Freeze the Stroke
Public Awareness Program for Immediate Detection of First Symptoms

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Aldiro Magano, BNurs; Paula Coutinho, MD, PhD

**Background and Purpose**—The capacity of the general population to identify stroke signs is a major determinant for success of prehospital emergency pathways. Previous educational strategies using the media were usually short-lived and expensive. Tailoring information programs for special subgroups like acute stroke relatives may improve this situation.

**Methods**—A poster was assembled that included a list of stroke signs and instructions to call 911. Consecutive admissions to the stroke unit were randomized. Intervention consisted of an educational session with relatives, in which a nurse delivered 5 posters and asked for their placement on the freezer door at the kitchen of the patient’s house and each of 4 neighboring houses. One month later, a questionnaire was administered to both groups.

**Results**—Sixty admissions were randomized (30 interventions), and 150 posters were distributed. One month after discharge, response rates were 81% for intervention group and 48% for control group. In the intervention arm, 64.5% had all the 4 answers correct, and 74.2% identified all first signs of stroke. For the control group, these values were 8% and 20%, respectively (P<0.001).

**Conclusions**—This stroke unit–based information strategy improved awareness of relatives and neighbors when compared with the usual discharge plan. The program avoids the media and explores regional health care structure and family and social organizations, and it targets a subgroup keen to receive and spread information. The low cost, ease of use, and duration of the stimulus facilitate further testing and evaluation of impact on hospital presentation and thrombolytic treatment rates. (**Stroke.** 2012;43:2510-2512.)

**Key Words:** educational campaigns ● emergency medicine ● health policy ● stroke signs

Stroke is a medical emergency and major efforts are being made to decrease time until arrival at the first treating hospital. The capacity of the general population to identify stroke signs, the need to activate by telephone a special prehospital stroke pathway, and emergency care are major determinants for success of treatment.1 Several previous studies show that massive public campaigns through the media are usually expensive and short-lived, failing to achieve consistent improvement of stroke awareness and knowledge of the population.2,3 An alternative option may consist of approaching specially sensitized subgroups,4 such as relatives and neighbors of stroke patients. The aim of this study was to assess the impact of an affordable educational program on acute stroke detection and action targeted to such a group.

**Materials and Methods**

**Target Population**
All consecutive admissions to the stroke unit were considered during a 3-month period in 2009. Patients admitted for relief measures or prescribed palliative care were excluded. Randomization to intervention and control groups ensued, using randomly permuted blocks of 10 without stratification. The informal caregiver of each patient was approached and, after obtaining written informed consent, was asked to contact and recruit 4 neighbors willing to receive information on stroke and answer a telephone questionnaire. Patient relatives and neighbors signed written informed consent before randomization. A total of 60 admissions were randomized (30 to the intervention group).

**Intervention and Control Groups**
A poster measuring 297×210 mm was assembled that contained the following: title of the campaign at the top; an image alluding to ischemic brain damage and the importance of time; 3 warning signs recommended by the Portuguese Stroke Society (language impairment, face and arm weakness); and instructions on how to call 911 (Figure 1).

In the intervention group, a session with the patient, 1 responsible relative, and a nurse was organized. The nurse delivered 5 posters and asked to distribute them to 4 neighboring homes along with instructions to place the poster on the kitchen refrigerator. This was performed exploring the analogy between the campaign title and a component of refrigerators (the freezer), a household appliance assessed daily by most residents. During that session, contact and demographic data from the patient’s house and the 4 neighboring houses were collected. One week later, the poster positioning was verified by telephone.

**Results**
—Sixty admissions were randomized (30 interventions), and 150 posters were distributed. One month after discharge, response rates were 81% for intervention group and 48% for control group. In the intervention arm, 64.5% had all the 4 answers correct, and 74.2% identified all first signs of stroke. For the control group, these values were 8% and 20%, respectively (P<0.001).

**Conclusions**—This stroke unit–based information strategy improved awareness of relatives and neighbors when compared with the usual discharge plan. The program avoids the media and explores regional health care structure and family and social organizations, and it targets a subgroup keen to receive and spread information. The low cost, ease of use, and duration of the stimulus facilitate further testing and evaluation of impact on hospital presentation and thrombolytic treatment rates. (**Stroke.** 2012;43:2510-2512.)

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In the control group, the same structured session occurred before discharge. The only difference was that no posters were delivered. Both groups received instructions on risk factor prevention, management of daily living activities, and compliance with drug and treatment prescriptions as part of the usual stroke unit discharge plan.

**Assessment Instruments**

One month after the intervention, a questionnaire was conducted by telephone to all family houses in both groups (5 calls were made before giving up, including during nonworking hours and weekends). The interviewer was previously trained and blinded to the study group. The questionnaire consisted of 4 multiple-choice questions. The first 2 assessed stroke recognition, whereas the others evaluated decision process and acting immediately after stroke (Table).

**Informed Consent**

All patients and caregivers understood the study purpose and provided written informed consent. Approval from the referring stroke physician was also obtained before enrollment in experiments. This study was approved by the hospital Review Board and Ethics Commission.

**Statistical Analysis**

The SPSS software was used, including $\chi^2$ and Fisher exact tests, when indicated.

**Results**

The intervention group was given 150 posters (1 per family house). One week later, 88% of the families (N=132) answered the telephone to assess poster placement. It was placed on the kitchen in 97% (refrigerator, 64%; walls or doors, 27%; table, 9%) of homes and in the living room in 3% of homes.

At 1 month, 121 families (81%) answered the questionnaire in intervention arm, and 72 (48%) answered the questionnaire in the control group. The mean age of respondents was 46.6 years (SD=14.6), 75% were women, and, on average, respondents had 7.5 years of education (SD=3.8). There were no significant demographic differences between the intervention and control groups. Considering all the families surveyed (N=193), the average number of inhabitants was 3.5 (SD=1.14), distributed by 2 generations. In the intervention branch, 64.5% of the surveyed answered all the questions (4/4) correctly compared

**Table. Questionnaire Applied at 4 Weeks**

<table>
<thead>
<tr>
<th>Question 1. In which part of the body does a stroke occur?</th>
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<tbody>
<tr>
<td>a) Heart</td>
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<table>
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<tr>
<th>Question 2. Which of these are stroke signs?</th>
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<tbody>
<tr>
<td>a) Face weakness</td>
</tr>
<tr>
<td>b) Arm weakness</td>
</tr>
<tr>
<td>c) Language impairment</td>
</tr>
<tr>
<td>d) Chest pain</td>
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<tr>
<th>Question 3. Does time of arrival at the hospital have implications for treatment?</th>
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<tr>
<td>a) Yes</td>
</tr>
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<table>
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<tr>
<th>Question 4. What should you do if a relative has sudden onset of right-side weakness?</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Wait</td>
</tr>
<tr>
<td>b) Place relative in bed</td>
</tr>
<tr>
<td>c) Call 911</td>
</tr>
</tbody>
</table>

Correct answers in **bold**.
with 8% of controls ($P<0.001$). On a question-by-question analysis, for question 2, 74.2% of the respondents in the intervention group knew all stroke warning signs compared with 20% in the control group ($P<0.001$) (Figure 2). For question 4, in the intervention group, 87.1% would call 911, 9.7% would go to the hospital by car, and 3.2% would consult the general practitioner. In the control group, these values were 32%, 40%, and 28%, respectively ($P<0.01$).

**Discussion**

When compared with the usual discharge plan, the proposed intervention significantly improved the knowledge of relatives and neighbors of stroke patients. The program was based on stroke unit activities, selected a subgroup more sensitized to stroke, and took advantage of health, family, and social organizations. The intervention group performed better in question 2, assessing recognition, and question 4, which evaluated action immediately after stroke detection.

Our approach contrasts with the majority of studies in the field that opted for expensive media campaigns targeted to the general public.\(^1,2,5-8\) Fogle et al\(^5\) showed statistical significance in increasing public knowledge of warning signs and the need to activate by telephone the prehospital stroke pathway. However, statistical significance was not verified in the intention to actually call 911 when witnessing a potential stroke.\(^3,5\) Furthermore, several studies conclude that the continuity of exposure to the campaigns is essential to avoid knowledge decay.\(^1,3\)

This study has several limitations. The intervention was focused on 3 major signs of ischemic stroke, missing others like numbness, dizziness, and headache. In the control group, only 48% answered follow-up questionnaires. Multiple-choice questions were used and assessments were conducted by telephone, which may overestimate correct answers in both groups.\(^6\) Furthermore, public knowledge was assessed by questionnaire, and there was no direct measure (hospital presentations and thrombolytic treatment) of increased stroke pathway activation.

The number of people reached was relatively small (at least 4 people for each stroke patient admitted). Nonetheless, if the strategy was offered to all stroke admissions, then 3% to 5% of the reference population could be targeted each year. According to prices verified in this study, it would entail an additional cost per stroke survivor of $0.50 (posters and telephone calls), plus nurse time required for extending the standard educational session.

**Conclusion**

The intervention was effective in increasing awareness of stroke warning signs and the importance of immediately activating by telephone a specific prehospital stroke pathway. Furthermore, it may improve the connection between the population of reference and the local stroke unit. The low cost associated with this strategy, its feasibility of application, and longer duration of stimulus facilitate medium-term and long-term health education achievements. Altogether, it may represent a better approach to stroke education in local settings that is more targeted and affordable than most media campaigns.

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**Disclosures**

None.

**References**

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