Barriers to Acute Stroke Therapy and Stroke Prevention in Mexican Americans

Lewis B. Morgenstern, MD; Lyn Steffen-Batey, PhD; Melinda A. Smith, MPH; Lemuel A. Moyé, MD, PhD

Background and Purpose—The purpose of this study was to identify specific targets to improve acute stroke treatment and stroke prevention in the Mexican American (MA) community.

Methods—A professional, academic survey research team provided structured questions and elicited responses from 719 subjects identified by random-digit dialing in the biethnic community of Corpus Christi, Texas. This community of approximately 300,000 is approximately half MA and half non-Hispanic white (NHW). The cooperation rate for the survey was 58%.

Results—MAs (n=357) were younger, less well educated, and had lower family income than NHWs (n=362, P=0.001). MAs had a higher prevalence of diabetes mellitus (P=0.001) but similar rates of hypertension, elevated cholesterol, and current tobacco use. MAs less commonly recognized that acute stroke therapy existed (P=0.029), were less likely to acknowledge a time window for acute stroke treatment (P=0.001), and were more reticent to say they would call 911 for stroke symptoms (P=0.01) than NHWs. MAs were significantly less able to recall stroke symptoms and risk factors than NHWs. Only approximately 20% of both groups identified stroke as the No. 1 cause of disability. MAs expressed less confidence in their ability to prevent stroke (P<0.001), more distrust in the medical establishment (P=0.007), and more concern that money impedes their seeking medical care (P<0.001).

Conclusions—There are significant barriers to both acute stroke treatment and stroke prevention in MAs. This study identifies specific targets amenable for testing in an intervention project following confirmation by a methodology other than telephone survey. (Stroke. 2001;32:1360-1364.)

Key Words: Hispanic Americans ■ Mexican Americans ■ minority groups ■ stroke, acute ■ stroke prevention

Planning effective public health interventions to improve stroke prevention and acute stroke treatment in high-risk populations requires identification of salient factors to target. Resources are limited and educational campaigns expensive. Quantitative research may aid the determination of resource allocation to increase the effectiveness and efficiency of stroke prevention and acute stroke treatment programs.

A paucity of information on stroke in Hispanic Americans has led a call for more research to specifically identify targets to reduce the burden of stroke in this population.1 Stroke incidence in Hispanic Americans is likely higher than in non-Hispanic whites (NHWs).2 Stroke subtypes in Hispanic Americans are distinctly different from those in NHWs, again suggesting the need for independent investigation to address stroke in the Hispanic American population.2–4 Hispanic Americans are the fastest growing minority group in the United States,5 and Mexican Americans (MAs) constitute the largest subgroup of this important population.6 Stroke mortality is higher in young MAs but reportedly lower in older MAs than in NHWs.7,8 Risk factor profiles would predict higher stroke rates in MAs,9 and indeed some have explained the lower stroke mortality in older MAs as a function of vital statistics error.7,10 Intracerebral hemorrhage mortality is at least as high as that found in NHWs at all ages.11 Recently, in a pilot study, stroke attack rates were noted to be higher in MAs than in NHWs at all ages.12 The present study used a professional, academic survey research strategy to detect prevalence differences among MAs and NHWs in stroke risk factors; differences in knowledge of stroke risk factors and acute stroke therapy resources; and access to quality medical care differences that may explain barriers to utilization of these resources.

Subjects and Methods

This study was conducted in the biethnic community of Nueces County, Texas. Nueces County is located on the Texas Gulf Coast and is approximately 150 miles from Houston and San Antonio. The population of the county is approximately 300,000, and 95% reside within the city of Corpus Christi.11 Hispanic Americans constitute 52% of the population, and 92% of these are MA. Of the remaining 48%, 43% are NHW. The 1990 US census13 showed sociodemo-
graphic differences between these 2 major groups in Nueces County. The differences in income and education for MA and NHW in Nueces County are quite similar to the levels for these respective ethnic groups in Texas as a whole. This suggests that the population of Nueces County may reflect closely the characteristics of the broader population of MAs.

This project was approved by the University of Texas at Houston Committee for the Protection of Human Subjects. The surveys were completed orally by telephone interview. In the 1990 census, 91% of households in Nueces County had telephones.13 This information is not available by ethnicity. The survey contained demographic items; questions about access to quality medical care and acculturation; an inventory of personal stroke risk factors; free recall of stroke risk factors and acute stroke symptoms; behavioral intentions relating to stroke prevention and acute stroke; and a set of Likert Scale questions regarding attitude toward the US healthcare system and barriers to stroke prevention and acute treatment. Ethnicity was defined by self-report. The survey was translated into Spanish and back translated by native Spanish speakers. The instrument was pilot tested in a multiethnic volunteer group and refined for clarification.

The Public Policy Research Institute (PPRI) of Texas A&M University administered the survey in Corpus Christi. The PPRI is a highly experienced professional, academic survey research service. Interviewers were trained and supervised. Surveys were administered in Spanish or English by the same interviewer who read a script for standardization. PPRI was asked to obtain data from 600 subjects oversampled older residents by requiring that at least 33% of the sample in both ethnic groups occur in subjects older than 50 years. The goal was to interview 25% MA women, 25% NHW men, 25% NHW women, and 25% NHW men. We oversampled older residents by requiring that at least 33% of the sample in both ethnic groups occur in subjects older than 50 years. Interviews began on July 22, 1999, and were completed by September 30, 1999. Households were identified by random-digit dialing from a random telephone list of Nueces County residences provided by Survey Sampling Inc.

A total of 18 361 calls were attempted, and 870 interview hours were required to complete the process. Supervisory staff monitored 146 calls (16%). Each interview averaged 10.7 minutes in duration. A total of 719 subjects completed the interviews. The ethnic and sex composition of the sample is shown in Table 1. The final cooperation rate was 58%.

Ethnic differences in survey responses were determined. The analysis compared responses among MAs and NHWs. Two-tailed \( t \) tests were used to determine the variation in the distributions of continuous variables. The Mantel-Haenszel \( \chi^2 \) statistic was used to test for variation in the distributions of categorical variables. Logistic regression analyses were used to assess the relationships between ethnicity and the variables of interest.

**Results**

Of the 719 subjects enrolled, 357 were MA and 362 were NHW. Table 2 presents demographic and access to care data for the respondents. MA respondents were younger than the NHWs, which is reflective of differences in these populations in Texas. MAs, on average, had resided in Corpus Christi longer than NHWs. Education and income achieved were significantly less in the MA group than in NHWs. Table 2 also demonstrates ethnic-specific awareness of acute stroke therapy. MAs were less likely to recognize that acute treatment for stroke existed; less likely to acknowledge a short time window for acute stroke therapy; and less likely to say they would call 911 if they or a loved one were having a stroke. None of the respondents from either group said “TPA,” “clot-busting drug,” or anything similar when asked to report the name of any specific therapy for someone who has just had a stroke.

Table 3 identifies prespecified variables likely to influence stroke prevention efforts: having a primary care physician, having insurance, and seeing a physician within the past year. Although prevalence estimates indicate that significantly fewer MAs have a primary care physician than NHWs, logistic regression analysis shows that the likelihood of having a primary care physician is similar among the 2 groups after adjustment for age, sex, education, and insurance. Additionally, the prevalence of MAs who do not have health insurance was significantly greater than among NHWs. However, in logistic regression analysis after adjustment for age, sex, and education, no significant difference remains.

There were no differences between the 2 ethnic groups in prevalence of seeing a physician within the past year. Table 3 also reports personal history of stroke risk factors. MAs are more likely to have been told by a physician that they have diabetes than NHWs, but this was not true for hypertension or high serum cholesterol. Since there were no ethnic differences in prevalence of seeing a physician within the past year, we are reasonably confident that the ethnic comparison of risk factors is not confounded by lack of physician contact.

Table 4 reports the ethnic-specific free recall of stroke risk factors. When adjusted for age, sex, education, insurance, and a personal history of stroke, MAs were approximately half as likely to recall hypertension or tobacco use as stroke risk factors compared with NHWs. MAs more frequently named diabetes mellitus, but <10% in both groups were able to recall this risk factor. Only approximately 20% of both groups recognized that stroke was the No. 1 cause of disability (22% MA, 19% NHW; \( P=0.29 \). Table 4 also reports the ethnic-specific free recall of acute stroke symp-
Subjects were asked to respond to a series of Likert Scale–type statements to determine the ethnic-specific attitudes regarding health behaviors related to stroke. The Figure shows the 3 questions in which ethnic differences were elicited. MAs less commonly expressed a belief that their actions could prevent them from having a stroke than NHWs (Figure, panel A). Similarly, MAs expressed less trust in physicians and hospitals than NHWs (Figure, panel B). Money was found to be a significant barrier in seeking acute stroke care more commonly among MAs than among NHWs (Figure, panel C). No ethnic differences were found for statements regarding confidence in the US medical care system or preference to care for health problems at home.

Discussion
This study found significant barriers for MAs to achieve adequate stroke prevention and acute stroke therapy. Access to quality medical care for Hispanic American populations is a challenge facing public health efforts in the United States as this population ages and increases in number. Previous research has shown the relative importance of access to care compared with acculturation in use of preventive healthcare services by Hispanic Americans. Acculturation is the process of adopting the language and community identity of a new country for an immigrant. The present study was conducted in a community of mostly second and third generation US residents. Indeed, the MAs, on average, resided in Nueces County longer than the NHWs. This factor allows a more pure assessment of the relationship of ethnicity to access to care.

The purpose of the present research was not only to uncover obstacles facing MAs in stroke prevention and acute stroke therapy but also to identify specific targets for intervention. For acute stroke, it appears that knowledge about stroke warning signs is not enough. Both groups did quite poorly in stroke symptom recall. Although MAs were signif-

### Table 3. Prevalence and Odds Ratios of Risk Factors and Access to Care Variables for Stroke Prevention Reported by MA and NHW Men and Women (n=719)

<table>
<thead>
<tr>
<th>Variable</th>
<th>MA, %</th>
<th>NHW, %</th>
<th>P*</th>
<th>Odds Ratio (95% CI)†</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access to care</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary care physician</td>
<td>69</td>
<td>77</td>
<td>0.02</td>
<td>1.01 (0.68–1.5)</td>
</tr>
<tr>
<td>No insurance</td>
<td>21</td>
<td>13</td>
<td>0.001</td>
<td>1.20 (0.73–1.8)‡</td>
</tr>
<tr>
<td>Saw physician ≤1 y</td>
<td>80</td>
<td>79</td>
<td>0.87</td>
<td>0.84 (0.57–1.3)</td>
</tr>
<tr>
<td>Risk factors</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypertension</td>
<td>31</td>
<td>35</td>
<td>0.18</td>
<td>0.98 (0.70–1.4)</td>
</tr>
<tr>
<td>Diabetes</td>
<td>15</td>
<td>9</td>
<td>0.02</td>
<td>2.10 (1.2–3.4)</td>
</tr>
<tr>
<td>High cholesterol</td>
<td>25</td>
<td>28</td>
<td>0.65</td>
<td>1.25 (0.86–1.8)</td>
</tr>
<tr>
<td>Current smoker</td>
<td>24</td>
<td>25</td>
<td>0.74</td>
<td>0.66 (0.46–0.98)</td>
</tr>
</tbody>
</table>

NHW is used as the referent group.
*χ² test.
†Logistic regression adjusted for age, sex, education, and insurance status.
‡Logistic regression adjusted for age, sex, and education.

### Table 4. Prevalence and Odds Ratios of Free Recall of Stroke Risk Factors and Acute Stroke Symptoms by MA and NHW Men and Women (n=719)

<table>
<thead>
<tr>
<th>Variable</th>
<th>MA, %</th>
<th>NHW, %</th>
<th>P*</th>
<th>Odds Ratio (95% CI)†</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk factors</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypertension</td>
<td>21</td>
<td>37</td>
<td>0.001</td>
<td>0.58 (0.41–0.83)</td>
</tr>
<tr>
<td>Diabetes</td>
<td>8</td>
<td>5</td>
<td>0.08</td>
<td>2.18 (1.1–4.3)</td>
</tr>
<tr>
<td>Cholesterol</td>
<td>19</td>
<td>27</td>
<td>0.01</td>
<td>0.77 (0.53–1.1)</td>
</tr>
<tr>
<td>Smoking</td>
<td>18</td>
<td>34</td>
<td>0.001</td>
<td>0.48 (0.33–0.70)</td>
</tr>
<tr>
<td>Stroke symptoms</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Numbness</td>
<td>31</td>
<td>38</td>
<td>0.07</td>
<td>0.78 (0.56–1.09)</td>
</tr>
<tr>
<td>Speech</td>
<td>13</td>
<td>23</td>
<td>0.001</td>
<td>0.66 (0.43–0.99)</td>
</tr>
<tr>
<td>Weakness</td>
<td>17</td>
<td>22</td>
<td>0.13</td>
<td>0.93 (0.63–1.4)</td>
</tr>
<tr>
<td>Vision</td>
<td>7</td>
<td>15</td>
<td>0.001</td>
<td>0.51 (0.30–0.86)</td>
</tr>
<tr>
<td>Facial droop</td>
<td>9</td>
<td>15</td>
<td>0.03</td>
<td>0.75 (0.35–0.94)</td>
</tr>
</tbody>
</table>

NHW is used as the referent group.
*χ² test.
†Logistic regression analysis adjusted for age, sex, education, insurance status, and history of stroke.
present research suggests that education regarding stroke symptoms should be accompanied with a clear message of why this information is important, particularly in ethnic groups, including MAs, with a relative distrust of the medical system. There are no published studies on the relative efficacy of intravenous recombinant tissue plasminogen activator for acute stroke in MAs. However, the cardiac literature suggests equal efficacy of thrombolytics for myocardial infarction in Hispanics and NHWs despite increased delay time to treatment in Hispanics.17

Stroke prevention efforts in MAs may be helped by calling attention to risk factor reduction. Again, however, motivation is crucial. MAs clearly feel less empowered to prevent themselves from having a stroke compared with NHWs. The message to those at risk must explain that awareness and action regarding risk factor reduction are linked to reduced disability and mortality. Fatalistic religious beliefs among certain Hispanic populations may make this difficult18 and suggest that education through churches and clergy may be advantageous. Since it appears that MAs and NHWs visit a physician with similar regularity, a trusted primary care physician may facilitate increased knowledge and behavior regarding stroke prevention.

The present study results demonstrate risk factor differences between MAs and NHWs. MAs were more likely to have a history of diabetes mellitus. Hypertension, lipids, and smoking history were similar between the 2 groups. While diabetes appears to be a salient risk factor for stroke in the MA community, <10% of subjects from either ethnic group could name it as a risk factor for stroke. Despite the fact that MAs in Corpus Christi are not an immigrant population, there were also significant socioeconomic and access to care (insurance) differences between the 2 ethnic groups. These differences, coupled with diabetes, may play a role in the increased stroke attack rates seen in MAs compared with NHWs12 and greater stroke rates complicating acute heart disease.19

This study is limited by the methodology of survey research. Subgroups that are more highly educated and are of higher socioeconomic status are likely to participate in this research compared with the general population. However, the differences between MAs and NHWs in our sample are reflective of differences between Hispanic Americans and NHWs in the United States.20 Recall responses among NHWs in this survey were quite similar to NHW responses in a study done in Cincinnati recently.21 This study focused on relative differences in personal risk factors among the 2 race/ethnic groups. Since there was no difference in the percentage of subjects visiting a physician within the previous year (Table 3), the comparison of knowledge of personal risk factors was not confounded by differences in recent access to a physician. MAs may have not understood the questions as well because of language and education differences. Since the survey was translated and extensively pilot tested, we think that this is unlikely. Additionally, the quality and quantity of the interaction with physicians were not assessed in this study and may have differed by ethnicity. Whether the ethnic differences in the prevalence of stroke risk factors and access to
care mediate differences in stroke incidence or stroke mortality requires a community-based surveillance project.

As a telephone survey, validation of personal risk factor information was not possible. To validate the telephone survey methodology, we used information from a face-to-face patient and/or closest individual interview of all verified stroke patients in Nueces County during the first 6 months of 2000. The Brain Attack Surveillance in Corpus Christi (BASIC) project is an active and passive community-based stroke surveillance project in Nueces County. Cases aged 45 years and older are identified and abstracted by trained abstractors and verified by fellowship-trained stroke neurologists. Ethnic differences among stroke patients were available for demographic, access to care, and risk factors. The BASIC patient interview found similar ethnic differences in demographic, access to care, and risk factor profiles. Completion of high school was more common in NHWs ($P=0.001$), and a family income of <$20 000 was more common in MAs ($P=0.001$). Identification of a primary care physician was similar among both ethnicities ($P=0.63$), as was seeing a physician within the previous 12 months ($P=0.22$). Prevalence of current smoking, hypertension, and elevated cholesterol did not differ between groups. Diabetes mellitus was more common in MAs ($P=0.001$).

The variables identified in the present study establish clearly identified factors whose attributable risk can be identified in population-based studies. This study took place in a nonimmigrant MA community. While this enabled a more pure assessment of ethnic differences, the findings may not be generalizable to other MA populations with less access to healthcare services. Comparisons with other Hispanic populations are also needed before generalization to non-MA Hispanic groups.

Acknowledgments

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References


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