Community Education for Stroke Awareness
An Efficacy Study

Erica B. Stern, PhD, OTR; MaryEllen Berman, BSN, RN; Juliann J. Thomas, PhD, OTR; Arthur C. Klassen, MD

Background and Purpose—This study examined the effectiveness of a slide/audio community education program aimed at increasing knowledge of stroke risk factors, stroke warning signs, and action needed when stroke warning signs occur. The program targets audiences at higher risk for stroke, especially individuals who are black or ≥50 years of age.

Methods—Subjects were 657 adults living in the community or in senior independent-living settings. The study examined the effectiveness of the program when presented alone and when accompanied by discussion (facilitation) led by a trained individual. Knowledge of stroke risk factors and warning signs was assessed using parallel pretests and posttests developed and validated specifically for the study.

Results—ANCOVA indicated that neither pretesting nor facilitation had a significant effect on posttest measures of knowledge. Paired t tests of groups receiving both the pretest and posttest demonstrated significant increase in knowledge (mean increase, 10.87%; P<0.001). ANCOVA indicated that these gains in knowledge were similar across subjects of different sex, race, age, and educational level. No significant differences could be ascribed to facilitation.

Conclusions—The data indicate that the slide/audio program is effective in increasing knowledge of stroke risk factors, warning signs, and necessary action in subjects of varying ages, races, and education. Pretesting and facilitation did not significantly affect the short-term acquisition of information. The slide/audio program appears to offer a short, easily used educational experience for diverse communities, whether as a stand-alone program or with facilitated discussion.

(Stroke. 1999;30:720-723.)

Key Words: audiovisual aids ■ risk factors ■ stroke prevention ■ education

Despite progress in stroke prevention and improvements in medical care, stroke remains the third leading cause of death and the major cause of long-term disability in adults in the United States. Further progress in stroke prevention and treatment will depend, at least in part, on education of the community at large regarding both risk factor reduction and treatment will depend, at least in part, on education of the community at large regarding both risk factor reduction and the need for timely implementation of appropriate therapies.

Treatment of acute ischemic stroke, with thrombolytic agents and with other therapies currently being developed and tested, is based on the assumption that these therapies must be administered within a limited time window. At present, however, only a small minority of patients with acute stroke seek medical care within the recommended 3-hour interval required for treatment with intravenous tPA.

Many factors contribute to delays in seeking treatment for stroke, but the principal factor is lack of public knowledge regarding stroke signs and symptoms and the need for rapid response to these indicators. Williams et al found that 75% of patients presenting with acute stroke did not correctly interpret the nature of their symptoms, and 63% did not feel that symptoms were serious. In addition, a recent Gallup survey indicated that only 58% of adults over age 50 could correctly name weakness, numbness, or paralysis as major stroke symptoms. These data are consistent with a random telephone survey by Dornan et al, who found that 43% of their adult sample were unable to name 1 warning sign of stroke. Similarly, studies by Kothari et al and Piacioli et al found that 39% of patients with acute stroke and 43% of the general population were unable to identify any stroke warning signs, and that most stroke patients and the general population had a very limited knowledge of stroke risk factors.

Community education specifically aimed at stroke appears critical. Several large community education projects on cardiovascular disease have studied changes in general cardiovascular knowledge, attitudes, and behavior, but few educational studies have specifically targeted education regarding stroke risk factors, stroke symptoms, and the appropriate response to signs and symptoms of stroke. In one study, Glanz et al found that a
relatively long (5-session) peer-facilitated educational program increased knowledge of stroke risk factors in elderly subjects. More recently, Dornan et al., using a random telephone survey, found a statistically significant increase in the public’s knowledge of stroke warning signs following an extensive community education campaign consisting of media appearances by local stroke experts, newspaper articles, and public service announcements.

Responding to the need for an effective, flexible, easily used, single-session community education program, the Stroke Subcommittee of the Minnesota Affiliate of the American Heart Association developed a short, professionally produced, culturally inclusive slide/audio community education program entitled Stroke: It Could be You. The program was designed to be accompanied by content discussion (facilitation) directed by a trained volunteer. This study evaluates the educational impact of the slide/audio program, measuring the effects of the program on participants’ knowledge of stroke risk factors and warning signs. It also explores the impact of pretesting and facilitation on this knowledge. The study was designed to answer the following research questions: Does the slide/audio program Stroke: It Could Be You increase knowledge of stroke risk factors and warning signs? Does the addition of facilitation following this slide/audio program change participants’ knowledge of risk factors and warning signs? Is learning similar for participants of different races, ages, and educational levels?

### Subjects and Methods

#### Subjects

Subjects consisted of 657 adult volunteers living in the community or in senior independent-living settings who attended Stroke: It Could Be You educational presentations. The 34 presentations were sponsored by churches, community centers, senior independent-living centers, local businesses, and service and social groups in metropolitan and rural venues throughout Minnesota. Table 1 summarizes subject demographic data. Human subjects approval was granted under Minnesota Center for Survey Research umbrella approval from the University of Minnesota’s institutional review board.

#### Educational Intervention

Stroke: It Could Be You is a 12-minute, professionally produced slide/audio program. The program defines stroke; describes and differentiates among thrombotic, embolic, and hemorrhagic strokes; discusses risk factors for stroke and warning signs of stroke; and encourages an immediate response to stroke warning signs. The program targets audiences at higher risk for stroke, especially individuals who are black or ≥50 years of age. Though able to stand as an independent educational experience, the slide/audio program was designed to be followed by approximately 45 minutes of facilitation led by trained volunteers. For the study, all facilitation was performed by volunteer health professionals who were knowledgeable regarding stroke and had completed a standardized program of facilitator training.

Each presentation group was assigned to 1 of the 4 educational interventions (Figure). Subjects in groups 1 and 3 completed a pretest immediately before the session. Facilitators began each session by introducing themselves and soliciting stroke-related questions that subjects hoped to have answered by the program. No answers were offered at that time. All groups then viewed the

### Table 1. Subject Demographics by Educational Intervention*

<table>
<thead>
<tr>
<th></th>
<th>Slide/Tape Program Only</th>
<th>Slide/Tape Program and Facilitation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pretest/Posttest Group 1</td>
<td>Posttest Only Group 2</td>
</tr>
<tr>
<td>Age (n=643)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤44</td>
<td>18.8 (22.2)</td>
<td>6.7 (39.4)</td>
</tr>
<tr>
<td>45–64</td>
<td>20.0 (13.3)</td>
<td>29.7 (11.3)</td>
</tr>
<tr>
<td>65–75</td>
<td>12.5 (18.6)</td>
<td>19.4 (11.3)</td>
</tr>
<tr>
<td>76–84</td>
<td>25.6 (32.3)</td>
<td>20.0 (15.6)</td>
</tr>
<tr>
<td>≥85</td>
<td>23.1 (12.7)</td>
<td>70.35 (14.89)</td>
</tr>
<tr>
<td>Mean (SD), y</td>
<td>67.16 (19.39)</td>
<td>65.49 (20.16)</td>
</tr>
<tr>
<td>Sex (n=649)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>27.5 (10.6)</td>
<td>20.7 (13.9)</td>
</tr>
<tr>
<td>Female</td>
<td>72.5 (89.4)</td>
<td>79.3 (86.1)</td>
</tr>
<tr>
<td>Race (n=657)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>73.5 (77.4)</td>
<td>75.2 (77.1)</td>
</tr>
<tr>
<td>Black</td>
<td>19.1 (12.2)</td>
<td>13.9 (17.5)</td>
</tr>
<tr>
<td>Other</td>
<td>7.3 (10.3)</td>
<td>10.9 (5.4)</td>
</tr>
<tr>
<td>Education (n=636)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>≥College graduate</td>
<td>32.5 (19.0)</td>
<td>13.1 (22.4)</td>
</tr>
<tr>
<td>Some college/technical</td>
<td>29.9 (21.5)</td>
<td>20.0 (34.8)</td>
</tr>
<tr>
<td>High school graduate</td>
<td>29.3 (41.1)</td>
<td>48.8 (33.5)</td>
</tr>
<tr>
<td>&lt;High school graduate</td>
<td>8.3 (19.0)</td>
<td>13.1 (22.4)</td>
</tr>
<tr>
<td>Mean years of schooling (SD)</td>
<td>13.82 (2.39)</td>
<td>12.65 (2.65)</td>
</tr>
</tbody>
</table>

*All values reported in valid % except those of mean (SD).
subtle differences in ability. Independent
that would perform well across a broad range of abilities and highlight
ination, and difficulty. Phase 3e was devoted to selecting a posttest
used to determine which to use for pretest and posttest. A 2-parameter item response model was
posttest instruments (form A compared with B as pretest; form A
difference between test means when the forms were used as pretest or
Unanswered items and those marked “don’t know” were scored as
Study data were coded and reviewed for out-of-range values.

**Data Preparation**

Study data were coded and reviewed for out-of-range values. Unanswered items and those marked “don’t know” were scored as incorrect. Cases were eliminated if racial information was missing or if test forms were <50% complete. To ensure similar proportions of black individuals across educational interventions, nonblack cases were randomly eliminated from the database. These procedures left data on 657 subjects for analysis, with subjects answering an average of 18.6 of the 21 pretest items and 20.5 of the 21 posttest items.

**Results**

A series of statistical analyses and models were used to examine the data, with a 0.01 level of statistical significance applied to all analyses. Before addressing the 3 research questions, the 4 educational intervention groups were compared ($x^2$ test) on demographic variables to determine whether differences existed that should be considered in subsequent analyses. The 4 groups were similar in racial makeup, but differed significantly by sex, age, and education level (See Table 1 for group demographics). It was, therefore, important to determine whether sex, age, or education had a strong relationship to posttest scores. Correlations between these variables and posttest knowledge scores were significant at the 0.01 level for age ($r=−0.423$) and education ($r=−0.364$) but failed to reach significance for race ($r=0.078$) and sex ($r=0.066$). Because of the importance of race in the study of the program's use across diverse populations, race was included in the final analyses, along with age and education. Sex was neither central to the study question nor significantly correlated to posttest knowledge scores. It was, therefore, was not included in further analysis.

To determine whether pretesting or facilitation had an effect on participants’ knowledge after their viewing of the slide/audio program, ANCOVA was used to test for the effects that pretest or facilitation had on posttest scores, with race, age, and education as covariates. Neither pretest effects nor facilitation effects were statistically significant. However, the combined covariates of race, age, and education did reach statistical significance ($P<0.001$), indicating that posttest scores were more closely related to demographic differences across the 4 groups than to either pretest or facilitation. Although blacks tended to score lower than other ethnic groups, the isolated impact of race was small (average $R^2=0.025$). Age and education were stronger predictors of posttest scores (average $R^2=0.589$ and 0.449, respectively). Tamhane post hoc comparison showed that subjects who were ≥64 years and those with education beyond high school

**TABLE 2. Tamhane Post Hoc Comparison of Posttest Scores by Age and Educational Level**

<table>
<thead>
<tr>
<th>Age, y</th>
<th>≤44</th>
<th>45–64</th>
<th>65–75</th>
<th>76–84</th>
<th>≥85</th>
</tr>
</thead>
<tbody>
<tr>
<td>Posttest score, X % correct (SD)</td>
<td>88.76 (10.89)</td>
<td>87.42 (12.28)</td>
<td>&gt; 81.68 (14.50)</td>
<td>76.80 (15.31)</td>
<td>&gt; 68.46 (18.93)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Educational Level</th>
<th>Some High School Graduation</th>
<th>High School Graduation</th>
<th>Some College or Technical School Graduation</th>
<th>College or Technical School Graduation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Posttest score, X % correct (SD)</td>
<td>72.06 (16.07)</td>
<td>77.89 (16.41)</td>
<td>&lt; 85.10 (13.60)</td>
<td>88.86 (11.41)</td>
</tr>
</tbody>
</table>

> , < Indicates that difference reached 0.01 level of significance.
TABLE 3. Paired t Test of Knowledge Gain for Groups 1 and 3 (n=327)

<table>
<thead>
<tr>
<th></th>
<th>Mean (SD)</th>
<th>df</th>
<th>t</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretest</td>
<td>68.55 (18.76)</td>
<td>326</td>
<td>11.87</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Posttest</td>
<td>79.42 (17.32)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

scored significantly better (P<0.01) on posttest than their older, less-educated counterparts. (Table 2).

The final analysis addressed whether the slide/audio program increased participants’ knowledge of stroke risk factors and warning signs. Because pretesting and facilitation had no meaningful effect on posttest scores, data from groups 2 and 4 were eliminated from further analysis, and data from subjects who had completed both pretest and posttest (ie, groups 1 and 3) were combined to examine participants’ learning.

An ANCOVA of knowledge gain scores (ie, difference between pretest and posttest knowledge scores) was performed to isolate the effects of the slide/audio program over and above facilitation. Demographic variables of sex, race, age, and education were used as covariates to identify any effects that these factors had on knowledge gain. ANCOVA showed no significant effects for facilitation or for the demographic factors. Therefore, regardless of sex, race, age, or educational status, subjects showed similar gains in knowledge regarding stroke risk factors and warning signs. Paired t tests demonstrated a 10.87% difference (P<0.001) between pretest and posttest scores (Table 3). Because neither facilitation nor demographic factors (sex, race, age, education) appears to be responsible for this increase in knowledge scores, the knowledge gain can be reasonably attributed to the Stroke: It Could Be You slide/audio program.

Discussion

The data indicate that Stroke: It Could Be You, a short community education slide/audio program, increases knowledge of stroke risk factors, warning signs, and actions to be taken when warning signs are present. This increase in knowledge is similar across a wide range of ages and levels of education in a racially diverse population. The data also indicate that the slide/audio program may be equally successful when used as a stand-alone community education tool or when accompanied by content discussion led by a trained facilitator. The current study did not consider long-term information retention, lifestyle change, or self-efficacy. It is possible that these and other important behaviors or types of learning may show preferential response to the presence of a trained facilitator. Future studies may wish to examine these possibilities.

The study was designed to assess the effect of the slide/audio program with and without facilitation and did not study the effects of placebo or facilitation alone. Though it is unlikely that a placebo experience would produce a knowledge gain, it is possible that facilitation alone could increase knowledge of stroke risk factors and warning signs. However, facilitation-based programs may not be a realistic and expeditious way in which to meet this overwhelming need. In contrast, this slide/audio program is inexpensive, easily disseminated, and not dependent on the availability of trained volunteers.

There is a demonstrated need for increased public understanding of stroke risk factors, signs, and symptoms and the need for rapid response to stroke symptoms. The slide/audio program Stroke: It Could Be You appears to offer a brief, effective, and easily used educational tool to increase stroke awareness and knowledge across diverse populations.

Acknowledgments

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References

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