

Racial Disparities in Receipt of Secondary Stroke Prevention Agents Among US Nursing Home Residents

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Background and Purpose—Although medications can significantly reduce the risk of recurrent stroke, little is known about the extent to which such therapies are given to nursing home residents. We sought to evaluate the extent to which people of color were less likely to receive pharmacological agents in the treatment of recurrent stroke while living in US nursing homes.

Methods—We identified 19 051 residents with a recent hospitalization and primary discharge diagnosis of 434 or 436 in 5 states from 1992 to 1996; of these, 7053 had concomitant conditions indicating anticoagulant therapy. We considered aspirin, dipyridamole, ticlopidine, or warfarin alone or in combination as secondary drug prevention. Generalized linear models provided estimates of the absolute difference in prevalence estimates of the receipt of agents used for the prevention of recurrent stroke between each race-ethnicity group adjusted for potential confounders.

Results—Variability in use of any treatment was observed by race-ethnicity ranging from 58% of American Indians receiving therapy to only 39% of Asian/Pacific Islanders. Among residents with an indication for anticoagulant therapy, the absolute estimated crude differences indicated that residents of color were less likely than non-Hispanic whites to receive warfarin. After controlling for confounding, Asian/Pacific Islanders, blacks, and Hispanics eligible for anticoagulant therapy received warfarin less often than non-Hispanic white residents.

Conclusions—Overall, only half of our elderly population received any pharmacological agent for secondary prevention of stroke. Interventions designed to improve the pharmacological management of recurrent stroke regardless of race are needed in the nursing home setting. (*Stroke*. 2003;34:2693-2697.)

Key Words: anticoagulants ■ antiplatelet agents ■ cerebrovascular accident ■ ethnology ■ nursing homes

Recurrent stroke is a major cause of morbidity and mortality among stroke survivors; the proportion of recurrent strokes ranges from 16% to 42% over a 5-year period.¹ Randomized controlled trials and meta-analyses have demonstrated the efficacy of both anticoagulants² and antiplatelet agents³ in preventing recurrent stroke. Despite the increased rates of stroke in African Americans,⁴ they are consistently underrepresented in clinical trials that evaluate the efficacy of treatments for secondary prevention of stroke. Although the extent to which the efficacy of treatments differs by race-ethnicity is unknown,⁵ there is no reason to believe that these agents would be more or less efficacious in minority populations.⁶ Nevertheless, 1 study suggested that blacks were less likely than whites to receive pharmacological treatment of stroke.⁷

Because stroke survivors often require nursing home placement in the months or years after stroke,⁸ we evaluated the extent to which people of color were less likely to receive pharmacological agents in the treatment of stroke while living in US nursing homes.

Materials and Methods

The Systematic Assessment of Geriatric Drug Use Via Epidemiology (SAGE) database^{9,10} provided data for this analysis. SAGE is an integrated database that includes information obtained through the Center for Medicare and Medicaid Services Case-Mix Reimbursement and Quality Demonstration Project. Nursing home staff at all Medicare/Medicaid-certified nursing homes in Kansas, Maine, Mississippi, Ohio, New York, and South Dakota evaluated residents using the federally mandated minimum data set (MDS). The MDS includes sociodemographic information, clinical items (including physical and cognitive function), clinical diagnoses, and a comprehensive set of symptoms, syndromes, and treatments being provided.^{11,12} Summary scales have been derived to determine performance for physical function (activities of daily living [ADLs])¹³ and cognitive ability (cognitive performance scale).^{14,15}

Study Sample

We identified the admission assessment for 488 863 nursing home residents. We selected 415 173 residents with reliable MDS and drug data; 371 790 residents were at least 65 years of age. We included residents who lived in facilities that systematically recorded drug data (n=337 362), excluding those with missing information on race-ethnicity (n=7097), sex (n=246), measures of physical function (n=3938) and cognitive function (n=1300), and insurance

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coverage (n=1555). Among these, 60 160 residents (18.6%) had a diagnosis of stroke on the MDS. The MDS stroke diagnosis is based on a physician's interpretation of the resident's medical history as presented by physical examination, medical records, and hospital discharge documentation if available. Because the MDS diagnosis of stroke does not differentiate between hemorrhagic and ischemic stroke, we selected residents (n=19 051) with a recent hospitalization (6 months) for ischemic stroke (*International Classification of Diseases*, ninth revision [ICD-9], codes 434 and 436).¹⁶⁻¹⁸

Race-ethnicity was defined as a social category that reflects the lifelong experience of being members of a socially assigned group that experiences economic (eg, lower income without health care benefits) and noneconomic (eg, providers withholding medical procedures) forms of discrimination by the majority group (non-Hispanic white Americans). Facility staff¹¹ assigned 1 of the following categories to each resident on the basis of the resident's self-identity: American Indian/Alaskan Native; Asian/Pacific Islander; black, not of Hispanic origin; Hispanic; and white, not of Hispanic origin. The manual states, "Consult resident as necessary. Enter the race/ethnic category within which the resident places self."¹¹ Thus, this variable is intended to reflect self-identity rather than staff perception.

Medication Data

Nursing staff recorded up to 18 medications taken by residents during the 7 days preceding the assessment. Medication data included brand or generic name, dosage, route, frequency of administration, and standing or as-needed order.^{11,12} We considered agents used for the prevention of stroke to be standing orders for aspirin, dipyridamole, ticlopidine, or warfarin. At the time of data collection, these agents were considered appropriate secondary prevention of stroke treatment in the elderly population.

Analytic Approach

On the basis of similar results of analyses stratified by state and sex, we pooled the data. We compared functional and clinical characteristics by race-ethnicity after age adjustment using the direct method. We estimated the crude prevalence difference of secondary stroke prevention agents using non-Hispanic white residents as the reference. Generalized linear models (using a binary distribution and identity link) provided adjusted prevalence estimates. In addition to age, cognitive function, and physical function, we considered the following risk factors for ischemic stroke as potential confounders: presence of atrial fibrillation, cardiac valve replacement, pulmonary embolism, hypertension, congestive heart failure, myocardial infarction, venous thrombosis, transient ischemic attacks, diabetes mellitus, gastrointestinal bleeds, peptic ulcer disease, dementia, Alzheimer's disease, and depression. Physical function was measured by a 5-item, 6-level scale based on dependency (dressing, eating, toileting, bathing, locomotion, transferring, and incontinence), with limitations defined as mild (0 to 1 activities impaired), moderate (2 to 3 activities impaired), or severe (4 to 5 activities impaired). The cognitive performance scale¹⁴ provided a measure of cognitive impairment and was categorized as mild (0 to 1), moderate (2 to 3), or severe (4 to 6) impairment corresponding to the Mini Mental State Examination values of 23 to 24, 12 to 17, and 1 to 6, respectively.¹⁹ Presence of comorbid conditions was determined on the basis of MDS items (when available) and inpatient claims data. Inpatient claims data were used to define history of peptic ulcer disease (ICD-9 codes 531 to 534), gastrointestinal bleeds (ICD-9 codes 578 and 569.3), transient ischemic attacks (ICD-9 code 435), atrial fibrillation (ICD-9 code 427.3), venous thrombosis (ICD-9 code 453), pulmonary embolism (ICD-9 code 415.1), cardiac valve replacement (ICD-9 code V42.2 or V43.3), and myocardial infarction (ICD-9 code 410). We retained variables whose inclusion in the model resulted in >10% change in the coefficients for race-ethnicity. We estimated the prevalence difference from a full model including all potential confounders and removed variables from the full model to improve precision around the estimate of the prevalence difference while not sacrificing the control of confounding.

Results

Indicators of health status and functional parameters reveal an extremely frail population (Table 1). Most were at least 75 years of age. Most (range, 87% to 92%) were admitted from an acute care hospital. At least 93% displayed moderate to severe impairment in performing ADLs. Non-Hispanic black, Asian/Pacific Islander, and Hispanic residents were more likely to be dependent in ADLs and have severe cognitive impairment relative to non-Hispanic white residents, with absolute differences ranging from 17% to 28% for ADLs and 12% to 13% for the cognitive performance scale.

The most common comorbid condition was hypertension, ranging from 58% to 74%, depending on race-ethnic group. Non-Hispanic blacks, Asian/Pacific Islanders, and Hispanics were more likely to have hypertension than non-Hispanic white residents but less likely to have atrial fibrillation, transient ischemic attacks, or depression. Diabetes mellitus was also a more common condition among other race-ethnic groups compared with non-Hispanic white residents. Table 2 shows the variation in prevalence estimates in the use of secondary prevention stroke agents (aspirin, warfarin, ticlopidine, or dipyridamole) by race-ethnicity. We found that 42% to 61% of residents did not receive any treatment for recurrent stroke prevention. Most residents (68% to 77%) did not receive aspirin. Although American Indians were more likely than non-Hispanic whites to receive any treatment, other residents of color were less likely to receive such treatments. Most of the observed differences in treatment patterns were attenuated with adjustment for confounders. Asian/Pacific Islanders received less of any secondary prevention agent (prevalence difference [PD], -9.2; 95% confidence interval [CI], -17.8 to -1.4) and American-Indians received more of any preventive agent (PD, 5.8; 95% CI, 0.6 to 11.0) compared with non-Hispanic whites.

Table 3 reveals secondary stroke prevention treatments among residents with a primary discharge diagnosis of ischemic stroke (ICD-9 code 434 or 436) and a history of at least 1 of the following: atrial fibrillation, pulmonary embolism, myocardial infarction, venous thrombosis, or cardiac valve replacement. Most residents (60% to 75%) who were eligible for anticoagulant therapy did not receive warfarin, with variability across categories of race-ethnicity. The absolute estimated crude differences indicate that residents of color were less likely than non-Hispanic whites to receive warfarin. After control of confounding, Asian/Pacific Islanders, non-Hispanic blacks, and Hispanics eligible for anticoagulant therapy received warfarin less often than non-Hispanic white residents. Because of the reduced sample size on which these analyses were based, the CIs around the estimates were wide.

Discussion

Overall, only half of our elderly population who had had an ischemic stroke within the past 6 months received any secondary prevention agent for recurrent stroke. Of those residents eligible for anticoagulant therapy for secondary stroke prevention, only 25% to 40% received warfarin. No systematic widespread trends in receipt of any secondary stroke prevention agents were observed by race-ethnicity among US nursing home residents,

TABLE 1. Age-Standardized* Comparison of Nursing Home Residents With Stroke Stratified by Race-Ethnicity

	American Indians (n=336), %	Asian/Pacific Islanders (n=131), %	Non-Hispanic Blacks (n=2246), %	Hispanics (n=224), %	Non-Hispanic Whites (n=16 114), %
Age category, y					
65–74	22.6	27.5	36.6	31.7	18.8
75–84	47.3	47.3	40.9	43.3	46.9
≥85	30.1	25.2	22.6	25.0	34.3
Admitted from hospital	90.8	91.2	91.0	91.9	86.8
Physical function					
Moderate impairment	41.9	27.5	31.1	20.2	45.9
Dependent	55.2	65.9	66.1	77.0	49.1
Cognitive impairment					
Moderate	50.7	55.6	44.2	51.3	48.6
Severe	17.5	29.2	30.3	30.3	17.7
Cardiovascular diseases					
Atrial fibrillation	32.0	26.5	21.8	26.1	32.0
Cardiac valve replacement	1.4	0.0	0.3	0.5	1.3
Pulmonary embolism	2.4	1.5	1.4	1.1	1.1
Hypertension	61.4	73.6	70.0	65.2	58.0
Heart failure	18.6	16.1	16.4	18.5	11.0
Myocardial infarction	7.5	1.5	5.7	6.6	6.5
Venous thrombosis	2.1	0.0	3.4	1.2	2.8
Transient ischemic attacks	9.4	7.5	6.8	7.3	8.4
Other conditions					
Diabetes mellitus	30.5	35.0	32.5	36.2	26.5
Gastrointestinal bleeds	7.0	11.9	6.3	6.6	4.8
Peptic ulcer disease	3.9	10.0	5.3	5.0	6.0
Dementia	20.3	15.9	22.1	27.2	17.4
Alzheimer's disease	1.5	2.5	2.9	2.2	2.9
Depression	8.7	8.5	7.0	8.3	15.1

*Adjusted by use of the direct method of age standardization and the pooled age distribution as the standard.

although warfarin use among residents eligible for anticoagulant therapy was reduced in residents of color.

The primary concern then is why so few residents receive secondary prevention agents for stroke in the nursing home setting. Many physicians are concerned about prescribing warfarin, despite the potential for increased monitoring and availability of medical services within nursing homes. This is reflected in part by the low rates of warfarin use, regardless of race-ethnicity, observed in the present study and others.^{7,20,21} Use of warfarin requires frequent laboratory monitoring to assess efficacy and safety, including testing the international normalized ratios.^{22,23} International normalized ratios <2.0 are often seen, indicating that prescribers may be less aggressively treating with warfarin to avoid adverse events.²² Indeed, only one half of nursing home residents on warfarin received the optimal dosage.²³ Also, lack of use of warfarin (appropriate treatment) may result in untoward effects.²⁴ Interventions to decrease deficiencies in warfarin management in nursing homes are needed. Pharmacist-run anticoagulant clinics have proved to be beneficial in outpatient settings.^{25,26} An ongoing study funded by the Agency for Healthcare Research and Quality (AHRQ)

aims to evaluate the process of anticoagulation management in nursing homes and to develop a best-practices model of care to improve patient safety related to anticoagulation therapy.²⁷

Antiplatelet use is recommended for all patients who have experienced a noncardioembolic stroke or transient ischemic attack,²⁸ and this recommendation is made without regard to race-ethnicity. Ongoing trials targeting minority groups such as the African-American Antiplatelet Stroke Prevention Study (AASSPS) are accruing important data on secondary stroke prevention. Nevertheless, the evidence on which these guidelines were based was derived from studies that little resemble the typical nursing home resident. For example, the overall incidence of (drug-independent) peptic ulcer bleeds is 5 to 6 times greater in the institutionalized population than in the community, regardless of age and sex.²⁹ Although aspirin use has not been associated with an increased rate of gastrointestinal hospitalizations among nursing home residents surviving stroke,³⁰ we previously reported a 36% excess risk of central nervous system bleeds among aspirin users surviving a stroke.³⁰ However, these risks may not exceed the expected benefits of aspirin treatment among stroke survivors. In a study quantifying the effect of

TABLE 2. Use of Secondary Prevention Stroke Agents Among Nursing Home Residents Who Experienced a Recent (6 Months) Ischemic Stroke Stratified by Race-Ethnicity (n=19 051)

	American Indians (n=336)	Asian/Pacific Islanders (n=131)	Non-Hispanic Blacks (n=2246)	Hispanics (n=224)	Non-Hispanic Whites (n=16 114)
Any treatment,* %	58.0	38.9	49.4	45.5	54.3
Aspirin, %	32.4	22.9	29.3	28.1	26.6
Warfarin, %	20.2	9.9	14.7	12.5	22.1
Ticlopidine, %	6.9	6.1	8.6	5.4	8.9
Dipyridamole, %	0	0	0.4	0.9	0.4
Prevalence difference (95% CI)					
Crude, any treatment	3.8 (-1.6 to 9.1)	-15.3 (-23.7 to -7.0)	-4.8 (-7.1 to -2.6)	-8.7 (-15.3 to -2.2)	Referent
Adjusted,† any treatment	5.8 (0.6 to 11.0)	-9.6 (-17.8 to -1.4)	-1.8 (-4.0 to 0.5)	-2.1 (-8.6 to 4.4)	Referent

n=19 051.

*Aspirin, warfarin, ticlopidine, or dipyridamole (all standing orders).

†Model includes terms for state, age, sex, physical and cognitive function, atrial fibrillation, hypertension, diabetes mellitus, depression, dementia, and Alzheimer's disease.

antiplatelet use on all-cause mortality in a population of stroke survivors living in nursing homes, aspirin users died at a rate 12% less than the rate of residents not treated with any secondary prevention agent.²⁴ Given these benefits, the estimated number needed to treat to harm was 467 for 6 months of aspirin use, making the absolute risk of bleeding associated with aspirin treatment low.³⁰ Therefore, the low estimates of aspirin use in the present study are concerning.

Our data are from a cross-sectional study, so it is unclear whether the treatment patterns observed reflect differential survival by race-ethnicity. Our data are limited to a snapshot on admission to the nursing facility. We are unable to evaluate whether the observed differences capture treatment patterns in the nursing home or are simply a reflection of prescribing within

the community or hospital settings from which the residents came. The MDS data also have some limitations. MDS data do not collect useful information regarding socioeconomic factors. As a result, we were unable to explore the role of economic deprivation in explaining racial differences. In addition, the diagnosis of stroke used in MDS does not differentiate between ischemic and hemorrhagic stroke. This is important because the prevalence of hemorrhagic stroke varies by race, where secondary prevention and treatment of hemorrhagic versus ischemic stroke are profoundly different.³¹ To resolve this issue, we identified a subsample of stroke residents from MDS who had a recent hospitalization (previous 6 months) for ischemic stroke. All analyses in this study are based on an ischemic stroke definition of primary discharge ICD-9 codes 434 and 436.¹⁶⁻¹⁸

TABLE 3. Use of Secondary Prevention Stroke Agents Among Nursing Home Residents Who Experienced a Recent (6 Months) Ischemic Stroke With Conditions Warranting the Use of Warfarin* Stratified by Race-Ethnicity (n=7053)

	American Indians (n=132)	Asian/Pacific Islanders (n=35)	Non-Hispanic Blacks (n=628)	Hispanics (n=67)	Non-Hispanic Whites (n=6191)
Any treatment,† %	62.9	42.9	55.9	47.8	60.5
Aspirin, %	25.8	14.3	23.4	19.4	19.4
Warfarin, %	36.4	25.7	31.7	25.4	39.6
Ticlopidine, %	3.0	2.9	4.9	4.5	5.6
Dipyridamole, %	0	0	0.2	1.5	0.5
Prevalence difference (95% CI)					
Crude, warfarin	-3.2 (-11.5 to 5.1)	-13.9 (-28.4 to 0.7)	-7.9 (-11.7 to -4.1)	-14.2 (-24.7 to -3.7)	Referent
Adjusted,‡ warfarin	-0.8 (-8.9 to 7.3)	-5.2 (-18.1 to 7.8)	-7.6 (-11.2 to -3.9)	-7.6 (-17.6 to 2.2)	Referent

n=7053.

*Atrial fibrillation, pulmonary embolism, myocardial infarction, venous thrombosis, or cardiac valve replacement.

†Aspirin, warfarin, ticlopidine, or dipyridamole (all standing orders).

‡Model includes terms for state, age, sex, physical and cognitive function, atrial fibrillation, hypertension, diabetes mellitus, depression, dementia, and Alzheimer's disease.

We observed racial differences in the use of warfarin among the subset of residents for which warfarin therapy is preferential. Blacks are less likely to receive noninvasive cerebrovascular testing compared with whites, which may be due to differential access to neurologists.³² The use of anticoagulation therapy varies by physician specialty.²¹ Unfortunately, we had no information regarding specialty of the prescribers and therefore were unable to evaluate the extent to which prescriber characteristics explained our findings. Nonclinical factors have been shown to influence the use of stroke prevention therapy.²¹ Significant geographic variation in the use of warfarin has been noted,²¹ with warfarin used least in the South. Yet, we adjusted for location of the nursing home in our analyses. It may well be, however, that people of color are more likely to be admitted to facilities with the least resources to carefully prescribe and monitor warfarin use. Evaluating the extent to which facility-level phenomena explained these differences was beyond the scope of this article. Finally, evaluating the extent to which racial discrimination explained the observed differences by race-ethnicity is beyond the capabilities of the data we had available for this study.

Despite the lack of widespread systematic racial differences in any treatment for ischemic stroke and the trend toward reduced use of warfarin in residents of color among people for whom anticoagulant therapy is warranted, interventions designed to improve and increase the pharmacological management of recurrent stroke are needed in the nursing home setting.

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