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Care Seeking after Stroke Symptoms

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Abstract

Objective—To assess risk factors associated with seeking care for stroke symptoms.

Methods—Using data from the population-based national cohort study (REasons for Geographic And Racial Differences in Stroke) conducted January 25, 2003–February 28, 2007 (N = 23,664), we assessed care-seeking behavior among 3,668 participants who reported a physician diagnosis of stroke/transient ischemic attack (n = 647) or stroke symptoms (n = 3,021) during follow-up. Care seeking was defined as seeking medical attention after stroke symptoms or a physician diagnosis.

Results—Overall, 58.5% of participants (2,146/3,668) sought medical care. In multivariable models, higher income was associated with greater likelihood of seeking care ($p = 0.02$): participants with income of \$75,000 had odds 1.43 times (95% confidence interval [CI], 1.02–2.02) greater than those with income of less than \$20,000. Diabetes and previous heart disease were associated with increased care seeking: odds ratio (OR) of 1.23 (95% CI, 1.04–1.47) and OR of 1.26 (95% CI, 1.06–1.49), respectively. Participants with previous stroke symptoms but no stroke history were less likely to seek care than those with stroke history or without previous symptoms (OR, 0.80; 95% CI, 0.67–0.96). Past smoking was associated with lower likelihood (OR, 0.71; 95% CI, 0.59–0.85; $p = 0.0003$) of seeking care relative to nonsmokers.

Interpretation—Only approximately half of participants with stroke symptoms sought care. This is despite the encouragement of advocacy groups to seek prompt attention for stroke symptoms. Our results highlight the importance of identifying characteristics associated with care-seeking behavior. Recognizing factors that contribute to delays provides opportunities to enhance education on the importance of seeking care for stroke symptoms.

Stroke is a preventable and treatable disease, and in the ideal world, as stated in a 1998 editorial, “every patient with acute ischemic stroke should present to a hospital stroke center immediately after the onset of symptoms.”¹ Unfortunately, many people do not seek medical attention for stroke symptoms, or if they do, they do not seek it in a timely manner. In a 1999 survey of 10,112 US residents, 231 reported a diagnosis of transient ischemic attack (TIA), and only 147 (64%) saw a physician within 24 hours of the diagnosis. An additional 323 (3.2%) respondents indicated they had not sought medical attention for TIA symptoms.²

The reasons for lack of seeking attention after stroke symptoms are not well understood, and the characteristics of those who fail to seek care remain poorly described. Evidence suggests that the lack of attention is partially attributed to low level of knowledge of symptoms of stroke.^{3–6} It is likely, however, that there are other barriers that affect a person’s response. Participants in the Asymptomatic Carotid Atherosclerosis Study received education on stroke symptoms and were urged to report symptoms to the Asymptomatic Carotid Atherosclerosis Study physician or nurse coordinator. Furthermore, that these individuals were participating in a clinical trial with an assigned study nurse likely provided a cohort of individuals “engaged” in their health status. Despite this, only about 40% of the participants with stroke or TIA reported their symptoms within 3 days of onset, and less than 25% reported their symptoms within 24 hours.⁷ A description of subpopulations not seeking care could provide the opportunity to target educational programs making these groups more aware of symptoms and the importance of urgent medical attention. This information could also provide the opportunity to design interventions to address some of the barriers to care seeking in those at greatest stroke risk.

Data collected in the REasons for Geographic And Racial Differences in Stroke (REGARDS) national cohort study provide an opportunity to describe the characteristics of those who do and do not seek medical attention for stroke symptoms. We hypothesized that participants with more stroke risk factors, including those with a previous physician diagnosis of stroke or TIA, would be more likely to seek medical attention for their symptoms. We also hypothesized that related to access to care, participants with lower socioeconomic status, residents in the southeastern stroke belt, and blacks would be less likely to seek medical care for their stroke symptoms.

Subjects and Methods

REGARDS is a national cohort of community-dwelling individuals older than 45 years, recruited with approximately equal representation of whites and blacks, men and women. For this report, participants enrolled from January 25, 2003, through February 28, 2007, were included. By design, the cohort was randomly selected to comprise 20% from the “buckle” of the stroke belt (coastal plain region of North Carolina, South Carolina, and Georgia), 30% from the stroke belt states (remainder of North Carolina, South Carolina, and Georgia plus Alabama, Mississippi, Tennessee, Arkansas, and Louisiana), and the remaining 50% from the other 40 contiguous states. Households from commercially available lists of US residents were sent an initial mailing to introduce the study, followed by telephone contact to recruit and enroll one participant randomly selected from eligible adults in that household. Using computer-assisted telephone interview, trained interviewers obtained demographic information, medical history, and indices of quality of life. Three to 4 weeks after the telephone interview, a brief physical examination including blood pressure measurements, blood samples, and an electrocardiogram was conducted in person, and signed informed consent was obtained. All involved institutional review boards approved the study methods. Additional methodological details are provided elsewhere.⁸

The study conducts active telephone surveillance at 6-month intervals to ascertain potential stroke events; medical records are retrieved and reviewed on all suspected events. If participants are unable to answer telephone questions for any reason, proxies or surrogates are contacted and the questions asked of them. All participants are asked whether, since the last time of contact, a physician had told them that they had had a stroke or TIA. Only participants who answered “no” were asked whether they had experienced the sudden onset of any of six stroke symptoms using the Questionnaire for Verifying Stroke-Free Status (Table 1).^{9–11} Thus, there are two mutually exclusive ways that a participant was considered as seeking care. First, the participant was considered as care seeking if he/she responded positively to a physician diagnosis of stroke or TIA, because he/she must have sought care to receive this diagnosis. Second, among participants who did not report a physician diagnosis of stroke but reported symptoms, those who reported seeing a physician for their symptoms were considered as care seeking. For the primary analysis, the proportion of individuals seeking care is defined as:

$$\frac{(\text{\#with Stroke/TIA Diagnosis by Physician}) + (\text{\#with symptoms but no diagnosis who sought care})}{(\text{\#with stroke/TIA Diagnosis by Physician}) + (\text{\#with symptoms but no diagnosis regardless of care seeking})}$$

The variables considered as potentially associated with care-seeking behavior are defined as follows. History of heart disease was defined as any self-reported myocardial infarction/heart attack, coronary artery bypass surgery, coronary angioplasty/stenting, or evidence of myocardial infarction from electrocardiogram. Hypertension was defined as systolic blood pressure of 140mm Hg or greater, diastolic blood pressure of 90mm Hg or greater, or self-reported use of antihypertensive medications. Diabetes was defined as a fasting glucose level greater than 126ml/dl, nonfasting glucose level greater than 200ml/dl, or self-reported medication use for glucose control. History of previous stroke symptoms was defined as answering “yes” to one or more symptoms in the Questionnaire for Verifying Stroke-Free Status battery. Age, race, sex, atrial fibrillation, education level, annual family income, health insurance, and history of stroke or TIA were defined by interview data. Urban/rural status of the participant was defined by residence from the percentage of the census tract residing inside of urban areas/clusters. This variable was categorized as rural if $\leq 25\%$ urban, mixed between 25% and 75% urban, and urban if $\geq 75\%$ urban.

Univariate differences in the proportion seeking medical care between strata were examined by a χ^2 test. The multivariable association of the potential correlates with care seeking was assessed using logistic regression, with differences between strata described by the odds ratio with 95% confidence limits. The multivariable analysis included all the covariates in the model. In a secondary analysis, a description of the likelihood of seeking care was assessed for each of the six individual stroke symptoms; participants who responded positively to physician diagnosis of stroke or TIA are not included in this analysis because the REGARDS interview did not ask symptoms of this subset of participants.

REGARDS data through February 28, 2007, were used in this analysis, at which time 26,633 participants were enrolled, having completed both the telephone survey and in-person component (recruitment is ongoing until 30,000 have been enrolled). Currently, the participation rate (percentage of telephone numbers with participants agreeing to be interviewed among known eligible participants contacted plus an adjustment for estimate of likely eligible participants among unknown eligible participants) is 44.7%.

Results

Table 2 (see second column) provides the demographics and stroke risk factors of the 3,668 participants who reported a physician diagnosis of stroke or TIA ($n = 647$), or stroke symptoms without a physician diagnosis of stroke or TIA ($n = 3,021$) during follow-up. The average (standard deviation) age of these participants was 68.4 (9.4) years, 53.5% were women, and 53.2% were black; education was distributed evenly across the four education levels (some high school, high-school graduate, some college, college graduate), and 93.4% had health insurance. The distribution of the stroke risk factors reflects that of the overall REGARDS cohort.

Table 3 shows care-seeking behavior overall and by type and number of symptoms of those reporting symptoms. Overall, 49.6% (1,499/3,021) of participants without a physician diagnosis of stroke or TIA sought medical care for symptoms, and 100% (647) of patients with a diagnosis of stroke or TIA, resulting in an overall proportion seeking care of 58.5% (2,146/3,668).

None of the demographic factors of age, race, sex, and urban-rural status were associated with the likelihood of seeking care in either univariate analysis (see Table 2; all $p > 0.05$) or the multivariable model (see Table 2; all $p > 0.36$), but region was marginally associated with likelihood of care seeking in the univariate model, with 56.0% of those in the Stroke Belt seeking care compared with 61.5.0% of those in the Stroke Buckle and 59.4% of those in the rest of the United States. Greater levels of socioeconomic status, whether indexed by income or education, were univariately associated with a greater likelihood of seeking care; however, only income persisted in the multivariable model. Regardless of the model considered, there was little difference in the likelihood of seeking care between participants with income less than \$20,000 compared with those with income between \$20,000 and \$34,999; however, in the multivariable analysis, for incomes of \$35,000 to \$74,999, the odds of seeking care was increased by approximately 30%, and for incomes greater than \$75,000, the odds of seeking care was increased by approximately 40% relative to the lower income group.

Univariately, the likelihood of seeking care was strongly associated with previous cerebrovascular diagnosis or stroke symptoms ($p = 0.0002$); those with only previous symptoms were less likely to seek care (53.7%) compared with those without symptoms or a previous physician diagnosis (60.0%) or those with a previous diagnosis of stroke or TIA (62.8%). Similarly, 62.3% of those with a history of heart disease sought care, whereas only 56.6% of those without such a history did so ($p = 0.0011$). Smoking was significantly ($p = 0.0011$) related to care-seeking behavior, with past smokers less likely to seek care (55.8%) than never or current smokers (59.7 and 61.9%, respectively). Participants with diabetes were more likely ($p = 0.0038$) to seek care (61.9%) than those without diabetes (56.7%). Each of these differences persisted in multivariable analyses (see Table 2). Hypertension was not associated with care-seeking behavior.

As shown in Table 3, the most commonly reported stroke symptom was sudden numbness (45.7%), and the least commonly reported stroke symptom was a sudden loss of half of vision (10.7%). The majority of participants (69.9%) reported a single symptom, whereas 22.5% reported two symptoms and 7.6% reported three or more symptoms. There was also an increase in the likelihood of seeking care with the number of symptoms where 46.4% of those experiencing a single symptom sought care compared with 58.0% of those experiencing two symptoms and 54.3% for those experiencing three or more symptoms.

In secondary analysis, we considered the likelihood of seeking care among those participants who reported having specific symptoms during follow-up, but without a physician diagnosis

of stroke or TIA. A high likelihood of seeking care was seen among those with either sudden loss of half of the visual field (64.8%), sudden loss of vision (62.2%), or painless weakness (59.2%) relative to seeking care after sudden loss of the ability to express oneself (35.1%) and sudden inability to understand what others were saying (38.0%). About half (50.1%) reported seeking care after sudden numbness.

Discussion

Approximately half of participants in a prospective study of stroke did not seek medical attention for symptoms commonly suggestive of stroke. There were no differences in care-seeking behavior by age, race, sex, region of the country, or urban versus rural residency; however, care seeking was more likely among participants with a higher socioeconomic status. This may be related to access to care issues or differential response to educational messages about stroke warning signs. For several risk factors (diabetes and previous heart disease), but not all (hypertension), participants were more likely to seek care for stroke symptoms. Those with a previous history of stroke were more likely to seek care, but participants who reported previous stroke symptoms but no history of stroke were significantly less likely to seek care. These participants who do not act on potential stroke symptoms represent an important subgroup that would benefit from educational campaigns that encourage prompt care-seeking behavior for symptoms. Interestingly, after multivariable adjustment, past smokers, who one would think would be more health conscious than current smokers, were found to be significantly less likely to seek care. The finding that participants with symptoms of loss of vision (either sudden loss of half of visual field or sudden loss of vision) and painless weakness were more likely to seek care was not surprising because these are some of the most pronounced and dramatic neurological deficits from stroke, and therefore shocking enough to prompt care-seeking. What is surprising is the lack of care-seeking behavior in participants with communication disturbances. With a few exceptions (ie, education), the similarity of the univariate and multivariable results emphasizes that factors predictive of care-seeking behavior are generally “independent” predictors of care seeking, suggesting that the univariate results are not a result of confounding with other factors.

The reasons for and risk factors associated with lack of care-seeking attention for stroke symptoms are not well characterized, although much has been written on delay in responding to stroke symptoms, especially delay in calling 911 or presentation to a hospital or emergency department. Moser and colleagues¹² summarized the literature published between January 1981 and March 2000, and found the following: black or Latino race; low socioeconomic status; living alone or being alone at symptom onset; consulting with physician, family member, or nonrelative; perception of symptoms as nonserious; and self-treatment increased delay time in seeking treatment (median delay time from 3–6 hours). Prior stroke or TIA decreased delay time and many cognitive and emotional factors have not been studied. Recent studies conducted in other countries provide additional insight.^{13–15} An Australian study of interviews with 150 patients of 410 admitted with a diagnosis of stroke/TIA found male sex, arrival by ambulance, response of others (calling 911 or taking patient to the hospital), and patient recognition of seriousness of symptoms were independently associated with reduced delay time (6 hours or less).¹³ In a study from Japan, recognition of seriousness of symptoms (by patient or witness) and symptoms of consciousness disturbance were significantly associated with arrival time within 2 hours, whereas diabetes was significantly associated with delayed arrival time; presenting symptoms of motor disturbance and history of previous stroke were significantly associated with recognition as a potential stroke.¹⁴ Interviewing 209 of 518 ischemic stroke patients admitted to a university affiliated hospital in Israel, Mandelzweig and colleagues¹⁵ found that sudden onset of symptoms, perception that symptoms were severe, advice from others to seek care,

and contacting or being transported by an ambulance were significantly associated with decreased odds of delay from time of awareness to time of first contact with any medical personnel; the perception of control over symptoms was associated with increased delay time. The interpretation of these results is limited, though, because of significant nonparticipation bias.

Giles and coworkers,¹⁶ looking at a cohort of TIA patients, found that 44% (107/241) sought medical attention within hours of the event, but only a small number (24/107, 22%) went to the emergency department and another 44% delayed seeking care beyond 24 hours. Patients with symptoms that lasted at least an hour, those with motor symptoms, and encouragingly, those with greater predicted stroke risk were more likely to seek emergency attention.¹⁶

A difference between these studies and ours is that these study populations included only patients who were subsequently diagnosed with stroke or TIA. REGARDS is one of a few studies poised to look at a broad range of contributing factors to care-seeking behavior after stroke symptoms regardless of whether the participant is diagnosed with stroke. In addition, the availability of this large general population sample with significant representation of blacks across age, sex, and urban versus rural residence groups is a strength of the study. The structure of the REGARDS follow-up interview did not solicit symptoms for the subset of individuals reporting physician diagnosis of stroke or TIA. This is a limitation of this study and has been changed for future interviews. Another limitation is that we do not ask perception of severity of the symptoms; however, individuals with symptoms that may be less severe and of shorter duration (TIA) should be encouraged to seek care for symptoms.

Although certainly some of these symptoms do not represent stroke,¹⁷ some may be minor strokes or TIAs, and early recognition and treatment is critical to reducing the risk for a major stroke through risk-factor management and education on warning signs of stroke. Although the REGARDS study design does not provide for an intensive and repeated educational component on stroke symptoms, at the time of enrollment, participants are provided a brochure on stroke symptoms and the urgency of seeking medical attention (ie, “Know Stroke” brochure from the National Institute of Neurological Disorders and Stroke, National Institutes of Health). Newsletters are mailed to participants twice a year containing study updates, and public health messages related to stroke risk factors, stroke symptoms, and instruction to call 911. With frequent follow-up with stroke-related questions, the participants are reminded they are in a “stroke study,” and they may retain and be more receptive to stroke information. This may be a bias of our study in that participants may be more aware of the need to seek medical care for stroke symptoms than the general population, may be more knowledgeable than the general population, and thus we may be overestimating care-seeking behavior compared with the general population. Lack of knowledge has been suggested as a reason people do not seek medical care, but we do not have data on participants’ knowledge of stroke symptoms.

Another limitation of our study is potential participation bias. Those choosing to participate could be nonrepresentative of the general population. The REGARDS cohort was not designed to be representative of the US population because of oversampling of blacks, residents of the Stroke Belt, and an eligibility criterion of age 45 or older. The average age of the cohort is slightly older than 65. However, the prevalence of major cardiovascular risk factors is similar to prevalence estimates from other studies such as the National Health and Nutrition Examination Survey. Measures of health-related quality of life for physical and mental functioning were also as expected for a population of this age, with physical functioning slightly lower than the overall norm. If participants were unable to answer follow-up questions for any reason, proxies or surrogates were contacted and the questions

asked of them. There may be some participants with stroke who were missed because a proxy or surrogate was not available.

Previously, we showed a high prevalence of stroke symptoms in persons without a physician diagnosis of stroke and an association of these symptoms with the Framingham Stroke Risk Score.¹⁷ In this analysis, we have demonstrated that many people with stroke symptoms do not seek medical attention, and there are socioeconomic factors and stroke risk factors that contribute to this. The delay or lack of attention to stroke symptoms has been shown to be a major contributor to underutilization of acute stroke therapies.¹ It has been suggested that the delay between symptom recognition and the decision to seek care is the longest phase of delay in delivering acute treatment, and therefore is the area that should be targeted for improvement.¹² Our results suggest that despite the encouragement of advocacy groups such as the American Stroke Association and the National Stroke Association, only approximately half of people seeks medical care after stroke symptoms. Additional research assessing the specificity/sensitivity of stroke symptoms might provide guidance on which symptoms should be more urgently addressed. Our results highlight the importance of identifying characteristics associated with delayed care-seeking behavior. Recognizing factors that contribute to delays provides opportunities to enhance education messages on the importance of seeking care for stroke symptoms.

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References

1. Fontanarosa PB, Winker MA. Timely and appropriate treatment of acute stroke: what's missing from the picture? *JAMA*. 1998; 279:1307–1308. [PubMed: 9565014]
2. Johnston SC, Fayad PB, Gorelick PB, et al. Prevalence and knowledge of transient ischemic attack among US adults. *Neurology*. 2003; 60:1429–1434. [PubMed: 12743226]
3. Pancioli AM, Broderick J, Kothari R, et al. Public perception of stroke warning signs and knowledge of potential risk factors. *JAMA*. 1998; 279:1288–1292. [PubMed: 9565010]
4. Schneider AT, Pancioli AM, Khoury JC, et al. Trends in community knowledge of the warning signs and risk factors for stroke. *JAMA*. 2003; 289:343–346. [PubMed: 12525235]
5. Ferris A, Robertson RM, Fabunmi R, Mosca L. American Heart Association and American Stroke Association national survey of stroke risk awareness among women. *Circulation*. 2005; 111:1321–1326. [PubMed: 15769775]
6. Samsa GP, Cohen SJ, Goldstein LB, et al. Knowledge of risk among patients at increased risk for stroke. *Stroke*. 1997; 28:916–921. [PubMed: 9158625]
7. Castaldo JE, Nelson JJ, Reed III JF, et al. for the ACAS investigators. The delay in reporting symptoms of carotid artery stenosis in an at-risk population. The Asymptomatic Carotid

- Atherosclerosis Study Experience: a statement of concern regarding watchful waiting. *Arch Neurol*. 1997; 54:1267–1271. [PubMed: 9341573]
8. Howard VJ, Cushman M, Pulley L, et al. The REasons for Geographic And Racial Differences in Stroke (REGARDS) Study: objectives and design. *Neuroepidemiology*. 2005; 25:135–143. [PubMed: 15990444]
 9. Meschia JF, Brott TG, Chukwudelunzu FE, et al. Verifying the stroke-free phenotype by structured telephone interview. *Stroke*. 2000; 31:1076–1080. [PubMed: 10797168]
 10. Jones WJ, Williams LS, Meschia JF. Validating the questionnaire for verifying stroke-free status (QVSFS) by neurological history and examination. *Stroke*. 2001; 32:2232–2236. [PubMed: 11588306]
 11. Meschia JF, Lojcono MA, Miller MJ, et al. Reliability of the questionnaire for verifying stroke-free status. *Cerebrovasc Dis*. 2004; 17:218–223. [PubMed: 14707425]
 12. Moser DK, Kimble LP, Alberts MJ, et al. Reducing delays in seeking treatment by patients with acute coronary syndrome and stroke. A scientific statement from the American Heart Association Council on Cardiovascular Nursing and Stroke Council. *Circulation*. 2006; 114:175–189.
 13. Barr J, McKinley S, O'Brien E, Herkes G. Patient recognition of and response to symptoms of TIA or stroke. *Neuroepidemiology*. 2006; 26:168–175. [PubMed: 16493205]
 14. Iguchi Y, Wada K, Shibasaki K, et al. First impression at stroke onset plays an important role in early hospital arrival. *Intern Med*. 2006:447–451. [PubMed: 16679699]
 15. Mandelzweig L, Goldbourt U, Boyko V, Tanne D. Perceptual, social, and behavioral factors associated with delays in seeking medical care in patients with symptoms of acute stroke. *Stroke*. 2006; 37:1248–1253. [PubMed: 16556885]
 16. Giles MF, Flossman E, Rothwell PM. Patient behavior immediately after transient ischemic attack according to clinical characteristics, perception of the event, and predicted risk of stroke. *Stroke*. 2006; 37:1254–1260. [PubMed: 16574923]
 17. Howard VJ, McClure LA, Meschia JF, et al. High prevalence of stroke symptoms among persons without a diagnosis of stroke or transient ischemic attack in a general population: the REasons for Geographic and Racial Differences in Stroke (REGARDS) study. *Arch Intern Med*. 2006; 166:1952–1958. [PubMed: 17030827]

Table 1

Stroke Symptoms from the Questionnaire for Verifying Stroke-Free Status (as Used on Follow-up Questionnaire)

1	Since the last time we talked with you, have you had sudden painless weakness on one side of your body?
2	Since the last time we talked with you, have you had sudden numbness or a dead feeling on one side of your body?
3	Since the last time we talked with you, have you had sudden painless loss of vision in one or both eyes?
4	Since the last time we talked with you, have you suddenly lost one half of your vision?
5	Since the last time we talked with you, have you suddenly lost the ability to understand what people were saying?
6	Since the last time we talked with you, have you suddenly lost the ability to express yourself verbally or in writing?

Table 2

Characteristics of Participants Reporting Stroke Symptoms or Physician Diagnosis of Stroke or Transient Ischemic Attack ($n = 3,668$), and Univariate and Multivariable Analysis of Factors Associated with Care Seeking

Predictors of Care-Seeking Behavior	Number Self-Reporting	Univariate Analysis		Multivariable Analysis			
		Proportion Seeking Care	p	Odds Ratio	95% Confidence Limits		
Demographic factors							
Age, yr	45–54	227 (6.2%)	55.1%	0.56	1.00	Reference	0.59
	55–64	1,161 (31.8%)	59.3%		1.26	0.89–1.78	
	65–74	1,313 (35.9%)	59.1%		1.24	0.87–1.76	
	75+	955 (26.1%)	57.4%		1.18	0.81–1.71	
Race	White	1,712 (46.8%)	59.4%	0.26	1.00	Reference	0.76
	Black	1,947 (53.2%)	57.6%		0.97	0.82–1.16	
Sex	Male	1,700 (46.5%)	58.9%	0.34	1.00	Reference	0.70
	Female	1,959 (53.5%)	58.0%		0.96	0.79–1.18	
Region	Rest of nation	1,734 (47.4%)	59.4%	0.055	1.00	Reference	0.36
	Stroke Belt	1,313 (35.9%)	56.0%		0.89	0.75–1.06	
	Stroke Buckle	608 (16.6%)	61.2%		0.99	0.79–1.25	
Urban-rural status	Urban	2,745 (75.0%)	57.9%	0.28	1.00	Reference	0.38
	Mixed	300 (8.2%)	62.7%		1.22	0.91–1.64	
	Rural	614 (16.8%)	58.6%		1.08	0.87–1.34	
Socioeconomic factors							
Income	<\$20,000	1,102 (34.9%)	56.7%	0.0003	1.00	Reference	0.020

Predictors of Care-Seeking Behavior	Number Self-Reporting	Univariate Analysis		Multivariable Analysis	
		Proportion Seeking Care	P	Odds Ratio	95% Confidence Limits
	\$20,000–\$34,000	1,006 (31.9%)	56.7%	0.96	0.79–1.17
	\$35,000–\$74,000	784 (24.8%)	64.0%	1.27	1.01–1.60
	\$75,000+	264 (8.4%)	66.7%	1.43	1.02–2.02
Education	Less than high school graduate	845 (23.1%)	56.2%	0.025	Reference
	High-school graduate	965 (26.4%)	57.0%	0.98	0.78–1.24
	Some college	979 (26.8%)	58.0%	1.04	0.82–1.31
	College graduate	865 (23.7%)	62.8%	1.17	0.90–1.51
Health insurance	No	242 (6.6%)	54.1%	0.16	Reference
	Yes	3,412 (93.4%)	58.8%	1.26	0.90–1.76
Concomitant disease factors					
Previous stroke/transient ischemic attack diagnosis or symptoms	Neither	1,673 (47.3%)	60.0%	0.0002	Reference
	Symptoms only	991 (28.0%)	53.7%	0.80	0.67–0.96
	Self-reported diagnosis	871 (24.6%)	62.8%	1.12	0.92–1.37
Previous heart disease ^a	No	2,413 (67.7%)	56.6%	0.0011	Reference
	Yes	1,152 (32.3%)	62.3%	1.26	1.06–1.49
Cigarette smoking	Never	1,447 (39.7%)	59.7%	0.014	Reference
	Past	1,526 (41.8%)	55.8%	0.71	0.59–0.85
	Current	674 (18.5%)	61.9%	0.96	0.77–1.21
Hypertension ^b	No	1,130 (31.1%)	56.8%	0.21	Reference

Predictors of Care-Seeking Behavior	Number Self-Reporting	Univariate Analysis		Multivariable Analysis	
		Proportion Seeking Care	<i>p</i>	Odds Ratio	95% Confidence Limits
	Yes	2,504 (68.9%)	59.0%	1.06	0.89–1.26
Diabetes ^c	No	2,384 (67.8%)	56.7%	1.00	Reference
	Yes	1,130 (32.2%)	61.9%	1.23	1.04–1.47
Atrial fibrillation	No	3,120 (87.3%)	58.4%	0.73	Reference
	Yes	452 (12.7%)	57.5%	0.88	0.70–1.12

^aHistory of heart disease defined as: self-reported myocardial infarction/heart attack, coronary bypass surgery, coronary angioplasty/stenting, or evidence of myocardial infarction from electrocardiogram.

^bHypertension defined as systolic blood pressure of 140mm Hg or greater, diastolic blood pressure of 90mm Hg or greater, or self-reported use of antihypertensive medications.

^cDiabetes defined as a fasting glucose level greater than 126mg/dl, nonfasting glucose level greater than 200mg/dl, or self-reported medication use for glucose control.

Table 3

Participants Seeking Care by Physician Diagnosis of Stroke or TIA, Stroke Symptoms, and Type and Number of Symptoms *

Characteristic (number and percentage of preceding category)		Number Seeking Care (percent)
Self reported physician diagnosis or stroke symptoms without stroke/TIA diagnosis (n = 3,668)	Physician diagnosis or stroke symptoms without diagnosis (n = 3,668; 100.0%)	2,146 (58.5%)
	Diagnosed stroke/TIA only (n = 647; 17.6%)	647 (100.0%) *
	Any symptom (n = 3,021; 100.0%)	1,499 (49.6%)
	Stratification by specific symptoms	Painless weakness (n = 946; 31.3%)
		Sudden numbness (n = 1,382; 45.7%)
		Loss of vision (n = 588; 19.5%)
		Loss of one-half vision (n = 324; 10.7%)
Number of stroke symptoms reported (N = 3,021)	Stratification by diagnosis only or symptoms only	173 (38.0%)
	One (n = 2,112; 69.9%)	201 (35.1%)
	Two (n = 679; 22.5%)	980 (46.4%)
	Three or more (n = 230; 7.6%)	394 (58.0%)
		125 (54.3%)

* Those with self-reported physician diagnosis of stroke were assumed to have sought care for symptoms.