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Stroke Symptoms as a Predictor of Future Hospitalization

Virginia J. Howard, PhD¹, Monika M. Safford, MD², Shauntice Allen, PhD³, Suzanne E. Judd, PhD⁴, J. David Rhodes, BSN, MPH⁴, Dawn O. Kleindorfer, MD⁵, Elsayed Z. Soliman, MD⁶, James F. Meschia, MD⁷, and George Howard, DrPH⁴

¹Department of Epidemiology, School of Public Health, University of Alabama at Birmingham, Birmingham, AL

²Division of Preventive Medicine, Department of Medicine, School of Medicine, University of Alabama at Birmingham, Birmingham, AL

³Dean's Office, School of Public Health, University of Alabama at Birmingham, Birmingham, AL

⁴Department of Biostatistics, School of Public Health, University of Alabama at Birmingham, Birmingham, AL

⁵Department of Neurology, University of Cincinnati, Cincinnati, OH

⁶Departments of Epidemiology/Prevention and Internal Medicine, Wake Forest School of Medicine, Winston Salem, NC

⁷Department of Neurology, Mayo Clinic Florida, Jacksonville, FL

Abstract

BACKGROUND—Stroke symptoms in the general adult population are common and associated with stroke risk factors, lower physical and mental functioning, impaired cognitive status, and future stroke. Our objective was to determine the association of stroke symptoms with self-reported hospitalization or emergency department (ED) visit.

METHODS—Lifetime history of stroke symptoms (sudden weakness, numbness, unilateral or general loss of vision, loss of ability to communicate or understand) was assessed at baseline in a national, population-based, longitudinal cohort study of 30,239 blacks and whites, 45 years, enrolled 2003–2007. Self-reported hospitalization or ED visit and reason were collected during follow-up through March 2013. The symptom-hospitalization association was assessed by proportional hazards analysis in persons stroke/TIA-free at baseline (27,126) with adjustment for sociodemographics and further adjustment for risk factors.

Corresponding Author: Virginia J. Howard, PhD; Department of Epidemiology, UAB School of Public Health, 1720 2nd Ave. South, Birmingham, AL 35294-0022, Phone: 205-934-7197; FAX: 205-934-8665; vjhoward@uab.edu.

Disclosure statements

The authors declare that they do not have any conflicts of interests.

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RESULTS—One or more stroke symptoms were reported by 4,758 (17.5%). After adjustment for sociodemographics, stroke symptoms were most strongly associated with greater risk of hospitalization/ED for cardiovascular disease (HR = 1.87; 95% CI: 1.78 – 1.96), stroke (HR = 1.69; 95% CI: 1.55 – 1.85), and any reason (HR = 1.39; 95% CI: 1.34 – 1.44). These associations remained significant and only modestly reduced after risk factor adjustment.

CONCLUSIONS—Stroke symptoms are a marker for future hospitalization and ED visit not only for stroke but for cardiovascular disease in general. Findings suggest a role for stroke symptom assessment as a novel and simple approach for identifying individuals at high risk for cardiovascular disease including stroke in whom preventive strategies could be implemented.

Keywords

stroke symptoms; hospitalization; prospective studies; Stroke Cardiovascular disease

Introduction

In the environment of limited healthcare resources, it is important to identify “high risk” persons to target interventions to reduce the overall healthcare burden.(1) Hospitalization and emergency department visits are the largest portion of costs for 10% of the Medicare population that account for more than half of total program costs. (2, 3) While potentially preventable hospitalizations rates have been declining since 2009, disparities exist among race/ethnicity groups and socio-economic status. (4) Through simple screening approaches, it may be possible to better identify that subset of the population who will place future substantial demands on hospitals and emergency departments. Targeting more preventive care in this group could reduce the magnitude of future healthcare utilization.

Strategies for primary and secondary prevention of stroke and cardiovascular disease (CVD) include control of hypertension and diabetes as well as education on stroke symptoms. (5–12) Medical history taken during a routine physician encounter commonly includes questions about history of stroke, but typically not questions about history of stroke symptoms. The *Questionnaire for Verifying Stroke-Free Status* (QVSFS) is a validated questionnaire comprised of two questions about history of stroke and transient ischemic attack (TIA) and six questions about sudden onset of stroke symptoms (Table 1).(13–15) This questionnaire has been used as a simple approach for screening for stroke symptoms in research settings.(13–16) In previous work, we found that a history of stroke symptoms was: 1) common among the general adult population with no history of physician-diagnosed stroke or TIA, ≈18%; (17) 2) closely related to Framingham stroke risk factors; (17) 3) associated with higher odds of impaired cognitive status; (18) 4) associated with significantly lower physical and mental functioning; (19) 5) unlikely to be reported to physicians, with only approximately half of those reporting a history of symptoms indicating they had informed a physician of these symptoms; (20) and 6) associated with increased risk of stroke approximately equal to that attributable to hypertension or diabetes. (21) To summarize, a sizable subgroup of people with history of stroke symptoms can be identified by six simple questions, and evidence suggests that history of stroke symptoms is far from benign.

In this report, we continue our investigation of the clinical significance of stroke symptoms by assessing if this questionnaire can serve as a tool to identify a group of individuals with high likelihood of hospitalization or emergency department utilization. We considered this as a predictor of future hospital/emergency department use not only for potential stroke, but also for CVD and any reason. We analyzed data from the large national, population-based REasons for Geographic and Racial Differences in Stroke (REGARDS) study. We hypothesized that compared to individuals not reporting history of stroke symptoms, the risk of hospitalization or emergency department visit for CVD, stroke or any reason would be greater for those reporting a lifetime history of stroke symptoms.

Methods

The goals of REGARDS are to advance understanding of racial and geographic differences in stroke (22) and cognitive functioning. (23) Between January 2003–October 2007, the study recruited 30,239 community-dwelling black and white participants, aged 45, from 1,833 counties in the 48 contiguous states. The final sample comprised 56% from the stroke belt, 42% blacks and 55% women.(24) Briefly, the cohort was recruited by a combination of mail and telephone contact. An interview assessing CVD risk factors was performed by telephone, followed by an in-person physical assessment 3–4 weeks after the telephone interview. Consent was obtained verbally and later in writing. The examination included blood pressure measurements, blood samples, and an electrocardiogram (ECG). All involved Institutional Review Boards approved the study methods. Additional details are provided elsewhere.(22, 24)

Ascertainment of Stroke Symptoms

The baseline interview asked participants if a health care professional had ever told them that they had had a stroke or TIA; for this analysis, participants who responded affirmatively were excluded. For those without stroke or TIA, the QVSFS was used to establish lifetime history of each stroke symptom. (Table 1).(13) The QVSFS has been shown to be sensitive (0.97), although specificity is modest (0.60.) (15) History of stroke symptoms was defined as “yes” to 1 or more symptoms vs. “no” to all symptoms.

Ascertainment of Outcomes

Participants or their proxies are contacted by telephone at 6-month intervals to identify any hospitalizations, emergency department visits, or overnight stays in nursing homes or rehabilitation centers during the previous 6 months. Participants are also asked about suspected stroke, TIA, or myocardial infarction (MI), the date(s) of the medical encounter(s) and the purported reasons. Reasons were categorized as being for cardiovascular (stroke, TIA, heart-related, renal or peripheral vascular disease) or other (e.g., cancer, fracture, etc.). The outcomes were defined as to whether there was a hospitalization/emergency department visit for: 1) any reason (“Any Hosp/ED”), 2) cardiovascular reasons (“CVD Hosp/ED”), and 3) stroke only.

Covariates

Potential confounding variables were assessed at baseline. Hypertension was defined as SBP $\geq$ 140 mmHg, DBP $\geq$ 90 mmHg or use of antihypertensive medications. Diabetes was defined as a serum glucose $\geq$ 126 mg/dL (7.0 mmol/L) for participants who had fasted 8 hours prior to sampling, serum glucose $\geq$ 200 mg/dL (11.1 mmol/L) for those who had not fasted, or medication use for diabetes. Dyslipidemia was defined as serum total cholesterol $\geq$ 240 mg per dL, or low-density lipoprotein cholesterol $\geq$ 160 mg per dL or high density lipoprotein cholesterol $<$ 40 mg per dL or use of cholesterol lowering medications. History of heart disease was defined as self-reported MI, coronary artery bypass surgery, coronary angioplasty or stenting, or evidence of MI from ECG. Atrial fibrillation was determined by self-report or ECG-evidence. Left ventricular hypertrophy (LVH) was determined by study ECG. Age, race, sex, educational level, annual family income, current smoking and perceived health status [compared to others your age, how would you rate your health, with responses excellent, very good, good, fair, poor], were from interview data.

Statistical Analysis

Follow-up time for each participant was calculated from date of physical exam to date of first hospitalization/emergency department visit (i.e., for any reason, CVD, or stroke). Individuals were followed for each of the three outcomes until: 1) first occurrence of outcome, 2) death, 3) withdrawal from study, or data closure for analysis. Participants were followed for up to 10 years with average follow-up of 2.9 years for hospitalization for any reason, 4.9 years for CVD, and 5.8 years for stroke. End of follow-up for analysis was March 31, 2013. History of any stroke symptoms, the six individual stroke symptoms, and number of symptoms was considered as a predictor in proportional hazards models after covariate adjustment. For each of the outcomes, association with stroke symptoms was evaluated separately in a series of incrementally adjusted models. Model 1 adjusted for sociodemographic factors of age, race, sex, income and education. Model 2 added hypertension, diabetes, current cigarette smoking, dyslipidemia, atrial fibrillation, LVH and history of heart disease. Model 3 added health status. Risk factors were selected based on inclusion in the Framingham Stroke Risk Function (25) plus dyslipidemia as a risk factor for heart disease. Analyses were conducted using SAS statistical software version 9.2 (SAS Institute, Cary, North Carolina).

Results

Of the 30,239 participants, 56 were excluded for data anomalies, 3,044 with self-reported stroke or TIA at baseline, and 13 (1.5%) with no follow-up, resulting in an analytic cohort of 27,126. The history of individual stroke symptoms within this cohort is provided in Table 1. One or more stroke symptoms were reported by 4,758 (17.5%) with the most common “sudden numbness or dead feeling on one side of the body.” Table 2 lists baseline characteristics by stroke symptom status. Compared to those without symptoms, participants with symptoms were more likely to be black and women, have more stroke risk factors and worse general health. Over follow-up, 19,507 (72%) reported one or more hospitalization/ED encounters for any reason, 9,142 (34%) for CVD, and 2,624 (10%) for stroke. The proportion reporting a first hospitalization/ED visit for any reason, CVD, or

stroke is provided by baseline stroke symptom status in Figure 1. For each of the outcomes, the difference in hospitalizations/emergency department encounters between those with and without a history of stroke symptoms becomes larger over the entire follow-up.

Table 3 provides hazard ratios (HR) across the incremental models, contrasting results from participants with history of symptoms to those without; rows in table correspond to having any symptom (relative to none), the risk per additional symptom (i.e., considering number of symptoms as a continuous factor), and each specific symptom (relative to not having it.)

With regard to hospitalization/emergency department visit for any reason, after adjusting for sociodemographic factors, having at least one stroke symptom was associated with a 39% increase in risk (95% CI: 1.34 – 1.44), attenuated to 31% (95% CI: 1.26 – 1.36) after risk factor adjustment. Adjustment for general health further attenuated the increased risk to 24% (95% CI: 1.19 – 1.28). In the sociodemographic model, the association of individual stroke symptoms with hospitalization/emergency department visit was relatively consistent, with increased risk between 38% and 46%, and increased risk per symptom 20% (95% CI: 1.18 – 1.22), attenuated to a 12% increase (95% CI: 1.10 – 1.14) after adjustment for risk factors and general health.

The magnitude of the association of stroke symptoms on hospitalization/emergency department visits for cardiovascular reasons was substantially larger, with a risk in the sociodemographic model of approximately double (HR = 1.87; 95% CI: 1.78 – 1.96) for having any symptom. This risk was attenuated after full adjustment (HR = 1.58; 95% CI: 1.50 – 1.66). In fully adjusted models, there did not appear to be substantial differences in the association of individual symptoms with future hospitalization/emergency department visits; the increased risk was between 1.46 and 1.76 times and the risk per symptom was increased 27% (95% CI: 1.24 – 1.30).

The association of any stroke symptom with hospitalization/emergency department visits for stroke was smaller than for CVD reasons, with a 69% increase in risk (95% CI: 1.55 – 1.85) in the sociodemographic model. There was only modest mediation of this after adjustment for risk factors and general health (HR = 1.46; 95% CI: 1.32 – 1.60). In the fully adjusted model, impact of individual stroke symptoms were similar in their association with future hospitalization/emergency visits, increasing risk between 1.34 and 1.58 times; and risk increased 22% (95% CI: 1.16 – 1.27) per stroke symptom.

Table 4 provides HRs for any stroke symptom with the three outcomes in the fully adjusted model, permitting comparison of the magnitude of the association of stroke symptoms to other factors in the model. Regardless of reason for hospitalization, the HR of having one or more stroke symptoms was generally larger than for any risk factor, and generally as large as a one-to-two category difference in general health.

Discussion

These findings suggest that lifetime history of stroke symptoms is associated with a substantial increase in future self-reported hospitalizations/ED visit over a multi-year horizon. While there do not appear to be large differences between specific stroke

symptoms, our analysis suggests that risk of a hospitalization/ED visit increases with the number of symptoms reported. The simplicity of six short questions identifying a sizable subpopulation at double the risk of urgent healthcare utilization for cardiovascular problems independent of other risk factors suggests that the stroke symptom questionnaire may be a usable tool in clinical settings to identify individuals at high risk for CVD and stroke in whom preventive strategies could be implemented. Importantly, history of stroke symptoms was associated with increased risk of hospitalization (for any reason, for cardiovascular, and for stroke) that was as large or larger than the effect of major stroke risk factors including cigarette smoking, atrial fibrillation, diabetes, history of heart disease and hypertension. The value of this approach may be in prompting: (1) patient education and the importance of their participation in risk factor prevention and control, (2) a more intensive evaluation that would uncover potential occult processes that are not detected from ordinary clinical encounters, and/or (3) more aggressive management of known risk factors.

We had anticipated that the association of history of stroke symptoms would be stronger for stroke hospitalization than for more general cardiovascular reasons. However, it is well-established that persons with a history of stroke/TIA have an increased risk for a broad spectrum of cardiovascular diseases including recurrent stroke, MI, or vascular death. Although our analysis focused on individuals with no overt history of stroke, it is reasonable to postulate that persons with possible subclinical stroke behave similarly biologically.(21, 26–28) Among a Medicare population of acute ischemic stroke patients followed for five years, MI accounted for readmissions at a comparable rate to readmissions for stroke.(29) In a meta-analysis of 39 studies with mean follow-up of 3.5 years after TIA and ischemic stroke, annual risk of fatal and nonfatal MI was 2.2 % (95% CI: 1.7–2.7%).(30) As such, the strong association with hospitalization and ED visits for all CVD is not counterintuitive.

The modest attenuation of the magnitude of the association of stroke symptoms with hospitalization/ED visit in the full multivariable models suggests that the mechanism for stroke symptoms placing individuals at increased risk for hospitalization or ED use is relatively independent of traditional stroke risk factors. History of stroke symptoms was more strongly associated with risk of hospitalization for cardiovascular reasons or for stroke than it was for any reason. The persistence of the significance of stroke symptoms in the models after adjustment for general health suggests that reporting stroke symptoms is not just a surrogate for poor health, but it may be a more specific index to the overall cardiovascular health of the participants.

There are numerous strengths of this analysis. The size of the population, national reach, quality of baseline evaluation, and length of follow-up permit robust estimates of the effect of stroke symptoms. Few studies have data on stroke symptoms and to our knowledge this is the first report examining the association of history of stroke symptoms with future health services utilization. However, there are some limitations, including the reliance on self-report for outcomes, and lack of availability of discharge diagnoses or claims data. Other studies have shown a high to moderate agreement between self-reported and claims data for ischemic heart disease (84%) and stroke (67%). (31) While some studies have found that health services use is underreported by older persons, (32) most confirm acceptable estimates of actual hospital use.(33, 34) Our study was intentionally based on a higher-level

classification of hospitalization reasons that are more likely to be reported by participants. Similar to other cohort studies, risk factors were only available at baseline and the prevalence and severity of co-morbidities may have changed over the long follow-up. We do not have information on who among these persons with history of stroke symptoms were being seen by healthcare professionals with their risk factors being monitored during follow-up.

Conclusion

Six simple questions that can be asked during a preventive health care encounter identify a population at high risk of future hospitalization or emergency department use, especially for CVD-related reasons. Whether targeted preventive care evaluations and aggressive risk factor management can reduce the risk to this population and the associated burden to the health care delivery system will require further evaluation.

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Figure 1.

Kaplan-Meier curves for the percent with hospitalization or emergency department visit for any cause (left), for cardiovascular reason (center), and for stroke (right); shown for those with and without any stroke symptoms at baseline, REGARDS (2003–2007), with follow-up through March 2013.

Table 1

Baseline Questions Establishing the History and Number of Stroke Symptoms in the REGARDS Analysis Cohort, 2003–2007 (N=27,126)

Stroke Symptom	No. (%)
Have you ever had sudden painless weakness on one side of your body?	1,593 (5.9)
Have you ever had sudden numbness or a dead feeling on one side of your body?	2,318 (8.6)
Have you ever had sudden painless loss of vision in one or both eyes?	1,235 (4.6)
Have you ever suddenly lost one half of your vision?	822 (3.0)
Have you ever suddenly lost the ability to understand what people were saying?	746 (2.8)
Have you ever suddenly lost the ability to express yourself verbally or in writing?	1,099 (3.7)
Reporting one or more of the above symptoms	4,758 (17.5)
Number of reported symptoms:	
None	22,368 (82.5)
One	2,848 (10.5)
Two	1,256 (4.6)
Three	379 (1.4)
Four	180 (0.7)
Five	64 (0.2)
Six	31 (0.1)

Table 2

Baseline Characteristics of REGARDS Study Participants Stratified by Stroke Symptom Status, N=27,126. [With the exception of age (where $p = 0.92$), all other variables differ between those with and without stroke symptoms ($p < 0.0001$).]

Characteristic (No. and %)		Stroke Symptoms	
		None (n=22,368)	One or More (n=4,758)
Demographic Factors	Age (mean $\pm$ SD)	64.4 $\pm$ 9.3	64.5 $\pm$ 9.6
	Black	8,683 (38.8)	2,381 (50.0)
	Men	10,117 (45.2)	2,008 (42.2)
Measures of Socio-Economic Status	Income Category	<\$20K	3,386 (15.1)
		\$20K – \$34K	5,232 (23.4)
		\$35K – \$74K	7,107 (31.8)
		\$75+	4,015 (18.0)
		Refused	2,628 (11.8)
	Education Category	< High School	2,268 (10.1)
		H.S. Graduate	5,637 (25.2)
		Some College	6,009 (26.9)
		College Graduate	8,443 (37.8)
Stroke Risk Factors	Hypertension	12,399 (55.6)	3,072 (64.8)
	Diabetes	4,107 (19.1)	1,272 (27.8)
	Current Smoking	2,976 (13.4)	876 (18.5)
	Atrial Fibrillation	1,517 (6.9)	607 (13.2)
	Left Ventricular Hypertrophy	1,973 (9.0)	567 (12.1)
	Dyslipidemia	6,867 (31.0)	1,703 (36.2)
	History of Heart Disease	3,274 (14.9)	1,032 (22.2)
General Health Measure	Self-Reported General Health	Excellent	4,162 (18.6)
		Very Good	7,508 (33.6)
		Good	7,708 (34.5)
		Fair	2,563 (11.5)
		Poor	387 (1.7)

Table 3

Risk of hospitalization or ED visit associated with stroke symptoms in REGARDS cohort, shown for: 1) any reason, 2) cardiovascular reasons, or 3) stroke. Shown in models with adjustment for: 1) sociodemographic factors (age, race, sex, income and education), 2) further adjustment for risk factors (hypertension, diabetes, current smoking, atrial fibrillation, left ventricular hypertrophy, history of heart disease and dyslipidemia), and 3) further adjustment for self-reported general health

	Any Reason			Cardiovascular			Stroke		
	Socio-Demographic	+ Risk Factors	+ General Health	Socio-Demographic	+ Risk Factors	+ General Health	Socio-Demographic	+ Risk Factors	+ General Health
Any Symptom	1.39 (1.34 – 1.44)	1.31 (1.26 – 1.36)	1.24 (1.19 – 1.28)	1.87 (1.78 – 1.96)	1.68 (1.60 – 1.77)	1.58 (1.50 – 1.66)	1.69 (1.55 – 1.85)	1.54 (1.40 – 1.69)	1.46 (1.32 – 1.60)
Per symptom	1.20 (1.18 – 1.22)	1.16 (1.14 – 1.18)	1.12 (1.10 – 1.14)	1.39 (1.36 – 1.42)	1.31 (1.28 – 1.34)	1.27 (1.24 – 1.30)	1.32 (1.26 – 1.37)	1.25 (1.20 – 1.30)	1.22 (1.16 – 1.27)
Communication	1.43 (1.33 – 1.53)	1.35 (1.25 – 1.45)	1.23 (1.14 – 1.32)	2.14 (1.96 – 2.33)	1.94 (1.77 – 2.13)	1.76 (1.61 – 1.93)	1.84 (1.57 – 2.16)	1.66 (1.40 – 1.97)	1.54 (1.30 – 1.82)
Numbness	1.44 (1.37 – 1.51)	1.32 (1.26 – 1.40)	1.25 (1.19 – 1.32)	1.92 (1.80 – 2.04)	1.69 (1.58 – 1.81)	1.56 (1.45 – 1.67)	1.69 (1.50 – 1.90)	1.49 (1.32 – 1.70)	1.40 (1.23 – 1.59)
Understanding	1.41 (1.30 – 1.53)	1.32 (1.21 – 1.44)	1.22 (1.12 – 1.33)	1.95 (1.78 – 2.15)	1.71 (1.54 – 1.91)	1.57 (1.41 – 1.75)	1.84 (1.54 – 2.20)	1.70 (1.41 – 2.05)	1.58 (1.31 – 1.91)
Bilateral Vision	1.38 (1.29 – 1.47)	1.31 (1.23 – 1.41)	1.25 (1.17 – 1.34)	1.71 (1.58 – 1.86)	1.53 (1.40 – 1.67)	1.46 (1.33 – 1.59)	1.55 (1.33 – 1.81)	1.41 (1.20 – 1.66)	1.34 (1.14 – 1.58)
Half Vision	1.45 (1.35 – 1.57)	1.37 (1.26 – 1.48)	1.31 (1.21 – 1.42)	1.96 (1.79 – 2.16)	1.72 (1.55 – 1.90)	1.65 (1.49 – 1.82)	1.73 (1.45 – 2.06)	1.57 (1.31 – 1.89)	1.51 (1.26 – 1.82)
Weakness	1.46 (1.38 – 1.54)	1.32 (1.24 – 1.40)	1.23 (1.15 – 1.30)	2.09 (1.94 – 2.24)	1.80 (1.67 – 1.94)	1.65 (1.53 – 1.79)	1.92 (1.68 – 2.19)	1.66 (1.44 – 1.91)	1.53 (1.33 – 1.77)

Table 4

Hazard ratios (and 95% confidence intervals) for all factors in the final model (sociodemographics + risk factors + general health) for hospitalization/ED visit for any reason, cardiovascular (CVD) and stroke.

	Hospitalization/ED for Any Reason	Hospitalization/ED for CVD	Hospitalization/ED for Stroke
Any stroke symptom	1.24 (1.19 – 1.28)	1.58 (1.50 – 1.66)	1.46 (1.32 – 1.60)
Demographic Factors			
Age (per 10 years)	1.25 (1.23 – 1.28)	1.38 (1.35 – 1.42)	1.62 (1.54 – 1.70)
Black race	0.82 (0.80 – 0.85)	0.94 (0.89 – 0.98)	0.98 (0.90 – 1.07)
Male sex	0.99 (0.96 – 1.03)	1.21 (1.15 – 1.26)	1.17 (1.07 – 1.27)
SES Measures			
Income	1.00 (ref)	1.00 (ref)	1.00 (ref)
< \$20K			
\$20K – \$34K	0.95 (0.91 – 1.00)	0.92 (0.86 – 0.99)	0.95 (0.84 – 1.07)
\$35K – \$74K	0.96 (0.91 – 1.00)	0.90 (0.84 – 0.96)	0.87 (0.77 – 1.00)
\$75K+	0.93 (0.88 – 0.99)	0.83 (0.76 – 0.91)	0.76 (0.64 – 0.90)
Refused	0.93 (0.88 – 0.98)	0.90 (0.83 – 0.98)	0.91 (0.78 – 1.05)
Education	1.00 (ref)	1.00 (ref)	1.00 (ref)
< than HS			
HS Grad	0.97 (0.92 – 1.03)	0.91 (0.84 – 0.97)	0.98 (0.86 – 1.12)
Some College	1.04 (0.98 – 1.09)	0.95 (0.88 – 1.02)	1.02 (0.89 – 1.17)
College Grad	1.00 (1.94 – 1.05)	0.86 (0.79 – 0.92)	0.92 (0.80 – 1.06)
Risk Factors			
Cigarette smoking	1.12 (1.07 – 1.17)	1.31 (1.23 – 1.39)	1.61 (1.44 – 1.80)
Atrial fibrillation	1.28 (1.21 – 1.34)	1.53 (1.43 – 1.64)	1.40 (1.24 – 1.59)
Diabetes	1.12 (1.08 – 1.17)	1.27 (1.21 – 1.34)	1.38 (1.26 – 1.52)
Dyslipidemia	1.04 (1.01 – 1.07)	1.01 (0.96 – 1.05)	0.91 (0.84 – 1.00)
History of heart disease	1.26 (1.21 – 1.32)	1.68 (1.59 – 1.77)	1.41 (1.27 – 1.55)
Left Ventricular Hypertrophy	1.07 (1.02 – 1.12)	1.09 (1.02 – 1.17)	1.18 (1.05 – 1.34)
Hypertension	1.11 (1.07 – 1.14)	1.16 (1.10 – 1.21)	1.17 (1.07 – 1.29)
Self-reported general health	1.00 (ref)	1.00 (ref)	1.00 (ref)
Excellent			
Very good	1.19 (1.13 – 1.24)	1.16 (1.08 – 1.25)	1.01 (0.88 – 1.16)
Good	1.39 (1.32 – 1.46)	1.46 (1.35 – 1.57)	1.16 (1.01 – 1.33)
Fair	1.68 (1.58 – 1.78)	1.82 (1.67 – 1.98)	1.38 (1.17 – 1.61)
Poor	2.17 (1.97 – 2.38)	2.30 (2.02 – 2.61)	1.97 (1.57 – 2.48)