American Heart Association and American Stroke Association National Survey of Stroke Risk Awareness Among Women

Anjanette Ferris, MD; Rose Marie Robertson, MD; Rosalind Fabunmi, PhD; Lori Mosca, MD, PhD, MPH

**Background**—Stroke is the third leading cause of death in the United States and a major cause of morbidity in women. Awareness of risk may be an important first step in stroke prevention. The purpose of this study was to assess knowledge and awareness about stroke in a nationally representative sample of women.

**Methods and Results**—An American Heart Association–sponsored telephone survey using random-digit dialing was conducted in June and July of 2003. Respondents were 1024 women ≥25 years of age, including an oversampling of racial/ethnic minorities (68% white, 12% black, 12% Hispanic). Participants were given a standardized questionnaire about heart disease and stroke risk. Only 26% of women ≥65 years of age reported being well informed about stroke, even though this group carries the highest incidence of stroke. Overall, 20% of women stated that they worried a lot about stroke. Among women aged 25 to 34 years, 37% stated that they were not at all informed about stroke, which was significantly higher than for women between 45 and 64 years (13%, \(P<0.05\)) and those ≥65 years of age (14%, \(P<0.05\)). More Hispanics reported being not at all informed about stroke compared with whites (32% versus 19%, \(P<0.05\)) and blacks (32% versus 20%, \(P<0.05\)). More white women were aware that at the onset of a stroke, treatment could be given to break up blood clots compared with blacks (92% versus 84%, \(P<0.05\)) and Hispanics (92% versus 79%, \(P<0.05\)). Correct identification of the warning signs of stroke was low among all racial/ethnic and age groups. More white respondents correctly identified sudden 1-sided weakness or numbness of the face or a limb as a sign of stroke significantly more often than did Hispanics (29% versus 17%, \(P<0.05\)).

**Conclusions**—Results of this national survey document that awareness and knowledge about stroke is suboptimal among women, especially among racial/ethnic minorities, who are at highest risk. These data support the need for targeted educational programs about stroke risk and symptoms and underscore the importance of public health programs to improve awareness of stroke among women. (*Circulation*. 2005;111:1321-1326.)

**Key Words:** stroke ■ women ■ prevention

Approximately every 45 seconds, someone in the United States suffers a stroke.\(^1\) Stroke is a leading cause of morbidity and is the third leading cause of mortality for men and women in the United States. Each year, \(\approx\)700 000 individuals experience a new or recurrent stroke,\(^1\) and >160 000 of these events are fatal. One quarter of women compared with 22% of men under the age of 65 die within 1 year of having an initial stroke,\(^1\) and nearly 40 000 more women than men die of stroke each year.\(^1\)

In 1997, the American Heart Association (AHA) initiated a campaign to increase awareness about cardiovascular disease among women. A study conducted by the AHA reported a low level of stroke awareness among US women in 1997.\(^2\) Only 11% of women stated that they were very well informed about stroke. A follow-up survey conducted in 2000 revealed only a 2% increase in the percentage of women who reported being well informed about stroke.\(^3\) Kothari et al\(^4\) evaluated knowledge of stroke risk factors, signs, and symptoms in 163 patients with potential stroke who presented to an emergency department in Cincinnati, Ohio. Of these patients, 39% had no knowledge of a single sign or symptom of stroke.\(^4\) The AHA and the American Stroke Association continue their efforts to educate women about heart disease and stroke. Modifiable risk factors such as hypertension, tobacco use, and diabetes remain targets for intervention and stroke prevention.

The purpose of the present study was to assess the current level of awareness and knowledge about stroke among women in the United States and to evaluate the differences in knowledge and perception of stroke based on race/ethnicity.
and age. This study serves as a follow-up to the 1997 and 2000 surveys conducted by the AHA.

Methods

A national random sample of women age 25 years and older was obtained using random-digit dialing, whereby samples of random numbers were systematically selected with equal probability across all eligible blocks in the United States. All blocks within a county were organized in ascending order by area code, exchange, and block number. A sampling interval was then calculated for each county in the United States. From a random start, blocks were systematically selected in proportion to their density of listed households. Once a block was selected, a 2-digit random number ranging from 00 to 99 was added to the exchange and block to form a 10-digit telephone number.

To ensure that adequate numbers of black and Hispanic women were represented in the sample, a targeted random-digit database sample was created to supplement the base sample. An exchange/tract coding system was used in which each US directory-listed household was assigned a density code that reflected the probability of either a Hispanic or a black household for the census tract in which the household resided. Density codes ranging from 30% to 100% were used. The sampling error for this study was ±3.1% at the 95% confidence interval.

Professional interviewers employed with a national opinion research company (Harris Interactive, Inc) conducted the telephone survey between June 26 and July 14, 2003. Within each household, the interviewer asked to speak to a woman if one had not answered the initial call and then asked the respondent to confirm that she was at least 25 years of age. Interviews lasted ~10 minutes. All interviews were conducted in English. Telephone calls were made in the evenings and on weekends so as to not exclude women who worked outside the home during the day. Participants were excluded if they were younger than age 25 or if they did not speak English.

A standardized 32-item questionnaire that included a mixture of Likert scale, open-ended, and recognition questions was administered. As in the previous surveys conducted in 1997 and 2000, questions were divided into 4 sections: general awareness of women’s health issues, communications and behaviors related to cardiovascular disease prevention, specific understanding of cardiovascular disease, and behaviors associated with prevention, and demographic characteristics.

A total of 2025 households were contacted for the random-digit database sample in the 2003 survey. Of these contacts, 945 were ineligible and 1080 were eligible. Of those eligible, 56 refused and 1024 agreed to participate. Sampling was discontinued after the 1024 interviews were conducted in English. Telephone calls were made in the evenings and on weekends so as to not exclude women who worked outside the home during the day. Participants were excluded if they were younger than age 25 or if they did not speak English.

The survey data were analyzed with software designed for market-survey analysis (Quantum, Quantrtime Ltd). Data are reported as percentages. Differences in responses between each racial/ethnic and age group and between surveys were analyzed with χ² tests. Statistical significance was set at P<0.05.

Results

Demographics

The demographic characteristics of the 1024 participants are presented in Table 1. The racial/ethnic distribution of respondents was 68% white, 12% black, 12% Hispanic, and 8% other ethnicities. A higher percentage of black women were single and never married compared with Hispanic women and white women. Hispanic women were less likely to have graduated from high school. Fewer white women had household incomes <$20 000 compared with black women and Hispanic women. A history of high blood pressure was reported by 15% of women. Nineteen percent of respondents were current smokers. High cholesterol was reported by 29% of women. A personal history of stroke was reported by 4% of women.

Table 1. Demographic Characteristics of Respondents

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>All (n=1024)</th>
<th>White (n=695)</th>
<th>Black (n=127)</th>
<th>Hispanic (n=125)</th>
<th>Other (n=77)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, y</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>25–34</td>
<td>21</td>
<td>16*</td>
<td>26</td>
<td>33</td>
<td>26</td>
</tr>
<tr>
<td>35–44</td>
<td>24</td>
<td>23</td>
<td>24</td>
<td>28</td>
<td>25</td>
</tr>
<tr>
<td>45–54</td>
<td>20</td>
<td>21</td>
<td>18</td>
<td>15</td>
<td>23</td>
</tr>
<tr>
<td>55–64</td>
<td>24</td>
<td>28*</td>
<td>19</td>
<td>18</td>
<td>18</td>
</tr>
<tr>
<td>≥65</td>
<td>11</td>
<td>11</td>
<td>13</td>
<td>7</td>
<td>9</td>
</tr>
<tr>
<td>Marital status</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Single, never married</td>
<td>15</td>
<td>11</td>
<td>35*</td>
<td>13</td>
<td>19†</td>
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<tr>
<td>Married or living together</td>
<td>66</td>
<td>71</td>
<td>41*</td>
<td>67</td>
<td>60</td>
</tr>
<tr>
<td>Separated or divorced</td>
<td>11</td>
<td>9</td>
<td>11</td>
<td>16†</td>
<td>16†</td>
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<tr>
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<td>9</td>
<td>13</td>
<td>4</td>
<td>5</td>
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<tr>
<td>Education</td>
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<td></td>
</tr>
<tr>
<td>Some high school or less</td>
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<td>4</td>
<td>7</td>
<td>15†</td>
<td>6</td>
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<tr>
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<td>24</td>
<td>25</td>
<td>26</td>
<td>19</td>
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<tr>
<td>Some college</td>
<td>22</td>
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<td>26</td>
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<td>29</td>
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<tr>
<td>2-Year college graduate</td>
<td>14</td>
<td>14</td>
<td>14</td>
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<tr>
<td>4-Year college graduate</td>
<td>18</td>
<td>20</td>
<td>17</td>
<td>16</td>
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<td>17</td>
<td>12</td>
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<td>Household income, $</td>
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<td></td>
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<tr>
<td>&lt;$20 000</td>
<td>12</td>
<td>8*</td>
<td>22</td>
<td>17</td>
<td>20</td>
</tr>
<tr>
<td>20 000–49 999</td>
<td>32</td>
<td>30</td>
<td>40†</td>
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<td>33</td>
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<td>23†</td>
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<td>≥100 000</td>
<td>7</td>
<td>9</td>
<td>2†</td>
<td>5</td>
<td>7</td>
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<tr>
<td>Personal history of disease</td>
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<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Diabetes</td>
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<td>10</td>
<td>14</td>
<td>15</td>
<td>12</td>
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<tr>
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<td>3</td>
<td>1</td>
<td>3</td>
<td>4</td>
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<tr>
<td>Stroke</td>
<td>4</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>5</td>
</tr>
</tbody>
</table>

All values are percentages. *P<0.05 vs white. †P<0.05 vs all other ethnic groups.

Awareness and Perception About Stroke

Overall, 20% of women stated that they worried a lot about stroke, but slightly fewer than one half of women reported that they did not worry at all about stroke. Approximately one third of women stated that they were very well or well informed about prevention, and demographic characteristics.

Among women between the ages of 25 and 34, 37% stated they were not at all informed about stroke. This was significantly higher than women between 45 and 64 years (37% versus 13%, P<0.05) and women 65 years and older (37% versus 14%, P<0.05). When respondents were asked if they had heard or read information about cardiovascular disease within the prior 12 months (Figure), only 61% of Hispanics responded “yes” compared with 82% of whites (P<0.05) and 74% of blacks (P<0.05). One third of women strongly agreed that it is easy to find accurate and easy-to-understand information about stroke. More black women (48%) reported easy access to information about stroke compared with white women (32%, P<0.05).
Warning Signs of Stroke
Knowledge of the warning signs of stroke by age, racial/ethnic group, and survey year is presented in Table 3. Questions about stroke warning signs were unaided. More white than Hispanic respondents (39% versus 29%, $P<0.05$) correctly identified sudden weakness/numbness of the face or a limb on one side as a warning sign of stroke. Sudden, severe headache was identified as a stroke warning sign by 35% of women between the ages of 35 and 44 compared with only 22% of women between the ages of 25 and 34 and 22% of women 65 years and older (both $P<0.05$). More white women correctly identified difficulty talking or understanding speech as a warning sign of stroke than did Hispanic women (29% versus 17%, $P<0.05$). Only 21% of women between the ages of 25 and 34 correctly identified this warning sign compared with 31% of women between the ages of 45 and 64 ($P<0.05$). A higher percentage of white women correctly identified sudden dimness or loss of vision, often in one eye, as a warning sign than did black women (23% versus 11%, $P<0.05$) or Hispanic women (23% versus 13%, $P<0.05$). Difficulty talking or understanding speech was identified as a warning sign of stroke by 26% of women in the present survey. This was a significant increase from years 2000 (26% versus 22%, $P<0.05$) and 1997 (26% versus 15%, $P<0.05$). A greater percentage of women identified dizziness as a warning sign of stroke in 2003 compared with 2000 (20% versus 16%, $P<0.05$) and 1997 (20% versus 14%, $P<0.05$).

Knowledge About Stroke Risk and Prevention
Over half of women (53%) believed that they were at low risk for stroke compared with women their age. Fifteen percent of participants had been told that their blood pressure was too high when last taken by a physician, and 11% reported a diagnosis of diabetes. Only 28% of women reported exercising 4 or more times per week. Overall, 89% of women agreed that some form of heart disease may result in a stroke (Table 4). This is a significant increase compared with year 2000 results (89% versus 86%, $P<0.05$). Only 80% of women 65 years or older currently agreed that some form of heart disease may result in a stroke compared with 95% of women 25 to 34 years old ($P<0.05$ ; Table 5). More women in 2003 believed that black women were more likely than white women to die from a stroke compared with 2000 (64% versus 54%, $P<0.05$) and 1997 (64% versus 48%, $P<0.05$). In the present survey, 83% of black respondents believed that black women were more likely than white women to die from a stroke. This was significantly greater than the percentage of white respondents (83% versus 64%, $P<0.05$) and Hispanics women (83% versus 45%, $P<0.05$) who believed this to be true. More white women were aware that at the onset of a stroke, treatment could be given to break up blood clots compared with blacks (92% versus 84%, $P<0.05$) and Hispanics (92% versus 79%, $P<0.05$). Nearly two thirds of women (63%) believed that stroke was a long-term disease that reduced quality of life. Although the majority of women (93%) felt comfortable talking with their doctor about pre-
ventive and treatment options with regard to their health, only 38% had discussed cardiovascular disease with their doctor.

**Discussion**

This study demonstrates that stroke awareness remains low among women in the United States, especially among racial/ethnic minorities. Only one third of women reported that they were very well or well informed about stroke. Correct identification of the warning signs of stroke is low, especially among black and Hispanic women. Despite the fact that black women reported easier access to information about stroke compared with white women, knowledge of stroke warning signs was demonstrated to be lower among black compared with white respondents. This suggests that information provided may be insufficient. Knowledge of stroke warning signs is also low among women between the ages of 25 and 34. More white women were aware that treatment exists for stroke. Only 30% of those treated had blood pressures below 140/90 mm Hg.7

The study by A. B. et al.8 evaluated the impact of physical activity on cardiovascular risk reduction. The incidence of stroke during an 8-year period was measured in a cohort of 72,488 women from the Nurses’ Health Study. Participants ranged in age from 40 through 65 and had no prior history of cardiovascular disease. The study found significant trends in risk reduction of total and ischemic strokes with physical activity.8 In a prospective study of 73,743 postmenopausal women ages 50 to 79, an inverse relation was found between increasing physical activity and total cardiovascular events. Women who either walked or performed vigorous exercises at least 2.5 hours per week had a 30% risk reduction of total cardiovascular events.9 A meta-analysis conducted to examine the association between physical activity and stroke incidence and mortality concluded that risk reduction of total,
ischemic, and hemorrhagic strokes was associated with moderate and high levels of physical activity. Ellekjaer et al found a decrease in stroke mortality with increased physical activity over a 10-year period in women 50 years and older. In the present study, only 28% of women reported exercising 4 or more times per week. Improving awareness of the benefits of lifestyle modification on stroke may help reduce its associated morbidity and mortality.

Risk factors for stroke including tobacco use, hypertension, elevated cholesterol, and diabetes were common among our study participants. Despite these reports, 53% of the women studied believed that they were at low risk for stroke compared with women their age. Control of risk factors remains an important target for intervention. The prevalence of obesity in the United States continues to rise at an alarming rate. Hypertension control rates remain low. Of known hypertensives, only 31% are controlled to a level <140/90 mm Hg. Rates of control have been reported to be lower for women compared with men. The Adult Treatment Panel III recommends that risk assessment be the initial step in the management of elevated cholesterol levels. Secondary prevention trials of lipid-lowering therapy have shown a significant risk reduction in stroke. The prevalence of risk factors such as hypertension and diabetes has been shown to be higher among racial/ethnic minorities compared with whites. The present study documents a low level of knowledge and awareness about stroke among US women. A significantly higher percentage of women recognized stroke warning signs in 2003 compared with survey years 1997 and 2000. Still, there remains a large margin for improvement in overall knowledge of the warning signs of stroke among women of all ages and racial/ethnic groups. Increasing awareness of the risk factors and warning signs of stroke among both women and men may be the initial step in reducing the burden of this disease.

This study has several limitations. The sample size of minority women was small. The study was conducted in English only, and results may not be generalizable to non–English-speaking women. However, because we excluded non–English-speaking women, it is likely that our estimates of awareness are conservative. Because of database constraints, we were unable to adjust for potential confounders such as socioeconomic status in evaluating the independent association of race/ethnicity and stroke awareness. Limitations to the data set did not allow us to compare clinical characteristics, such as the individual’s risk factors or understanding of her specific stroke risk, with knowledge of the warning signs of stroke.

This study emphasizes the importance of continued efforts to increase public awareness of stroke risk. Billings-Gagliardi et al demonstrated that incorporation of stroke prevention teaching into a core medical school curriculum can improve retention of stroke knowledge. Healthcare professionals can play a pivotal role in educating the public about stroke. Media may be one means of reaching women throughout the United States. Effective stroke prevention programs need to be developed on a national and community level. Targeted educational initiatives should be directed at those at highest risk, specifically racial/ethnic minorities and the elderly.

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References

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