

## BACKGROUND

Stroke is the third leading cause of morbidity and mortality in men and women, behind heart disease and cancer. Although men experience a higher incidence of stroke, women have poorer outcomes and the unique risk factors of pregnancy and hormone therapy (1). A midlife stroke surge was recently documented in women ages 45 to 54, which may be due to an increase in risk factors in this population (2,3). Women experience higher mortality after stroke than men. Gender differences in the management have been documented, with women experiencing greater emergency department wait times and less diagnostic testing (4).

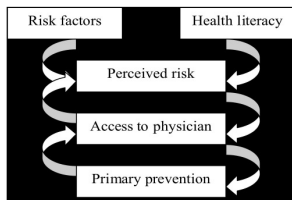
Education campaigns may have increased the public's knowledge of stroke warning signs. However, there is still information lacking about risk factors and warning signs for stroke (7,8). Most women do not perceive stroke or heart disease to be a major health concern and report that they are not well informed about their risk (8).

## OBJECTIVES

To understand the perception of risk of stroke in middle-age women with at least one risk factor for stroke. Also to understand knowledge of stroke in this population so that future health campaigns can be appropriately targeted. Parameters related to access of care will also be examined.

## RESEARCH MODEL

### Research Model



**Figure 1:** In our research model, we hypothesized that a persons risk factors for stroke and perceived risk, as well as their access to a physician, would mediate the success of primary prevention measures for stroke. We also predicted that health literacy measures, such as education and knowledge of stroke warning signs and risk factors, would predict perceived risk (9).

## METHODS

# PERCEPTION OF STROKE RISK AND HEALTH CARE FOLLOW-UP IN AT-RISK WOMEN



Jennifer Dearborn, BA<sup>1</sup>; Louise McCullough, MD, PhD<sup>1,2</sup>

1. University of Connecticut Health Center, Department of Neurology, Farmington, CT
2. Hartford Hospital, Stroke Center, Hartford, CT

QuickTime™ and a TIFF (Uncompressed) decompressor are needed to see this picture.

## CONCLUSIONS

In our cohort of predominantly white women seeking specialty medical care at a suburban hospital we found:

- Lacking knowledge about stroke warning signs/risk factors
- Inability to identify personal risk factors
- Women with hypertension and diabetes were more likely to perceive a risk of stroke
- Low % of women with atrial fibrillation identified this as a risk factor for stroke
- Large number reported not seeking care or taking a medication because of cost
- Not having prescription coverage or not having a PCP predicted length of time since last office visit
- Room for improvement in primary prevention markers for stroke, such as blood pressure, A1C control, ASA adherence and warfarin prescriptions (for atrial fibrillation)

## FUTURE DIRECTIONS

These results suggest several points of focus for future interventions:

- 1) Focusing on disease subgroups as a point of intervention for increasing stroke awareness. For example, interventions could be developed for women with atrial fibrillation, coronary artery disease or other groups that incorrectly perceive a low risk for stroke.
- 2) Using creative warning room strategies to increase awareness and knowledge about stroke. This could include individual risk forms/questionnaires to be collected by the physician.
- 3) Thinking about access to care and how it is a barrier to primary prevention
- 4) Addressing how health behavior and risk perception affect health outcomes in women.

## REFERENCES

- 1) Bushnell CD, Hara P, Colson C, et al. Advancing the study of stroke in women: summary and recommendations for future research from a NINDS-Sponsored Multidisciplinary Working Group. *Stroke*. 2006 Sep;37(9):2387-99.
- 2) Towfigh A, Saver JL, Englund R, Oshroque B. A midlife stroke surge among women in the United States. *Neurology*. 2007 Nov 13;69(20):1898-904.
- 3) de Lecuna MA, Egado JA, Fernandez C, et al. PIVE Study: Investigators of the Stroke Project of the Spanish Cerebrovascular Disease Study Group. Risk of ischemic stroke and lifetime estrogen exposure. *Neurology*. 2007 Jan 23;68(1):33-8.
- 4) Smith MA, Lisabeth LD, Brown DL, Morgenstern LB. Gender comparison of diagnostic evaluation for ischemic stroke patients. *Neurology*. 2005 Sep 27;65(6):855-8.
- 5) Lisabeth LD, Riser JM, Brown DL, et al. Stroke burden in Mexican Americans: the impact of mortality following stroke. *Ann Epidemiol*. 2006 Jan;16(1):33-40. Epub 2005 Aug 9.
- 6) Morgenstern LB, Smith MA, Lisabeth LD, et al. Excess stroke in Mexican Americans compared with non-Hispanic Whites: the Brain Attack Surveillance in Corpus Christi Project. *Ann Epidemiol*. 2004 Aug 15;14(6):370-83.
- 7) Schneider AT, Panico AM, Khoury JC, et al. Trends in community knowledge of the warning signs and risk factors for stroke. *JAMA*. 2003 Jan 15;289(3):343-6.
- 8) Moses L, Jones WK, King KS, Ouyang P, Rothberg BE, Hill MN. Awareness, perception, and knowledge of heart disease risk and prevention among women in the United States. *American Heart Association Women's Heart Disease and Stroke Campaign Task Force Arch Fam Med*. 2000 Jun;9(6):506-15.
- 9) Glanz K, Rimer BK, Verman K. *Health Behavior and Health Education: Theory, Research and Practice*. Fourth edition (2008).

## ACKNOWLEDGEMENTS

Thank you to the University of Connecticut Health Center and the Hartford Hospital Stroke Center for facilitating the project completion.

Also thank you to Dr. William White, Dr. Nancy Petry, Dr. Richard Fortinsky, Michelle Landes RN, Barbara DiMartino, Ilene Staff PhD.

A special thanks to the Northeast Cerebrovascular Consortium for funding this project through a mini-grant.

## RESULTS

Table 1: Sample Characteristics

	N	(%)
Mean age (years): 63.0 +/- 7.2		
Race		
White	194	91.5
Black	12	5.6
Other	6	2.9
Income		
<\$25,000	42	21.6
\$25,000 to 34,999	22	11.3
\$35,000 to 49,999	22	11.3
\$50,000 to 74,999	44	22.7
\$75,000+	64	33.1
Marital Status		
Married	124	57.9
Divorced/Separated	44	21.5
Widowed	24	11.2
Never Married	22	10.3
Education		
Some high school or less	17	8
High school diploma or GED	43	20.2
Some college or trade school	47	22.1
College degree	45	21.1
Graduate or professional school	61	28.6

Table 2: Risk Factor Prevalence

Risk Factor	N	%
Hypertension	162	76.4
Smoke currently	15	7.1
Smoke ever	111	52.4
Diabetes	68	32.5
Angina/coronary artery disease	55	27
Prior heart attack	36	17.1
Atrial fibrillation	37	17.8
Carotid stenosis	37	17.9
High cholesterol	157	77.3
Prior stroke/TIA	23	11.1

Women were asked in a yes/no format if they had each of the stroke risk factors

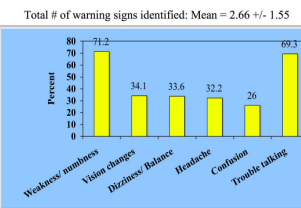
Table 3: Knowledge of Risk Factors

Risk Factor	N	%
Hypertension	154	71.6
Smoking	135	62.8
Diabetes	78	36.3
Heart disease/CAD	35	16.3
Atrial fibrillation	7	3.3
Carotid stenosis/atherosclerosis	16	7.9
High cholesterol	116	54
Poor diet	74	34.4
Lack of exercise	102	47.4
Overweight	122	56.7
Increased stress	46	21.5

Mean # of risk factors identified: 3.9 +/- 1.8 (range 0 to 8)

Women were asked to identify up to seven risk factors for stroke. Only shown responses were coded.

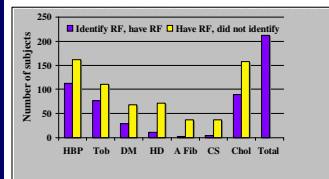
Figure 2: Warning signs of stroke



Percentage of women who identified a particular warning sign for stroke. Subjects were asked to list up to five warning signs. Only the above responses were coded.

Figure 3: Identification of Personal Risk Factors

HBP=high blood pressure; Tob=lifetime tobacco use; DM=Diabetes Mellitus; HD/MI=heart disease or myocardial infarction; A Fib=atrial fibrillation; CS=carotid stenosis; Chol=high cholesterol; RF=risk factor; Total = # in survey



The purple bar represents the number of women with each particular risk factor that identified the condition as a risk factor for stroke. The yellow bar represents the number of women with each risk factor. The difference between the two bars is the number of women who did not identify their health condition or behavior as a risk factor for stroke.

Table 4: Risk Perception

	Mean +/-SD	N	%
Mean risk perception (scale 1 to 10)	5.7 +/- 2.3		
Perception of other women's risk (scale 1 to 10)	5.5 +/- 1.7		
Worry about stroke			
Never/rarely		147	71.0
Sometimes/frequently		60	29.0
Perceived Health			
Poor/fair		74	35.4
Good/excellent		135	64.6

Women were asked to identify their perceived risk for stroke on a scale of 1 to 10, with 1 representing "no risk" and 10 meaning "very high risk". They also characterized other women's risk, their frequency of worry about stroke, and the perceived overall health.

Table 5: Multivariate analysis, predictors of risk perception

Variables included in model but not significant include: perceived health; prior stroke; prior TIA; carotid artery stenosis; smoking (100 lifetime); and HMO coverage

	B	p	Confidence Interval
Other women's risk of stroke	.336	<.001	.175 to .498
Worry about stroke	.734	<.001	.422 to 1.045
Have hypertension	.686	.037	.043 to 1.330
Have diabetes	.893	.004	.298 to 1.489

\*ENTER method

Predictors of a women's risk perception were first identified using bivariate correlations. Significant variables were included in the multivariate linear regression analysis. Variables that remained significant are shown in the table above. Variable that were not significant are listed.

Table 6: Access to health care

Sample Characteristics	N	%
No health insurance	16	7.5
Health insurance	196	92.5
No PCP	6	2.9
Have PCP	204	97.1
No medication b/c cost	37	17.8
Able to afford medicine	170	81.7
No health insurance	16	7.5
Health insurance	196	92.5
No Rx coverage	8	3.8
Rx coverage	204	96.2
No visit b/c cost	21	9.9
Able to afford visits	192	90.1
Mean length of time since visit (months)	7.54 +/- 10.84	
Range	[0, 84]	
Average co-pay for office visit (\$)	16.97 +/- 31.91	
Range	[0, 360]	
Average monthly cost medications (\$)	97.49 +/- 157.24	
Range	[0, 1000]	

Women answered the following questions: 1) Do you have any kind of health care coverage? 2) Do you have a primary care provider (PCP)? 3) Have you ever not been able to take a medication because of cost? 4) Do you have prescription (Rx) coverage? 5) Was there a time in the past 12 months when you wanted to see a doctor but couldn't because of cost?