Brief Report

Mexican Americans Receive Less Intensive Stroke Rehabilitation Than Non-Hispanic Whites

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Background and Purpose—Mexican Americans (MAs) have worse neurological, functional, and cognitive outcomes after stroke. Stroke rehabilitation is important for good outcome. In a population-based study, we sought to determine whether allocation of stroke rehabilitation services differed by ethnicity.

Methods—Patients with stroke were identified as part of the Brain Attack Surveillance in Corpus Christi (BASIC) project, TX, USA. Cases were validated by physicians using source documentation. Patients were followed prospectively for 3 months after stroke to determine rehabilitation services and transitions. Descriptive statistics were used to depict the study population. Continuous baseline variables were compared using 2 sample t tests or Wilcoxon rank-sum tests by ethnicity. Categorical baseline variables were compared using χ² tests. Ethnic comparisons of rehabilitation services were compared using χ² tests, Fisher’s exact tests, and logistic regression.

Results—Seventy-two subjects (50 MA and 22 non-Hispanic white [NHW]) were followed. Mean age, NHW-69 (SD 13), MA-66 (SD 11) years; sex (NHW 55% male, MA 50% male) and median presenting National Institutes of Health Stroke Scale did not differ significantly. There were no ethnic differences among the proportion of patients who were sent home without any rehabilitation services (P=0.9). Among those who received rehabilitation, NHWs were more likely to get inpatient rehabilitation (73%) compared with MAs (30%), P=0.016. MAs (51%) were much more likely to receive home rehabilitation services compared with NHWs (0%) (P=0.0017).

Conclusions—In this population-based study, MAs were more likely to receive home-based rehabilitation, whereas NHWs were more likely to get inpatient rehabilitation. This disparity may, in part, explain the worse stroke outcome in MAs. (Stroke. 2017;48:00-00. DOI: 10.1161/STROKEAHA.117.016931.)

Key Words: brain ■ disparity ■ Hispanic ■ population ■ rehabilitation ■ stroke

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University of Michigan institutional review board, the institutional review boards of both local hospital systems, and written informed consent was obtained from the subjects.

Data Analysis
Descriptive statistics were used to describe the study population. Continuous baseline variables were compared using 2 sample t tests or Wilcoxon rank-sum tests by ethnicity. Categorical baseline variables were compared using \( \chi^2 \) tests. Ethnic comparisons of rehabilitation outcomes were compared using \( \chi^2 \) tests or Fisher’s exact tests. A logistic regression model was used to compare the proportions of MAs and NHWs who used IRF as their first rehabilitation among those who ever received any rehabilitation services. Older age (<65 versus ≥65 years of age) was controlled for in the model as a single binary confounder. As this was a pilot investigation, the study was not powered to consider confounders and the prespecified analysis plan was to examine the crude association of rehabilitation services with ethnicity.

Results
Seventy-eight MA or NHW subjects consented to participate. Of these, 6 died or could not be located after hospital discharge leaving 72 available for analysis. Of these, 48 received any type of rehabilitation service. A flow diagram of subjects in the study is shown in Figure 1. Of the 72 subjects, 18 were discharged to an IRF from the acute stroke hospitalization. Only 2 subjects were subsequently transitioned to an IRF, 1 initially sent home without rehabilitation services and 1 from an SNF. Table provides the demographic and clinical data of the 72 participants by ethnicity. There were no significant differences in initial stroke severity or insurance status among the 2 ethnic groups. Of NHWs, 45% were discharged with any rehabilitation services, whereas 44% of MAs received any rehabilitation services post discharge (\( P = 0.9 \)).

Figure 2 shows the location for subjects who received any rehabilitation services. Among those who had rehabilitation, NHWs (100%) were more likely to go to an IRF or SNF compared with MAs (49%), \( P = 0.002 \), who were significantly more likely to have rehabilitation services as an outpatient or at home. NHWs (73%) were significantly more likely to go to an IRF compared with MAs (30%), \( P = 0.016 \). To control for age and Medicare insurance, we examined subjects who got any rehabilitation service using age <65 versus ≥65 years as a binary confounder in the regression model. After this adjustment, NHWs were four and a half times more likely to go to an IRF as their first rehabilitation location compared with MAs (odds ratio, 4.6; 95% confidence interval, 0.94–22.5).

Table. Demographic and Clinical Characteristics of the Participants

<table>
<thead>
<tr>
<th>Race/ethnicity</th>
<th>NHW (n, %)</th>
<th>MA (n, %)</th>
<th>All (n, %)</th>
<th>( P ) Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>22 100%</td>
<td>50 100%</td>
<td>72 100%</td>
<td></td>
</tr>
<tr>
<td>Age, median</td>
<td>71 63%</td>
<td>3.0 3.0</td>
<td>3.0 3.0</td>
<td>0.58</td>
</tr>
<tr>
<td>Initial NIHSS, median</td>
<td>2.5 3.0</td>
<td>3.0 3.0</td>
<td>3.0 3.0</td>
<td>0.58</td>
</tr>
<tr>
<td>Sex</td>
<td>Male 12 55%</td>
<td>25 50%</td>
<td>37 51%</td>
<td>0.72</td>
</tr>
<tr>
<td></td>
<td>Female 10 46%</td>
<td>25 50%</td>
<td>35 49%</td>
<td></td>
</tr>
</tbody>
</table>

\( P \) value for education and insurance is based on Fisher’s exact test, whereas \( P \) value for sex is based on \( \chi^2 \) test. MA indicates Mexican American; NHW, non-Hispanic white; and NIHSS, National Institutes of Health Stroke Scale.

Figure 1. Flow chart of subjects in the study. HHA indicates Home Health Agency; IRF, inpatient rehabilitation facility; OP, outpatient rehabilitation; and SNF, skilled nursing facility.

Figure 2. Distribution of first rehabilitation setting by ethnicity among those who received any rehabilitation services. IRF indicates inpatient rehabilitation facility; MA, Mexican American; NHW, non-Hispanic white; and SNF, skilled nursing facility.
Discussion
This initial investigation of rehabilitation allocation among MAs and NHWs in a community found a significant disparity suggesting that MAs get less intensive stroke rehabilitation than NHWs. Although this study was small and we could not adjust for potential confounders such as insurance status and stroke severity, there did not seem to be ethnic differences in these variables that could explain the large disparity in rehabilitation services provided. Furthermore, a binary regression model adjusting for age <65 versus ≥65 years, still suggested that NHWs were more than four and one half times more likely to go to an IRF for their first rehabilitation location than MAs, suggesting that Medicare insurance was not driving the result. There is a paucity of previous work in this area. A study using State Inpatient Databases found that Hispanics with stroke were less likely to be discharged to an acute or subacute rehabilitation setting than NHWs after adjustment for illness severity and comorbidities. A study of Medicare beneficiaries found that Hispanic patients with stroke were more likely to be discharged to home healthcare than NHWs and less likely to be discharged to an SNF. Two studies of IRF patients have demonstrated that Hispanics have lower physical function scores on rehabilitation admission than NHWs but have similar functional gains compared with other race-ethnic groups.

If this study’s results are replicated, there are important implications for stroke recovery in MAs, a numerous, fast growing, and rapidly aging segment of the United States. MAs have higher stroke incidence, more recurrence, and worse outcome compared with NHWs. It is possible that the outcome disparity may, in part, be explained by the lack of intensive poststroke rehabilitation.

The reasons for the differences in allocation of rehabilitation services are likely multifactorial. MAs are known to have strong family structure; family preference to provide care at home rather than place loved ones in an institution is one possible explanation for the ethnic differences in rehabilitation allocation. Although overall insurance differences were minor, it is possible that insurance quality differed by ethnicity. Furthermore, although initial National Institutes of Health Stroke Scale did not differ, it is possible that NHWs had more stroke symptoms and signs such as motor weakness that would suggest the need for an IRF.

Future studies should confirm the significant difference in rehabilitation allocation by ethnicity with enough subjects to adequately control for potential confounders and to examine possible pathogeneses. This study has important implications for the health of the largest minority population in the United States, Hispanic Americans.

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Disclosures
None.

References
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