Stroke Awareness in Brazil
Alarming Results in a Community-Based Study

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Background and Purpose—Stroke is the leading cause of death in Brazil. This community-based study assessed lay knowledge about stroke recognition and treatment and risk factors for cerebrovascular diseases and activation of emergency medical services in Brazil.

Methods—The study was conducted between July 2004 and December 2005. Subjects were selected from the urban population in transit about public places of 4 major Brazilian cities: São Paulo, Salvador, Fortaleza, and Ribeirão Preto. Trained medical students, residents, and neurologists interviewed subjects using a structured, open-ended questionnaire in Portuguese based on a case presentation of a typical patient with acute stroke at home.

Results—Eight hundred fourteen subjects were interviewed during the study period (53.9% women; mean age, 39.2 years; age range, 18 to 80 years). There were 28 different Portuguese terms to name stroke. Twenty percent did not recognize any warning signs of stroke. Only 34.6% of subjects answered the correct nationwide emergency telephone number in Brazil (#192). Only 51.4% of subjects would call emergency medical services for a relative with symptoms of stroke. In a multivariate analysis, individuals with higher education called emergency medical services (P=0.038, OR=1.5, 95% CI: 1.02 to 2.2) and knew at least one risk factor for stroke (P<0.05, OR=2.0, 95% CI: 1.2 to 3.2) more often than those with lower education.

Conclusions—Our study discloses alarming lack of knowledge about activation of emergency medical services and availability of acute stroke treatment in Brazil. These findings have implications for public health initiatives in the treatment of stroke and other cardiovascular emergencies. (Stroke. 2008;39:292-296.)

Key Words: awareness ■ education ■ emergency medical services ■ risk factors ■ symptoms
Table 1. English Version of the Questionnaire

Questions about the case report:
1. What do you think is happening to your aunt?
2. What would you do in this situation?
3. If you were going to remove her, where would be the most appropriate place to take her in this situation?
4. What is the telephone number of EMS (ambulance) in Brazil?
5. Is there treatment for this medical condition? (If yes, what is it?)
6. What would be the most appropriate medical specialty for taking care of your aunt in this situation?
7. What can be done to avoid having this medical condition?
8. Have you ever gone through some situation similar to that? (If yes, what did you do?)
9. Have you or any of your relatives or close friends ever experienced symptoms like that?
10. Have you ever had any training or teaching class about what to do in this situation? (If yes, where was it?)

Table 2. Demographic Profile of the Subjects Compared With National Data

<table>
<thead>
<tr>
<th>Variable</th>
<th>N=801 (%)</th>
<th>Brazil (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>369 (46.1)</td>
<td>49.2</td>
</tr>
<tr>
<td>Female</td>
<td>432 (53.9)</td>
<td>50.8</td>
</tr>
<tr>
<td>Age group, years</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18–39</td>
<td>449 (56.0)</td>
<td>36.8</td>
</tr>
<tr>
<td>40–59</td>
<td>233 (29.1)</td>
<td>18.7</td>
</tr>
<tr>
<td>60–79</td>
<td>119 (14.9)</td>
<td>7.5</td>
</tr>
<tr>
<td>Private health insurance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>415 (51.8)</td>
<td>24.5</td>
</tr>
<tr>
<td>No</td>
<td>386 (48.2)</td>
<td>75.5</td>
</tr>
<tr>
<td>Years of schooling</td>
<td></td>
<td></td>
</tr>
<tr>
<td>None or less than 1</td>
<td>8 (1)</td>
<td>10.8</td>
</tr>
<tr>
<td>1–3</td>
<td>29 (3.6)</td>
<td>14.2</td>
</tr>
<tr>
<td>4–7</td>
<td>99 (12.4)</td>
<td>31.3</td>
</tr>
<tr>
<td>8–10</td>
<td>124 (15.5)</td>
<td>16.4</td>
</tr>
<tr>
<td>11 or more</td>
<td>541 (67.5)</td>
<td>27.3</td>
</tr>
</tbody>
</table>

Questionnaire

The study questionnaire was designed to prompt a lay-subject response to an acute stroke scene in a close relative. The first part of the questionnaire gathered demographic information. Education was evaluated as the numbers of years at school, college, or university. In the second part, the interviewed subject was faced with a case report in Portuguese of a typical patient with acute stroke that could be translated to English as follows: “Suppose you have a 65 year-old aunt who lives close to your home. One day, during a conversation, she suddenly starts to have difficulty speaking and walking. As you try to help her, you notice some weakness on her right arm and leg, her face is drooping on the right side and you cannot understand what she is trying to say.”

This case report was followed by 10 subjective questions that addressed stroke recognition, immediate response of rescuer, activation of emergency medical service (EMS), transportation to the hospital, notions about treatment, and risk factors for cerebrovascular diseases (Table 1). Questions were directed to invoke the first 3 pathways of response suggested by the American Stroke Association community-oriented “Stroke Chain of Survival,” ie, stroke detection, dispatch, and delivery.

Statistical Analysis

All statistical analyses were performed using a SPSS software version 13.0 (SPSS Inc.). Chi square test was used to assess the univariate relationship between components of stroke knowledge and demographic variables. Multivariate binary logistic regression was used to assess simultaneous contribution of independent variables: age (≥ or <40 years), gender, educational level (defined as “higher” if more than 7 years of schooling), and private health insurance versus public healthcare coverage. Subjective answers were analyzed by one of the authors (O.M.P.N.) who looked for unspecified coded categories and predetermined words to assist with quantifying the data. Dependent variables included first reaction of rescuers (call rescue, take the patient to the hospital, or other actions), remembering the correct nationwide emergency telephone number, and awareness about at least one risk factor for stroke. Variables were eliminated in a stepwise backward fashion if they failed to reach significance (P<0.05) until a final model resulted. Finally, ORs and 95% CIs were generated for all terms in the final models.

Results

A total of 814 subjects were interviewed and consented to participate in the study. We excluded 13 questionnaires due to inappropriate age or incomplete information. In the final analysis, 801 subjects were included. Four hundred thirty-three (53.9%) were women. The mean age was 39.2±16.2 years (range, 18 to 80 years). The demographic details are shown in Table 2.

Stroke Recognition and Words to Name Stroke

Of 34 different explanations of the case report offered by the participants (Table 1, Question 1), there were 28 unique words used to describe stroke. “Derrame” (Portuguese term meaning “spillage”) was the most common name mentioned by 380 (47.4%) subjects followed by the acronym “AVC” (cerebrovascular accident) cited by 118 (14.8%) subjects, “infarto” (infarct) by 85 (10.6%) subjects, and “trombose” (thrombosis) by 79 (9.9%) subjects. One hundred twenty-five (15.6%) subjects correctly named “cerebrovascular accident” as the actual meaning of the abbreviation “AVC,” which is the most common term for stroke among neurologists in Brazil. After being exposed to the case report, 178 (22.2%) subjects did not recognize any of the presented warning signs and suggested an alternative diagnosis like myocardial infarction, cancer, or epilepsy.

Respondent’s Reaction to Stroke Symptoms

Faced with the possibility of a close relative exhibiting warning signs of stroke (Table 1, Question 2), 412 (51.4%) subjects informed that they would call EMS rescue, 310 (38.7%) subjects would take their relative to a hospital, 21
(2.6%) would take their relative to an outpatient clinic, and 58 (7.2%) would take other actions, including leaving the patient resting in bed or giving him or her antihypertensive medications. According to the multivariate analysis, subjects with higher education called EMS more often (53.5% versus 41.2%, \( P < 0.05 \)) than those individuals with lower education. Younger subjects (<40 years of age) also called EMS more often (55.5% versus 46.3%, \( P < 0.05 \)) than those individuals >40 years of age. Private health coverage (55.6% versus 51.3%, \( P < 0.05 \)) and male gender (54.5% versus 48.8%, \( P < 0.05 \)) were not significantly related to respondents’ reaction to call EMS. When asked about the nationwide emergency telephone numbers in Brazil, 277 (34.6%) subject correctly listed “192” or “193.” Five hundred twenty-four (65.4%) subjects did not know the correct ones or listed wrong numbers like the police number or 911 (EMS number in the United States, Canada, Argentina, and some other countries). Although there was a trend for subjects with higher education to be more able to name the correct emergency telephone number in Brazil than those with lower education (35.9% versus 27.9%, \( P = 0.074 \)), the difference was not statistically significant (Table 3).

**Access to Information About Stroke**
After being exposed to the scenario, 252 (31.5%) subjects reported having experienced or heard of a similar situation in a family member or close friend. Only 81 (10.1%) individuals reported having received information about stroke: 33 (40.7%) at school, 14 (17.3%) during first aid class at the time of driver licensing, and 11 (13.6%) by television; 23 (28.4%) reported less frequent sources of information. Subjects with higher education level reported more often having received information about warning signs of stroke (11.4% versus 3.7%, \( P = 0.006 \)).

**Risk Factors for Stroke**
Subjects identified the following as risk factors: smoking, 401 (50.1%); hypertension, 241 (30.1%); lack of exercise, 231 (28.8%); alcohol consumption, 164 (20.5%); high cholesterol, 123 (15.4%); stress, 92 (11.5%); obesity, 42 (5.2%); and diabetes, 14 (1.7%). One hundred forty-eight (18.5%) participants did not know a single risk factor. One hundred thirty (16.2%) individuals could name one risk factor correctly, 207 (25.8%) subjects knew 2 risk factors, and 316 (39.5%) of them could name 3 or more risk factors. Higher education (\( P < 0.05 \), OR: 2.0, 95% CI: 1.2 to 3.2) and age >40 years (\( P < 0.05 \), OR: 2.4, 95% CI: 1.5 to 3.3) were independently associated with knowing at least one risk factor in both univariate analysis and multivariate logistic regression analysis (Table 3).

**Knowledge of Stroke Treatment**
When asked about acute treatment for stroke, 542 (67.7%) believed that some kind of treatment was available; 143 (17.9%) believed there was no treatment at all in the acute phase. Physiotherapy was the most cited treatment for the acute phase of stroke with 101 (12.6%) subjects. Only one individual, of 801, stated that “some kind of medicine” could be given intravenously in the first 3 hours of acute stroke to provide treatment; that was the only reference for thrombolytic therapy. Among 15 different medical specialties, the neurologist was stated to be the specialist responsible for acute stroke treatment by 212 (26.5%), whereas the cardiologist was stated by 277 (34.6%).

**Discussion**
Coronary heart disease and stroke remain the leading causes of mortality in Latin America. In Brazil, a nationwide study demonstrated that stroke has been the leading cause of death over the past 20 years. The lack of public education about
stroke prevention, recognition, and treatment may contribute in a large scale to this worrisome reality. Indeed, our study discloses alarming results on lay knowledge about stroke recognition and activation of EMS in Brazil. Despite the fact that our convenience sample of the adult urban population had significantly higher education and socioeconomic status than the average Brazilian population, we found disconcerting ignorance of vital information about the treatment of the most deadly disease in Brazil.

There were 28 different words to name stroke. The term “AVC,” the Portuguese abbreviation for cerebrovascular accident, which is the current most often used term for stroke among neurologists in Brazil, was cited by only 118 (14.8%) of subjects. The term “derrame,” which was the most cited by subjects, means “spillage” and is more related to bleeding than to thrombosis. In addition, the term “brain attack” is usually related to seizure in Portuguese. That abundance of designations, besides attesting to the impact of stroke morbidity and mortality in Brazilian culture, also corroborates the exiguity of national initiatives for a unified effort to fight the burden of this disease. More recently, the Brazilian Stroke Society has started a national campaign to call this syndrome “AVC” and improve the awareness among health professionals, the public, and the media.

Only 34.6% of subjects correctly listed “192” or “193” as the nationwide emergency telephone numbers in Brazil, whereas 65.4% of subjects did not know the correct ones or listed wrong numbers. Subjects with higher education tended to list more often the correct emergency telephone number in Brazil than subjects with a lower educational level. Only 51.4% of subjects would call EMS if a close relative presents symptoms of stroke and almost 40% of respondents would take their relative to a hospital instead of accessing the EMS system. Moreover, instead of the neurologist, the cardiologist tended to be pointed out as the most indicated specialist responsible for acute stroke treatment, which is certainly not the case in Brazil. This troublesome confusion on the activation of EMS may cause substantial delay in the treatment of stroke and other cardiovascular emergencies. That also reflects the paucity of government policies for education and training about medical emergencies and first aid.

Most studies from developed countries have found that knowledge about stroke varies positively with income and education but is lower in men than women.9,10 In a recent hospital-based survey from India, 21% of subjects could not identify even a single risk factor for stroke.11 The percentage of respondents who identified at least one risk factor for stroke in our study was comparable to other studies from developed and underdeveloped countries10–14 (Table 4). Smoking, which has been extensively targeted by government campaigns in Brazil, was the only risk factor that was recognized by more than 50% of subjects. The average awareness of other stroke risk factors among individuals was poor in our study but was significantly lower among those respondents with lower education level and those older than 40 years of age. Similar studies in other countries have also found stroke awareness to be worse among older participants even after targeted community intervention.11,13 Future educational efforts should especially focus individuals with low income and unquestionably include elderly subjects.

Regarding knowledge about stroke treatment, we found that one of 3 subjects is skeptical about it or is not aware that stroke has effective treatment in the acute phase. Of greatest concern, only one individual, of 801, made reference to thrombolytic therapy as a treatment for stroke. We believe that this lack of awareness about acute stroke treatment is related to the low availability of this therapy in Brazil. The fact that we did not find better awareness about stroke reperfusion therapy in subjects with private healthcare coverage may indicate that the problem is still present in more affluent parts of society.

It is important to consider some limitations of our study, mainly related to the choice of personal interviews instead of the typical random digit telephone survey of developed countries. Population-based telephone interview surveys using random digit dialing may be inappropriate in Brazil because many people from the poor areas of urban centers may not have a telephone. Similar to previous studies in developing countries,11 we decided to interview subjects in public areas, although they may not be representative of the whole Brazilian population, as well. Indeed, the produced sample had more education, higher socioeconomic status, and a higher level of private healthcare coverage than the general Brazilian population. However, we expect that in a sample with more illiteracy and lower socioeconomic status, results would reveal even more limited access to information about

### Table 4. Comparison With Studies That Used Open-Ended Questionnaires

<table>
<thead>
<tr>
<th>Risk Factors</th>
<th>United States, 1998, 10%</th>
<th>Australia, 2001, 10%</th>
<th>South Korea, 2002, 10%</th>
<th>United States, 2001, 10%</th>
<th>India, 2004, 10%</th>
<th>This Study, 2005, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>14</td>
<td>12.3</td>
<td>30.4</td>
<td>20</td>
<td>21</td>
<td>18.5</td>
</tr>
<tr>
<td>Hypertension</td>
<td>49</td>
<td>31.8</td>
<td>28.7</td>
<td>32.3</td>
<td>45.1</td>
<td>30.1</td>
</tr>
<tr>
<td>Stress</td>
<td>23</td>
<td>33.7</td>
<td>6.8</td>
<td>32.3</td>
<td>40.9</td>
<td>11.5</td>
</tr>
<tr>
<td>Poor eating</td>
<td>20</td>
<td>32.2</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>35.6</td>
</tr>
<tr>
<td>Smoking</td>
<td>19</td>
<td>39.4</td>
<td>2</td>
<td>29.2</td>
<td>1.2</td>
<td>50.1</td>
</tr>
<tr>
<td>High cholesterol</td>
<td>16</td>
<td>13.5</td>
<td>7.3</td>
<td>18.4</td>
<td>6.7</td>
<td>15.4</td>
</tr>
<tr>
<td>Obesity</td>
<td>16</td>
<td>26.8</td>
<td>...</td>
<td>18.1</td>
<td>3.2</td>
<td>5.2</td>
</tr>
<tr>
<td>Heart disease</td>
<td>5</td>
<td>...</td>
<td>0.1</td>
<td>5.3</td>
<td>2.0</td>
<td>0.4</td>
</tr>
<tr>
<td>Alcohol</td>
<td>4</td>
<td>2.8</td>
<td>1.1</td>
<td>6</td>
<td>5.1</td>
<td>20.5</td>
</tr>
<tr>
<td>Diabetes</td>
<td>3</td>
<td>...</td>
<td>0.2</td>
<td>2.4</td>
<td>10.7</td>
<td>1.7</td>
</tr>
</tbody>
</table>
stroke. In any case, this assumption should be confirmed by subsequent studies.

Improving stroke-related knowledge may advance stroke prevention and treatment and has been declared a health priority in North America and Europe. Studies that looked at stroke recognition and activation of EMS in many developed countries have almost invariably concluded that interventions are needed to move more strongly link stroke recognition to immediate action and increase the number of patients with stroke who are eligible for acute treatment.\textsuperscript{10,12–15} In developing countries such as Brazil, the challenge seems to be even larger because authorities have to face an extreme paucity of specialized stroke centers, overcrowding of emergencies, and nihilism against stroke treatment by the lay population and healthcare professionals.

**Summary**

In conclusion, the important findings that emerge from this study in Brazil is the alarming lack of knowledge about activation of EMS and ignorance about the availability of acute stroke treatment by the adult population at Brazilian urban centers. Surprisingly, such aspects were present even in a sample with more education, higher socioeconomic status, and a higher level of private healthcare coverage than the general population. To reduce public confusion, it is important to reach a consensus name for stroke in Brazil and to ensure more Brazilians know that stroke is a medical emergency and has effective treatment in the acute phase. We believe that a national effort to improve public awareness about how to access EMS in Brazil (the EMS telephone number) is urgent and imperative to decrease stroke impact in Brazilian society.

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**Disclosures**

None.

**References**

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