Impact of Primary Care Patient Visits on Racial and Ethnic Disparities in Preventive Care in the United States

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Background: **The causes of racial and ethnic disparities in preventive care are not fully understood. We examined the hypothesis that fewer primary care visits by minority patients contribute to these disparities.**

Methods: **We analyzed claims for Medicare beneficiaries 65 and older who participated in the Medicare Current Beneficiary Survey, 1998 to 2002. Five preventive services were included: colorectal cancer testing, influenza vaccination, lipid screening, mammography, and Papanicolaou smear screening. In separate multivariate analyses, we examined the effect of minority status (self-report of African American race or Hispanic ethnicity) on having a claim in the past 12 months for each preventive service after successive control for number of primary care visits and other patient characteristics.**

Results: **The final sample included 15,962 subjects. In age-adjusted analyses, minorities had statistically lower rates of claims for each of the 5 procedures. After controlling for number of primary care visits, the effect of minority status was slightly attenuated but remained statistically significant for receipt of each procedure. After adding low income, low educational level and supplementary insurance, health status, and year, minority status was significantly associated only with colorectal cancer screening (odds ratio [OR] 0.79; 95% confidence interval [CI] 0.67 to 0.94) and influenza vaccinations (OR 0.56; 95% CI 0.49 to 0.64).**

Conclusions: **The frequency of primary care visits seems to contribute minimally to racial and ethnic disparities in preventive services. Other patient characteristics, particularly those associated with poverty, explain much of these disparities. (J Am Board Fam Med 2007;20:587–597.)**

Racial and ethnic disparities in preventive services have been widely documented, particularly for African American and Hispanic patients,[1–9] but causes of these disparities remain incompletely understood. When disparities have been examined for specific visits, relatively few disparities in preventive care are observed.[10–14] One potential explanation is that number of primary care visits mediates disparities in preventive care.

In general, African Americans and Hispanic patients have fewer primary care visits,[15,16] and fewer primary care visits are associated with lower rates of preventive care.[17–20] If fewer primary care visits by minority patients largely mediate these disparities, then interventions designed to increase the number of primary care visits for these underserved patients might significantly ameliorate disparities in preventive services.

We examined this hypothesis using a nationally representative sample of elderly Medicare beneficiaries. We examined the independent association of minority status with receipt of colorectal cancer testing, influenza vaccination, lipid testing, mammography, and Papanicolaou smear testing. Next, we examined the impact of the frequency of primary care visits on this relationship. Last, we examined the impact of other potential barriers to care including differences in patient educational level, income, supplemental insurance, and health status on the association between minority status and receipt of preventive services.

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Methods

Data Sources

The study was approved by the University of Rochester Human Subjects Review Board. Our data source was the Centers for Medicare & Medicaid Services' (CMS) Medicare Current Beneficiary Survey (MCBS). The MCBS includes an annual survey (for a maximum of 4 years per participant) of a rotating panel of Medicare beneficiaries. Participants are asked to provide sociodemographic, health status, and health care information. These data can be linked to each participant's Medicare claims data (diagnoses and diagnostic and procedural medical services) using linkages provided by CMS. This linkage at the patient level allows for creation of a unique dataset that includes a combination of detailed self-reported data and claims data. Further details about the survey are available at www.cms.hhs.gov/mcbs. Selected Medicare subpopulations are oversampled, and appropriate longitudinal and cross-sectional weights are provided to allow for estimates for the entire Medicare pop-

Table 1. Characteristics of a National Sample of Elderly, Community-Dwelling, non-HMO, Medicare Beneficiaries*

Characteristics	Minority (n = 2187)	White (n = 13,775)	*P* Value (for χ^2 or *t* test)
Age			<.0001
65 to 69	25.0	20.2	
70 to 74	21.7	21.8	
75 to 79	19.7	21.7	
80 to 84	15.6	20.3	
85+	18.1	15.9	
Sex			<.0001
Male	38.4	43.4	
Female	61.6	56.7	
Education			<.0001
Less than high school graduate	61.9	28.8	
At least high school graduate	38.1	71.2	
Metropolitan area			<.0001
No	23.5	32.9	
Yes	76.5	67.1	
Income			<.0001
≤25,000 annual	85.4	57.6	
>25,000 annual	14.6	42.4	
Lives alone			<.1585
No	67.1	65.6	
Yes	32.9	34.4	
Proxy responded			<.0001
No	84.6	92.2	
Yes	15.4	7.9	
Supplemental insurance			<.0001
None	23.1	12.8	
Medicaid	35.5	6.1	
Private insurance	41.4	81.1	
Number of primary care office visits			<.0001
None	36.7	28.9	
1 to 2	20.5	26.8	
3 or more	42.8	44.3	
Activities of Daily Living†	1.8	1.6	<.0001
Self-assessed health status‡	3.1	2.7	<.0001

*Data derived from Medicare Current Beneficiary Survey (Access to Care), 1998 to 2002.
† On a 3-point scale, with higher scores indicating more impairment.
‡ On a 5-point scale, with higher scores indicating poorer health.

Table 2. Effects of Minority Status on Receipt of Preventive Care Services

Covariates Included in Models	Odds Ratios for Claim for a Preventive Care Service by Minority Status				
	Colon Cancer Screening	Influenza Vaccination	Lipid Screening	Mammogram	Pap Smear
Age	0.59 (0.51–0.69)	0.50 (0.44–0.56)	0.81 (0.72–0.91)	0.59 (0.51–0.68)	0.61 (0.5–0.75)
Age, frequency of primary care visits	0.63 (0.53–0.72)	0.51 (0.45–0.57)	0.86 (0.76–0.97)	0.61 (0.53–0.7)	0.64 (0.52–0.79)
Age, frequency of primary care visits, education level	0.69 (0.59–0.81)	0.54 (0.47–0.6)	0.92 (0.81–1.04)	0.71 (0.61–0.81)	0.76 (0.62–0.94)
All covariates (listed in Table 1)	0.79 (0.67–0.94)	0.56 (0.49–0.64)	0.95 (0.84–1.08)	0.9 (0.77–1.05)	0.94 (0.76–1.17)

Data are expressed as odds ratio (95% confidence interval).

ulation. To maximize sample size, data were aggregated across 4 years (1998 to 2002). The total number of observations initially available for analysis was 88,509.

Exclusion Criteria

Our study sample consisted of whites, African Americans, and Hispanics over 65 years of age. Respondents were excluded from our sample for any of the following reasons (number in parentheses refer to the number of excluded participants): (1) residence in a long-term care facility because care is often provided within the facility (6,462); (2) age less than 65 years—only persons with end-stage renal disease or qualifying disabilities are eligible for Medicare for this age-group (12,852); (3) race/ethnicity *other than* Hispanic, African American/black, or white because the focus of the study was on these 2 minority groups and sample size for other groups were considerably smaller (3,169); (4) enrollment in a Medicare HMO and hence had no claims from their medical visits (15,262); or (5) lacked Medicare B and thus did not have ambulatory claims (1,118).

To minimize bias associated with multiple repetitions of the survey, we randomly selected among years of the survey for those respondents who participated in multiple years of data collection, eliminating 25,834 repeated observations. Finally, we eliminated respondents with missing data on any of the covariates (7,850). The final sample contained 13,775 non-Hispanic white and 2187 minority (for analytic purposes, we classified the African American and Hispanic participants as minority) patients.

Measures

Race/Ethnicity

Minority status was defined as self-report of African American/black race or Hispanic ethnicity based on the responses to 2 questions: "(Are you/Is SP) of Hispanic or Latino origin?" [Yes or No] and "Looking at this card, what is (your/SP's) race?" [American Indian or Alaska Native; Asian; black or African American; Native Hawaiian or other Pacific Islander; white; another race (specify)]. Participants in our analyses were classified as a minority if they responded either "yes" to the first question or "black or African American" to the second question. Other minorities were excluded because of small numbers and heterogeneity.

Receipt of Clinical Preventive Services

Relevant Current Procedural Terminology (CPT), Healthcare Common Procedure Coding (HCPC), and Berenson-Eggers Type of Service (BETOS) codes were used to identify persons receiving preventive services during 1 year of their survey participation. Details of this identification have been previously provided.[21] Because of the challenges in distinguishing screening procedures from diagnostic procedures,[22] both screening and diagnostic codes were included.

Primary Care Visits

For each selected respondent, we examined the claims records generated during the MCBS survey year. All claims coded as bills from physicians describing themselves as general practitioners, family physicians, internists, obstetrician/gynecologists, or geriatricians were counted. The frequency distributions by procedure were skewed, with a mean of around 5 visits during the year across all the procedures. Close examination of these distributions by each preventive service revealed approximately 30% of the sample having no primary care visits during the year, 25% having 1 to 2 visits, and 45% having 3 or more visits. We categorized "primary care visit number" using these cut-offs and

Table 3. Factors Associated with Receipt of Colorectal Screening

Patient Characteristic	Odds Ratio	Lower 95% Confidence Interval	Upper 95% Confidence Interval
Race or ethnicity (referent: non-Hispanic white)			
Minority	0.79	0.67	0.94
Age (referent: ≥85 years)			
65 to 69	1.29	1.13	1.48
70 to 74	1.33	1.17	1.52
75 to 79	1.44	1.27	1.62
80 to 84	1.18	1.03	1.35
Educational attainment			
Less than high school	0.84	0.76	0.93
Residence (referent: nonmetropolitan residence)			
Metropolitan area	1.12	1.00	1.25
Income (referent: <$25,000)			
≤$25,000	0.80	0.73	0.88
Functional health (3-point scale)			
1 point decrease	0.89	0.85	0.94
Self-rated health (5-point scale)			
1 point decrease	0.99	0.95	1.04
Living situation (referent: married or cohabitating)			
Lives alone	1.06	0.96	1.16
Respondent (referent: participant)			
Proxy	0.79	0.66	0.95
Supplemental insurance (referent: private)			
None	0.58	0.50	0.68
Medicaid	0.77	0.65	0.92
Survey year (referent: 4)			
1	0.76	0.69	0.85
2	1.15	1.01	1.31
3	1.02	0.87	1.18
Number of primary care office visits (referent: none)			
1 to 2	2.31	1.99	2.68
3 or more	3.33	2.85	3.90
Sex (referent: male)			
Female	1.07	0.98	1.17

ran models with and without this variable included to assess the extent to which visit frequency mediated the association between race/ethnicity and receipt of preventive services.

Covariates

We controlled for the following covariates in our analyses: age (categorized as 65 to 69, 70 to 74, 75 to 79, 80 to 84, and with 85 and older as the reference group), education (less than high school graduation versus at least high school graduation), annual income (less than $25,000 versus $25,000 or more), metropolitan residence (versus not), whether the respondent lived alone (versus not), availability of supplemental insurance (private insurance, Medicaid supplemental, versus none), proxy response to the survey (versus self-response), functional status using the Activities of Daily Living scale (a 3-point impairment scale),[23] and respondents' estimates of their general health compared with others of their age (5-point scale). Such relative self-ratings of health status have been shown to predict mortality.[24,25]

Statistical Analyses

To accommodate the complex survey design of the MCBS, including the multiple years of enrollment in the survey and clustered sampling, SAS SUR-

Table 4. Factors Associated with Receipt of Influenza Vaccination

Patient Characteristic	Odds Ratio	Lower 95% Confidence Interval	Upper 95% Confidence Interval
Race or ethnicity (referent: non-Hispanic white)			
Minority	0.56	0.49	0.64
Age (referent: ≥85 years)			
65 to 69	0.69	0.58	0.82
70 to 74	0.93	0.82	1.07
75 to 79	1.07	0.94	1.21
80 to 84	1.11	0.97	1.26
Educational attainment (referent: at least high school)			
Less than high school	0.93	0.85	1.02
Residence (referent: nonmetropolitan residence)			
Metropolitan area	0.88	0.76	1.02
Income (referent: >$25,000)			
≤$25,000	0.81	0.73	0.90
Functional health (3-point scale)			
1 point decrease	0.96	0.91	1.02
Self-rated health (5-point scale)			
1 point decrease	1.00	0.96	1.05
Living situation (referent: married or cohabitating)			
Lives alone	1.11	1.02	1.21
Respondent (referent: participant)			
Proxy	0.90	0.76	1.07
Supplemental insurance (referent: private)			
None	0.58	0.51	0.67
Medicaid	0.78	0.65	0.94
Survey year (referent: 4)			
1	0.13	0.11	0.15
2	1.04	0.93	1.17
3	1.09	0.97	1.22
Number of primary care office visits (referent: none)			
1 to 2	1.92	1.68	2.19
3 or more	2.96	2.61	3.35
Sex (referent: male)			
Female	1.05	0.95	1.15

VEY procedures were used (SAS Institute, Cary, NC; Version 9.1). Survey weights were used to adjust for oversampling and nonresponse to yield population parameter estimates. Data were analyzed with logistic regression to assess the adjusted relationship between minority status and receipt of a preventive service.

Results

Table 1 summarizes the characteristics of the sample based on minority status. In general, minority participants had lower income, less education, poorer health and functional status, fewer visits, and were less likely to receive preventive services than non-Hispanic whites.

The multivariate analyses are shown in Table 2. The first row presents results that adjust for age and control for sampling design and national weights. In each instance, minority patients had lower rates of preventive services in the past 12 months than non-Hispanic whites.

The second row in Table 2 adds to the model control for primary care visit frequency. Although adjustment for the number of primary

Table 5. Factors Associated with Receipt of Lipid Screening

Patient Characteristic	Odds Ratio	Lower 95% Confidence Interval	Upper 95% Confidence Interval
Race or ethnicity (referent: non-Hispanic white)			
Minority	0.95	0.84	1.08
Age (referent: ≥85 years)			
65 to 69	1.71	1.51	1.95
70 to 74	1.87	1.65	2.12
75 to 79	1.68	1.50	1.89
80 to 84	1.42	1.26	1.60
Educational attainment (referent: at least high school)			
Less than high school	0.91	0.83	0.99
Residence (referent: nonmetropolitan residence)			
Metropolitan area	1.17	1.00	1.36
Income (referent: >$25,000)			
≤$25,000	0.85	0.78	0.92
Functional health (3-point scale)			
1 point decrease	0.91	0.87	0.94
Self-rated health (5-point scale)			
1 point decrease	1.06	1.02	1.10
Living situation (referent: married or cohabitating)			
Lives alone	1.15	1.06	1.25
Respondent (referent: participant)			
Proxy	0.64	0.56	0.73
Supplemental insurance (referent: private)			
None	0.67	0.61	0.74
Medicaid	1.06	0.93	1.21
Survey year (referent: 4)			
1	0.79	0.71	0.88
2	1.05	0.93	1.18
3	1.06	0.94	1.19
Number of primary care office visits (referent: none)			
1 to 2	2.56	2.29	2.85
At least 3	4.29	3.84	4.79
Sex (referent: male)			
Female	1.04	0.96	1.13

care visits resulted in a slight and consistent increase in the odds of a minority patient receiving a clinical preventive service, the increase was not statistically significant. Notably, racial and ethnic disparities for each of the preventive service remained statistically significant.

The third row of Table 2 adds control for the effects of low educational attainment to the model. The association of minority race/ethnicity with lipid screening was no longer statistically significant. The final row adds control for the remaining covariates including low income, resulting in further attenuation of effects of minority race/ethnicity. The association remained statistically significant for only colorectal cancer screening and influenza vaccination (Tables 3 and 4). In each of these models containing all the covariates, frequency of primary care visits was strongly associated with receipt of preventive services (Tables 3–7). The odds ratio for 3 or more primary care visits ranged from 2.95 for mammogram to 6.90 for Papanicolaou smear.

Discussion

Consistent with previous studies,[1–9] we found significant age-adjusted racial and ethnic disparities for receipt of preventive services in the past 12 months in this national sample of elderly patients. Despite poorer self-rated and functional

Table 6. Factors Associated with Receipt of Mammography Screening

Patient Characteristic	Odds Ratio	Lower 95% Confidence Interval	Upper 95% Confidence Interval
Race or ethnicity (referent: non-Hispanic white)			
Minority	0.90	0.77	1.05
Age (referent: ≥85 years)			
65 to 69	3.40	2.74	4.21
70 to 74	3.06	2.53	3.71
75 to 79	2.68	2.20	3.26
80 to 84	2.27	1.86	2.79
Educational attainment (referent: at least high school)			
Less than high school	0.78	0.70	0.88
Residence (referent: nonmetropolitan residence)			
Metropolitan area	0.96	0.80	1.15
Income (referent: >$25,000)			
≤$25,000	0.74	0.65	0.84
Functional health (3-point scale)			
1 point decrease	0.86	0.82	0.91
Self-rated health (5-point scale)			
1 point decrease	0.92	0.88	0.97
Living situation (referent: married or cohabitating)			
Lives alone	0.99	0.89	1.10
Respondent (referent: participant)			
Proxy	0.55	0.42	0.71
Supplemental insurance (referent: private)			
None	0.51	0.41	0.62
Medicaid	0.75	0.62	0.90
Survey year (referent: 4)			
1	0.52	0.45	0.60
2	0.89	0.76	1.05
3	0.96	0.81	1.16
Number of primary care office visits (referent: none)			
1 to 2	2.41	1.99	2.91
At least 3	2.95	2.46	3.54

health, minorities were significantly less likely to have made 2 to 3 primary care visits and more likely to have had no primary care visits during the year. However, when we assessed the impact of these disparities in primary care on disparities in preventive care, we found that primary care visit frequency only slightly attenuated these disparities.

Controlling for differences in low educational attainment resulted in further attenuation of minority effects. These findings are consistent with previous studies suggesting that disparities in education (and the closely related construct, health literacy) contribute to racial and ethnic disparities in preventive care.[8,26–31] Controlling for other factors likely to affect care including low income, supplementary insurance, and health status eliminated the association between minority status and receipt of preventive services except for colorectal cancer screening and influenza vaccination. These findings are consistent with previous studies showing that minorities are less likely to receive colorectal cancer screening and influenza vaccination, even after controlling for various access barriers.[4,5,32] The causes of these residual disparities may include unmeasured factors such as attitudes toward particular procedures, costs not fully covered by insurance, language, and health literacy.[33–35]

Our findings suggest that although frequency of primary care visits are in general strongly

Table 7. Factors Associated with Receipt of Papanicolaou Screening

Patient Characteristic	Odds Ratio	Lower 95% Confidence Interval	Upper 95% Confidence Interval
Race or ethnicity (referent: non-Hispanic white)			
Minority	0.94	0.76	1.17
Age (referent: ≥85 years)			
65 to 69	4.39	3.43	5.61
70 to 74	4.00	3.14	5.08
75 to 79	2.90	2.23	3.77
80 to 84	2.03	1.59	2.59
Educational attainment (referent: at least high school)			
Less than high school	0.76	0.66	0.88
Residence (referent: nonmetropolitan residence)			
Metropolitan area	1.14	0.96	1.35
Income (referent: >$25,000)			
≤$25,000	0.75	0.65	0.88
Functional health (3-point scale)			
1 point decrease	0.90	0.84	0.97
Self-rated health (5-point scale)			
1 point decrease	0.85	0.79	0.91
Living situation (referent: married or cohabitating)			
Lives alone	1.19	1.02	1.38
Respondent (referent: participant)			
Proxy	0.83	0.57	1.20
Supplemental insurance (referent: private)			
None	0.78	0.62	0.98
Medicaid	0.69	0.53	0.89
Survey year (referent: 4)			
1	0.84	0.72	0.99
2	1.01	0.85	1.21
3	1.06	0.88	1.29
Number of primary care office visits (referent: none)			
1 to 2	4.55	3.53	5.87
At least 3	6.90	5.33	8.93

linked to receipt of preventive services, they seem to contribute relatively little to racial and ethnic disparities in receipt of these services. Instead, socioeconomic characteristics associated with poverty such as low educational attainment and low income, in addition to availability of supplemental insurance and health status, explain much of these disparities and also contribute to fewer visits. It is quite possible that 15-minute office visits[36] do not provide sufficient time for primary care physicians to address many of these interrelated barriers to care.[37] Longer office visits are probably required when working with impoverished patients to confirm patient understanding[38] and also to problem solve around how to best address financial barriers to adherence.[39]

Practice- and population-based interventions may help address racial and ethnic disparities in preventive services. Use of patient registries, combined with the ability to target patients overdue for a preventive service (regardless of whether they have a scheduled visit), improve uptake of preventive care.[40,41] This strategy has been effective in promoting childhood immunizations and improving rates of cancer screenings in minority populations.[42,43] Such recall systems typically require establishment of an electronic patient tracking registry in addition to personnel who can contract patients by mail or phone.[44] Additional targeted and tailored interventions may be needed to address other mediators of disparities including financial barriers, health lit-

eracy, and cultural beliefs and attitudes among others. Newer reimbursement models are needed that take into account the increased costs of caring for poor patients,[45] to avoid the unintended consequences of pay-for-performance.[46]

These findings are subject to several limitations. First, the sample was confined to community-dwelling, Medicare beneficiaries aged 65 and older and those not enrolled in managed care. Thus, the extent to which these findings generalize to other groups cannot be assessed. Second, we used a broad definition of preventive services because these data do not allow us to clearly distinguish between screening or diagnostic tests.[22] However, studies that have attempted to tease apart screening and diagnostic procedures also show disparities in screening.[5] We only examined visits to primary care physicians to include in our primary analyses. We did analyze our data using all physician visits (not just primary care visits), and the results were not appreciably different from the results described above. Third, we grouped visit frequency into 3 categories, potentially masking differences within these categories. In many cases, at least one visit with at least one visit with a primary physician would be required to receive the particular preventive service, so we included a category for no visits. We also conducted analyses using greater numbers of categories for visits (0, 1 to 2, 3 to 5, 6 or more, 0, 1 to 4, 5 to 9, 10 or more) in addition to using continuous measures. Results remained consistent with those presented above. Last, we could not determine, based on these data, whether any patient clearly satisfied the US Preventive Services Task Force screening recommendations because results from prior screening were not available. For example, Papanicolaou smear screening is not recommended past 65 years among women who have had adequate screening, normal Papanicolaou smears, and are not otherwise at high risk. But, we had no way of ascertaining this from these data. Similarly, we lacked 10 years of data for colonoscopy screening and results for colonoscopy. For these reasons, we assumed that receipt of the procedure in the last 12 months represented a proxy for preventive services screening regardless of the recommended interval. Finally, because African American patients have higher rates of colonic polyps[47] and cervical disease,[48] our methods may have tended to underestimate the actual extent of disparities in receipt of screening.

In conclusion, this study shows that among elderly patients, fewer primary care visits by minorities are only one of many factors contributing to racial and ethnic disparities in preventive services. Thus, multipronged interventions will probably be required to address these disparities.

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