claim number, as well as information for each HEDIS measure. We used the Health Insurance Claim number to link the individual to the Medicare 1999 Denominator file and Group Health Plan Master file.

The Denominator file was the source of the age, sex, race, place of residence (zip code, county, and state), and monthly state Medicaid "buy-in" status. The Medicare race variable identifies five groups: whites, blacks, Asians and Pacific Islanders, Hispanics, and Native Americans, plus other and unknown. The monthly state buy-in variable indicates whether a beneficiary was enrolled in a state-administered Medicaid program for each month of the year.

The Group Health Plan Master file was used to confirm an individual's enrollment in 1999 in the managed care plan that reported information on the beneficiary. Information regarding each managed care plan was taken from Medicare's monthly Medicare Managed Care Health Plan report for December 1999. The report contains information on tax status (profit or nonprofit), type of managed care model (staff, group, independent practice association, or other), geographic location, and number of managed care enrollees.

Finally, the 1990 U.S. Census STF 3b file was used to obtain the median household income for head of household aged  $\geq 65$  years by zip code.

### Case identification

The criteria used by the managed care plans to identify enrollees with diabetes, as well as the criteria used to identify those who had each care indicator performed, are described in the HEDIS 2000 Technical Specifications and the NCQA website (6,9). Briefly summarized, individuals to whom insulin and/or oral hypoglycemics/antihyperglycemics were dispensed in 1999 or who had either 1) one face-to-face inpatient or emergency department encounter or 2) two face-to-face ambulatory or nonacute inpatient encounters with an International Classification of Diseases, 9th Edition, Clinical

Modification (ICD-9-CM) diagnosis code of 250.XX, 357.2, 262.0, 366.41, or 648.0, were considered to have diabetes. These criteria are similar to those used by others to identify individuals with diabetes in either medical records or administrative data (10–12). In addition, each subject had to be continuously enrolled in 1999, which was defined as no gap in coverage of  $>45$  days and enrolled as of 31 December 1999.

### Outcome measure

The measure of poor diabetes control used by HEDIS is a GHb value of  $>9.5\%$  for the most recent GHb test. The test must have been performed during the measurement year (1999). If no GHb test was performed in 1999, then the beneficiary was assumed to have a GHb value  $>9.5\%$ .

### Study cohort

A total of 293 of the 301 managed care plans that provided data to NCQA for 1999 submitted individual-level data on poor GHb control for 157,394 individuals aged  $\geq 65$  years with diabetes. Not all of the plans submitted correct or usable data on each individual. We followed the methods used in our earlier analyses of the 1999 data to create the study cohort of subjects for whom we believed the data would be most likely to be accurate (8,13). If the summary percentage of individuals with poor GHb control was  $\geq 10$  absolute percentage points different than the value we calculated using the individual data, all members of the plan were deleted (74 plans with 64,174 patients with diabetes). All subjects ( $n = 4,052$ ) from an additional 15 plans were excluded because for  $\geq 10\%$  of the individuals, GHb control results were listed for an individual but the plan did not indicate that the individual had undergone the GHb test. Next, all members of 19 plans were excluded ( $n = 2,777$ ) because  $\geq 5\%$  of the Health Insurance Claim numbers submitted by the plan could not be matched with Health Insurance Claim numbers in the 1999 Denominator file. Finally, all individuals  $>75$  years of age were excluded ( $n = 5,540$ ), as were individuals whose race group was listed as other, unknown, or Native American ( $n = 4,578$ ). Therefore, the final population available for study was 76,273.

### Analysis

We tabulated the number and percentage of beneficiaries by race for each individual- and plan-level variable. Race-specific unadjusted rates of poor GHb control according to the HEDIS definition were then calculated for each of these variables, as well as the age- and sex-adjusted rates. Among those beneficiaries who had undergone a GHb test ( $n = 58,849$ ), we also examined whether poor GHb control was related to the receipt of two other diabetes care measures reported by NCQA: eye examination and LDL cholesterol determination. In addition, multivariate logistic modeling was used to calculate the odds ratios of having poor GHb control using whites as the reference group. The multivariate analysis was also applied to this smaller subset of individuals (58,849) on whom we had knowledge that a GHb test, as well as the other two diabetes care measures, actually had been performed. The logistic model included the person-level covariates of age, sex, Medicaid status and income, plan-level covariates of plan tax status, model of managed care (group, staff, or independent practice association), U.S. Census Region location of the health plan, quartile of total plan size based on Medicare enrollment, quartile of the percentage of individuals in the plan who are members of minority race groups, and the other diabetes care information (namely, whether an individual had undergone an eye examination or LDL cholesterol test).

Tests of the statistical significance of differences between whites and each of the minority groups were applied. Differences in the distribution of the individual- and plan-level characteristics were tested using the  $\chi^2$  statistic. Differences between the percentage of beneficiaries with poor GHb control and the age- and sex-standardized rates were tested with the  $Z$  test. Because of the large number of tests performed,  $\chi^2$  and  $Z$  tests were considered significant at the  $P$  value  $<0.01$ . Model-derived adjusted odds ratios and 95% CIs are reported.

**RESULTS**— Univariate analysis showed a large number of differences in the distribution of individual- and plan-level characteristics among whites compared with minority group members (Table 1). The only comparison that was not statistically significant ( $P < 0.001$ )

## Racial variation in poor GHb control

**Table 1—Distribution of person-level and plan-level characteristics among Medicare managed care beneficiaries and the percentage of these beneficiaries who were in poor control in 1999, according to the HEDIS definition, by race**

Characteristic	White			Black			Asian			Hispanic			Total percentage in poor control
	n	Percent distribution	Percentage in poor control	n	Percent distribution	Percentage in poor control	n	Percent distribution	Percentage in poor control	n	Percent distribution	Percentage in poor control	
<b>Age</b>													
65–69 years	27,957	45.1	32.7	4,532	48.8*	39.9†	552	24.4*	26.6†	717	26.8*	37.9†	33.7
70–75 years	34,085	54.9	31.5	4,763	51.2	40.8†	1,710	75.6	23.2†	1,957	73.2	35.4†	32.4
<b>Sex</b>													
Male	32,423	52.3	32.0	3,876	41.7*	41.7†	1,086	48.0†	23.8†	1,397	52.2	35.9†	32.8
Female	29,619	47.7	32.1	5,419	58.3	39.4†	1,176	52.0	24.2†	1,277	47.8	36.3‡	33.0
<b>Income</b>													
≤\$13,100	5,818	9.4	38.4	2,903	31.2*	43.9†	79	3.5*	32.9	470	17.6*	40.9	40.2
\$13,101–16,299	12,442	20.1	33.6	2,189	23.6	38.2†	266	11.8	24.8‡	668	25.0	39.8†	34.4
\$16,300–20,500	20,149	32.5	31.9	2,086	22.4	39.6†	473	20.9	31.1	747	27.9	34.1	32.7
>\$20,500	23,633	38.1	29.7	2,117	22.8	38.2†	1,444	63.8	21.1†	789	29.5	31.9	29.9
<b>Medicaid</b>													
Yes	2,348	3.8	39.9	854	9.2*	48.5†	212	9.4*	32.1	320	12.0*	39.4	41.4
No	59,694	96.2	31.7	8,441	90.8	39.5†	2,050	90.6	23.2†	2,354	88.0	35.6†	32.5
<b>Profit status</b>													
For profit	31,429	50.7	37.0	5,174	55.7*	45.4†	404	17.9*	34.2	1,412	52.8	43.1†	38.3
Nonprofit	30,613	49.3	26.9	4,121	44.3	33.9†	1,858	82.1	21.8†	1,262	47.2	28.3	27.5
<b>HMO model</b>													
Group	25,343	40.8	25.2	3,981	42.8*	35.4†	1,610	71.2*	20.2†	1,178	44.1*	28.0	26.3
Staff	3,487	5.6	19.8	658	7.1	27.5†	38	1.7	18.4	136	5.1	30.9‡	21.3
IPA	32,007	51.6	39.0	4,476	48.2	46.7†	574	25.4	34.8	1,327	49.6	44.2†	40.0
Other	1,205	1.9	24.5	180	1.9	38.3†	40	1.8	27.5	33	1.2	21.2	26.2
<b>Plan size§</b>													
≤5,062	6,476	10.4	34.7	996	10.7*	39.0†	102	4.5*	31.4	259	9.7*	36.3	35.3
5,063–12,026	13,016	21.0	34.7	1,786	19.2	44.6†	113	5.0	38.9	391	14.6	43.0†	36.1
12,027–25,720	16,642	26.8	35.4	2,712	29.2	46.3†	667	29.6	16.2†	723	27.0	40.8†	36.4
25,721–318,982	25,908	41.8	27.8	3,801	40.9	34.5†	1,380	61.0	26.1	1,301	48.7	31.4†	28.6
<b>Percentage minority  </b>													
0–3	9,728	15.7	25.9	189	2.0*	32.8†	69	3.1*	36.2	54	2.0*	31.5	26.2
3.01–8	17,998	29.0	34.5	1,614	17.4	40.4†	279	12.3	27.6	542	20.3	37.1	35.0
8.01–16	27,179	43.8	31.7	4,371	47.0	38.2†	1,122	49.6	26.2†	1,512	56.5	33.5	32.4
16.01–68	7,137	11.5	35.1	3,121	33.6	43.8†	792	35.0	18.7†	566	21.2	42.4†	36.7
<b>U.S. Census Region</b>													
Midwest	7,808	12.6	30.3	1,597	17.2*	39.2†	54	2.4*	42.6	72	2.7*	43.1	31.9
Northeast	13,232	21.3	40.8	1,911	20.6	53.6†	114	5.0	50.0	231	8.6	59.7‡	42.7
South	13,007	21.0	36.8	3,091	33.3	41.8†	84	3.7	33.3	643	24.0	38.7	37.8
West	27,995	45.1	26.1	2,696	29.0	30.0†	2,010	88.9	21.7†	1,728	64.6	31.7†	26.4
Total	62,042	81.3	32.0	9,295	12.2	40.3†	2,262	3.0	24.1†	2,674	3.5	36.1†	32.7
Age/sex-adjusted total			32.0			40.6†			24.7†			36.5†	

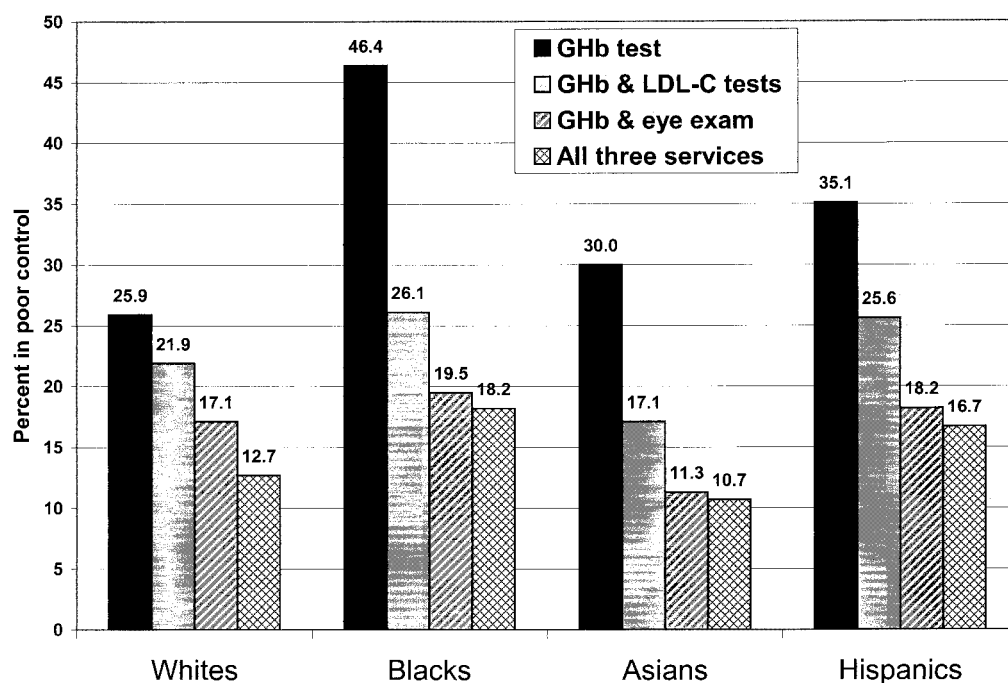
Data are n or %. \*Significance level of  $P < 0.001$  for the difference in the distribution of the variable among white beneficiaries compared with the distribution among members of this race group; †significance level of  $P < 0.001$ ; ‡significance level of  $P < 0.01$  in the percent of white beneficiaries who are in poor control compared with minority group beneficiaries who are in poor control; §plan size = total number of Medicare beneficiaries in plan; ||percent minority = percent of persons in the plan who are either black, Asian, Hispanic, or Native American race. HMO, health maintenance organization; IPA, independent practice association.

was between whites and Hispanics for the variables sex and profit status of the plans.

In 1999, almost one-third (32.7%) of elderly Medicare managed care members either had not undergone a GHb test or had a GHb value  $>9.5\%$  (Table 1). Among the four race groups, elderly Asians had the lowest age- and sex-

adjusted rate of poor glycemic control (24.7%, which was significantly lower than the value for whites (32.0%;  $P < 0.001$ ). The age- and sex-adjusted rates of poor control among blacks (40.6%) and Hispanics (36.5%) were significantly higher than for whites ( $P < 0.001$ ). The unadjusted rates of GHb control were sta-

tistically significantly higher among blacks than among whites for almost all of the person-level and plan-level characteristics. Interestingly, Hispanics who were in Medicaid had rates of control similar to whites who were in Medicaid ( $P = 0.855$ ), as was true for those in nonprofit plans ( $P = 0.288$ ).



**Figure 1**—Percentage of Medicare managed care beneficiaries aged 65–75 years with diabetes who had GHb >9.5% in 1999 according to the number of diabetes care measures performed, by race.

Among the 58,849 individuals for whom the GHb test was performed and for whom we had information on the two other diabetes process of care indicators (eye examination and LDL cholesterol test), those who had undergone more tests had lower rates of poor GHb control (Fig. 1). This pattern was observed across all race groups. Undergoing both an eye examination and an LDL cholesterol test was associated with a 13.2–percentage point reduction in the level of poor GHb control among whites (from 25.9 to 12.7%), a 28.2–percentage point reduction among blacks (from 46.4 to 18.2%), a 18.4–percentage point reduction among Hispanics (from 35.1 to 16.7%), and a 19.3–percentage point reduction among Asians (from 30.0 to 10.7%) (all decreases significant at  $P < 0.001$ ).

The multivariate analysis confirmed the significant differences found between whites and blacks, as well as between whites and Hispanics, for poor GHb control. After adjusting for the person-level, plan-level, and diabetes care covariates, the adjusted odds ratio of blacks having a GHb value >9.5% compared with whites was 1.16 (95% CI 1.10–1.22), and the adjusted odds ratio of Hispanics having a GHb value  $\leq$ 9.5% compared with whites was 1.19 (1.09–1.30). The difference between Asians and whites disappeared. The adjusted odds ratio was 0.93 (0.83–1.03) (Table 2).

The covariates in the multivariate model that were associated with an increased risk of poor GHb control were younger age-group, Medicaid-administered program, for-profit plan, independent practice association model plan, smaller plan, >3% of plan members being of minority race, location of the plan in the northeast or south, and not receiving each of the other diabetes care services (LDL cholesterol test or eye examination). There was no significant interaction between any of the main effect variables and black or Hispanic race.

**CONCLUSIONS**— Much is yet to be achieved in the control of GHb among elderly Medicare managed care beneficiaries and in the elimination of differences between whites and those who are black or Hispanic. The estimate of poor GHb control for all individuals with diabetes in our study cohort was 32.7% for 1999. This is approximately the same as the 33.4% reported by NCQA for Medicare managed care beneficiaries of all ages for 2000 and 9.8 percentage points lower than the 42.5% reported for the commercial managed care plans (6). Perhaps the strong interest that Medicare has demonstrated in monitoring diabetes care among fee-for-service beneficiaries (14,15) and improving diabetes care among all beneficiaries (16) is responsible for the lower rate of poor GHb control

among Medicare beneficiaries. However, even with the Medicare program initiatives, one-third of the elderly individuals in managed care are in poor control of GHb. It could be argued that the HEDIS method of assigning a GHb value >9.5% to those individuals for whom no value was found by the plan inappropriately inflates the number of individuals under poor control by arguing that, in fact, these subjects were in such good control or had such mild diabetes that frequent monitoring was not required. However, the American Diabetes Association recommends two GHb determinations per year in patients with diabetes who meet treatment goals and are under stable glycemic control (3).

These are the first managed care data of a national scope reporting differences in GHb control by race. Finding the highest levels of poor control in blacks and Hispanics is consistent with the data from National Health and Nutrition Examination Survey III (NHANES III) and two studies from individual managed care plans from earlier in the 1990s. Using NHANES III data, which includes adult patients with diabetes treated in both managed care and fee-for-service settings, Harris et al. (17) reported that poor glycemic control, defined as a GHb >8%, was higher in black women (50%) and Mexican-American men (45%) than in other race-sex groups (35–38%). Wis-



**Table 2—Odds ratios and 95% CIs from multiple logistic regression model analysis of poor diabetes control, by race, other individual characteristics, managed care plan characteristics, and diabetes care services received, 1999**

Characteristic	OR	CI lower	CI upper	P
<b>Race</b>				
White (reference)				
Black	1.16	1.10	1.22	<0.001
Asian	0.93	0.83	1.03	0.152
Hispanic	1.19	1.09	1.30	<0.001
<b>Age</b>				
65–69 years (reference)				
70–75 years	0.93	0.90	0.97	<0.001
<b>Sex</b>				
Female (reference)				
Male	1.02	0.99	1.06	0.152
<b>Income</b>				
≤\$13,100 (reference)				
\$13,101–16,299	0.94	0.88	1.00	0.041
\$16,300–20,500	0.93	0.87	0.98	0.008
>\$20,500	0.87	0.82	0.92	<0.001
<b>Medicaid</b>				
No (reference)				
Yes	1.28	1.19	1.38	<0.001
<b>Profit status</b>				
Profit (reference)				
Nonprofit	0.89	0.85	0.93	<0.001
<b>HMO model</b>				
IPA (reference)				
Group	0.68	0.66	0.71	<0.001
Staff	0.46	0.43	0.50	<0.001
<b>Plan size*</b>				
≤5,062 (reference)				
5,063–12,026	0.99	0.93	1.06	0.757
12,027–25,720	0.88	0.82	0.93	<0.001
25,721–318,982	0.90	0.84	0.96	0.001
<b>Percentage minority†</b>				
0–3 (reference)				
3.01–8	1.72	1.62	1.83	<0.001
8.01–16	1.66	1.56	1.77	<0.001
16.01–68	1.76	1.63	1.89	<0.001
<b>U.S. census region</b>				
Midwest	1.05	0.99	1.12	0.103
Northeast	1.86	1.77	1.95	<0.001
South	1.33	1.26	1.40	<0.001
West (reference)				
<b>Eye examination</b>				
No (reference)				
Yes	0.52	0.50	0.54	<0.001
<b>LDL cholesterol test</b>				
No (reference)				
Yes	0.32	0.31	0.34	<0.001

Data are n or %. \*Plan size = total number of Medicare beneficiaries in plan; †percentage minority = percent of persons in the plan who are either black, Asian, Hispanic, or Native American. HMO, health maintenance organization.

dom et al. (18) reported information about predominantly working-age Midwestern managed care members with di-

abetes in 1991. The mean GHb value for blacks was 9.13%, as compared with 8.48% for whites. Martin et al. (19) re-

viewed 2 years of medical chart information for Northern California Kaiser Permanente members aged ≥45 years with diabetes during the period 1990–1993. Among individuals who had undergone a GHb test, they reported mean GHb values of 9.4% for blacks, 9.8% for Hispanics, and 8.6% for whites. The value for whites was significantly lower than that seen in blacks.

Unfortunately, the Medicare administrative data do not capture laboratory values. Therefore, studies of the quality diabetes care among Medicare fee-for-service beneficiaries are generally limited to diabetes process-of-care measures such as the performing of annual GHb or LDL cholesterol test or eye examination. Comprehensive state-specific data have been presented by Jencks et al. (14,15). They recently reported that in the median state in 2000 or 2001, 78% of fee-for-service Medicare beneficiaries aged 18–75 years with diabetes had undergone an GHb test, 74% had undergone an LDL cholesterol test, and 70% had undergone an eye examination. Unfortunately, they do not report on the use of these services by race. These rates are very similar to the rates we reported for Medicare managed care beneficiaries of the same age for 1999, cited earlier: 79.9, 73.5, and 67.3%, respectively (7).

Based on the age- and sex-adjusted rates for GHb control shown in Table 1, compared with whites, blacks were 26.8% more likely to have GHb values >9.5% and Hispanics were 14.1% more likely. The odds ratios in the multivariate model, which adjusted for the person-level, plan-level, and diabetes care variables, reinforced the conclusion that blacks and Hispanics are more likely than whites to have poor control of diabetes. We know of no previous reports regarding GHb control among Asians in managed care. It is considered encouraging that the age- and sex-adjusted rate of poor GHb control is lower (24.7%) than among whites (32.0%), although ~25% of Asians with diabetes are still under poor control.

In our analysis of individuals who we know had undergone at least the GHb test and had information on the other two care measures (Fig. 1), it is not surprising that as the number of diabetes care services received increased to two and three, the percentage of individuals with poor glycemic control decreased. The unad-

justed rates for poor GHb control among those with all three care services were quite low: from 18.2% in blacks to 10.7% in Asians. However, the likelihood of receiving all three tests was mediocre and varied significantly across race groups. Blacks were the least likely to receive all three services (51.8%) and Asians were the most likely (72.3%) (data not shown). The relationship between increased testing and increased control may best be described as association and should not be interpreted as a cause and effect. However, the conclusion might be drawn that the more comprehensive the diabetes care, the less likely an individual is to have a GHb value >9.5%. Therefore, managed care plans should continue to be encouraged to provide all appropriate diabetes care services to members of all races.

Several weaknesses of the study are associated with the fact that we were limited to the data as they were collected by the managed care plans and as defined by the HEDIS Technical Specifications. Therefore, the GHb information reported is whether the individual had a GHb value at last testing >9.5% and not the actual value. Also, the value selected to indicate poor control (9.5%) is much higher than the current level of care goal set by the American Diabetes Association, which is a GHb value of <7.0%; additional treatment action is suggested for patients with values >8% (3). Thus, the HEDIS definition of poor control may be viewed as liberal. Furthermore, to be included in the HEDIS sample, the individual had to be alive on the last day of the year. Therefore, the possibility exists that the individuals with diabetes who had the most severe disease or who were in the least good control died before the end of the year and were not included in the sample. This may result in overly optimistic estimates of diabetes control. The upper age limit required for HEDIS reporting is 75 years. Using information from the National Health Interview Survey, the National Centers for Disease Prevention and Control (CDC) estimated that in 2000, 44% of elderly subjects with diabetes were aged  $\geq 75$  years (20). Thus, we had no information on almost one-half of the elderly population with diabetes. Finally, because 1999 was the first year poor GHb control was reported by the plans, we found many inconsistencies and errors, which resulted in our eliminating information about all members in 108 plans

( $n = 71,003$ ), with 45.1% of the elderly initially reported to CMS as having diabetes. Although this is a major loss of study subjects, we believe that including only those plans and individuals for whom we have confidence in the data quality is preferred. It is possible that those plans that correctly reported the data would have provided better care in 1999, thus biasing our estimates of poor GHb control downward. However, there is no way to determine this with certainty.

Despite these shortcomings, there are strengths in this study. It is the first report of diabetes outcomes measures in elderly Medicare beneficiaries drawn nationally based on data collected since development of the Diabetes Quality Improvement Program (DQIP) and HEDIS guidelines. Also, these data are for a period 6 years after the publication of the DCCT and 1 year after the UKPDS. Most importantly, this study provides the first comparison of nationwide information on differences in the important measures among four major race groups.

In summary, managed care organizations need to continue to increase their efforts to reduce the rate of poor GHb control among elderly Medicare managed care beneficiaries, particularly among blacks and Hispanics. Also, we encourage those responsible for the development of the HEDIS guidelines to extend the age range to include those elderly individuals aged >75 years and to require plans to report the actual last GHb value recorded.

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## References

1. Diabetes Control and Complications Trial Research Group: The effect of intensive treatment of diabetes on the development and progression of long-term complications in insulin-dependent diabetes mellitus. *N Engl J Med* 329:977–986, 1993
2. U.K. Prospective Diabetes Study (UKPDS) Group: Intensive blood-glucose control with sulphonylureas or insulin compared with conventional treatment and risk of complications in patients with type 2 diabetes (UKPDS 33). *Lancet* 352:837–853, 1998
3. American Diabetes Association: Standards for the medical care for patients with diabetes mellitus. *Diabetes Care* 26:S33–S50, 2003
4. Diabetes Quality Improvement Project: DQIP 1.2 specifications [article online]. Available from <http://www.dqip.org/measures.html>. Accessed 7 March 2003
5. National Commission for Quality Assurance. Available from <http://www.ncqa.org/index.htm>. Accessed 7 March 2003
6. Schneider EC, Zaslavsky AM, Epstein AM: Racial disparities in the quality of care for enrollees in Medicare managed care. *JAMA* 287:1288–1294, 2002
7. Virnig BA, Lurie N, Huang Z, Musgrave D, McBean AM, Dowd B: Racial variation in quality of care among Medicare+Choice enrollees. *Health Affairs* 21:224–230, 2002
8. National Commission for Quality Assurance: The state of health care quality, 2002: comprehensive diabetes care [article online]. Available from [http://www.ncqa.org/sohc2002/SOHC\\_2002\\_CDIAB.html#Definition](http://www.ncqa.org/sohc2002/SOHC_2002_CDIAB.html#Definition). Accessed 7 March 2003
9. National Commission for Quality Assurance: *Health Plan Employer Data Information Set (HEDIS) 3.0*. Washington, DC, National Committee for Quality Assurance, 1997
10. Hebert PL, Geiss LS, Tierney EF, Yawn BP, McBean AM: Identifying persons with diabetes using Medicare claims data. *Am J Med Qual* 14:270–277, 1999
11. Hux JE, Ivis F, Flintoft V, Bica A: Diabetes in Ontario: determination of prevalence and incidence using a validated administrative data algorithm. *Diabetes Care* 25:512–516, 2002
12. Blanchard JF, Anderson K, Ludwig S, Kendall O, Wadja A, Depew N, Dean H: Incidence and prevalence of diabetes in Manitoba, 1986–1991. *Diabetes Care* 19:807–811, 1996
13. Huang Z, Virnig B, Lurie N, Musgrave D, McBean AM, Dowd B: Does Medicare managed care provide equal treatment for mental illness across races? *Arch Gen Psychiatry*. In press
14. Jencks SF, Cuedon T, Burwin DR, Fleming B, Houck PM, Kussmaul AE, Nilasena DS, Ordian DL, Arday DR: Quality of medical care delivered to Medicare beneficiaries: a profile at state and national levels. *JAMA* 284:1670–1676, 2000
15. Jencks SF, Huff ED, Cuedon T: Changes in the quality of care delivered to Medicare beneficiaries, 1998–1999 to 2000–2001. *JAMA* 289:305–312, 2003
16. Center for Medicare and Medicaid Services, Quality Improvement Organizations' 7th Scope of Work, Section C—Statement of Work [article online]. Available from <http://cms.hhs.gov/qio/2b.pdf>. Accessed 7 March 2003
17. Harris MI, Eastman RC, Cowie CC, Flegal

- KM, Eberhardt MS: Racial and ethnic differences in glycemic control of adults with type 2 diabetes. *Diabetes Care* 22:403–408, 1999
18. Wisdom K, Fryzek JP, Havstad SL, Anderson RM, Dreiling MC: Comparison of laboratory test frequency and test results between African-Americans and Caucasians with diabetes: opportunity for improvement: findings from a large urban health maintenance organization. *Diabetes Care* 20:971–977, 1997
19. Martin TL, Selby JV, Zhang D: Physician and patient prevention practices in NIDDM in a large urban managed-care organization. *Diabetes Care* 18:1124–1132, 1995
20. Boyle JP, Honeycutt AA, Venkat Narayan KM, Hoerger TJ, Geiss LS, Chen H, Thompson TJ: Projection of diabetes burden through 2050. *Diabetes Care* 24:1936–1940, 2001