

Stroke Education in an Emergency Department Waiting Room: A Comparison of Methods

Yu-Feng Yvonne Chan¹, Lynne D. Richardson¹, *Roxanne Nagurka², Ke Hao³, Sergey B. Zaets¹, Michael B. Brimacombe⁴, Susanne Bentley¹, Steven R. Levine⁵

¹Department of Emergency Medicine, Icahn School of Medicine at Mount Sinai, New York, New York 10029, USA

²Department of Emergency Medicine, Rutgers, New Jersey Medical School, Newark, New Jersey 07103, USA

³Department of Genetics and Genomic Sciences Icahn School of Medicine at Mount Sinai, New York, New York 10029, USA

⁴Department of Biostatistics, Division of Biostatistics, Rutgers, New Jersey Medical School, Newark, New Jersey 07103, USA

⁵Department of Neurology, Icahn School of Medicine at Mount Sinai, New York, New York 10029, USA

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*Corresponding Author:

Roxanne Nagurka

Tel: +1 973 972 5129;

Email:

gurkrm@gsbs.rutgers.edu

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ABSTRACT

Background: Since the emergency department (ED) waiting room hosts a large, captive audience of patients and visitors, it may be an ideal location for conducting focused stroke education. The aim of this study was to assess the effectiveness of various stroke education methods.

Methods: Patients and visitors of an urban ED waiting room were randomized into one of the following groups: video, brochure, one-to-one teaching, combination of these three methods, or control group. We administered a 13-question multiple-choice test to assess stroke knowledge prior to, immediately after, and at 1 month post-education to patients and visitors in the ED waiting room.

Results: Of 4 groups receiving education, all significantly improved their test scores immediately post intervention (test scores 9.4 ± 2.5 - 10.3 ± 2.0 , $P < 0.01$). At 1 month, the combination group retained the most knowledge (9.4 ± 2.4) exceeding pre-intervention and control scores (both 6.7 ± 2.6 , $P < 0.01$).

Conclusion: Among the various stroke education methods delivered in the ED waiting room, the combination method resulted in the highest knowledge retention at 1-month post intervention.

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Introduction

Delayed presentation of stroke patients to the emergency department (ED) occurs primarily due to a lack of public knowledge of the risk factors, warning signs, and symptoms of stroke.¹ Up to 27% of adults cannot name a single warning sign of stroke and up to 25% are unable to name a single risk factor.^{2,3} This lack of stroke knowledge is most widespread in the populations at highest risk

for experiencing stroke: the elderly, African Americans, and men.^{4,7}

Community education that includes teaching how to identify a stroke and the need for prompt medical attention after stroke onset has been shown effective.⁸⁻¹⁰ Studies have demonstrated a particular need for community education in urban

and medically underserved areas predominantly home to ethnic minorities.¹

Various educational programs for stroke patients and their caregivers have been proposed to increase stroke awareness and provide stroke education. They include seminars, community educational programs, and stroke educational campaigns.⁸⁻¹⁵ Investigations into interventions to increase stroke knowledge in the community have studied audio-visual programs, brochures, and personal counseling. Application of a wide spectrum of these methods seems to have achieved the best results; however, the effectiveness of these programs remains unproven.

There continues to be a need for increased stroke education, and the ED waiting room may be an ideal location due to a high volume of patients, many of who are at high risk for stroke. The almost continual, large-scale, captive audience of patients and visitors in the ED allows for focused stroke education. There are limited data concerning public health education in the ED devoted to alcohol and tobacco use, domestic violence and stroke.¹⁶⁻²⁰

The aim of this pilot study was to compare different methods of stroke education for use in an ED waiting room and to determine which approach is the most effective.

Materials and Methods

Study design

This study was conducted at University Hospital in Newark, NJ in 2005. Subject selection was based on the last digit of an individual's medical record number. Student research assistants approached only Fast Track (triaged to urgent care) patients waiting in the ED waiting room with a medical record number ending in an odd or even number (based on a computer generated list). Subjects were enrolled after signing a written informed consent form approved by our Institutional Review Board. We studied a convenience sample because subjects were recruited only when our research assistants were available. Over the course of the study, recruitment was conducted during various times over seven days of the week

from 10 am to 10 pm. Research assistants were college and medical students trained to adhere to the study protocol.

We compared five different methods of stroke education: 1) Video group: viewed a 12-minute educational stroke video developed by the American Stroke Association; 2) Counseling group: received one-to-one instruction from a trained research assistant who covered the same information presented in the video which lasted 15 minutes; 3) Brochure group: received a brochure containing the same information presented in the video (time varied per individual, but lasted no more than 20 minutes); 4) Combination group: received a combination of the three aforementioned methods (average 1 hour); and 5) Control group: received no intervention. The content of the educational intervention was identical in all intervention groups and the post-test was developed to test knowledge of this information.

Participants in the video group were individually conducted to a separate viewing room. The material contained in the two-page brochure summarized the information in the video and some parts of the brochure were verbatim from the video. Similarly, the education received from the one-to-one counseling was scripted and covered the material in the brochure. Educational efficacy was assessed via improvement from pre-test to post-test scores.

Setting

The setting was a 504-bed urban, inner city, teaching hospital, with an ED serving over 82,000 patients annually. The hospital is a designated regional stroke center that treats over 700 stroke patients annually. ED patients were primarily low-income African Americans.

Selection of participants

We recruited patients with non-acute illnesses who were triaged to the Fast Track waiting area of the ED that is open from 7 am to 11 pm seven days a week. Patients were asked to participate in our research project on stroke education. Candidates were excluded if they had no telephone or mailing address, were unable to read, under the

age of 18, non-English speaking, psychiatrically or cognitively impaired, under arrest, or incarcerated.

Ethical Considerations

The Institutional Review Board of the University of Medicine and Dentistry of New Jersey approved this study.

Data collection

Consenting individuals were randomized into one of the four intervention groups or the control group. A list of random numbers was generated using SPSS-PC 9.0 (SPSS Inc., Chicago, IL), to allow equal assignment into the five groups. Patient assignments were placed in consecutively numbered sealed envelopes and attached to informed consent forms. All intervention group subjects received the same information via their assigned method about stroke risk factors, warning signs, and the immediate actions to be taken after the onset of stroke symptoms. We allotted approximately 10-15 minutes per subject. All of the subjects were brought to the same study room and informed that there would be a post-test regardless of their group assignments. Participants were educated by three research assistants who were trained to use the same technique and teaching script. Those in the control group received no education.

Each of the five groups completed a 13 question pre-test to assess baseline stroke knowledge (Appendix 1). The test assessed knowledge of topics including stroke risk factors, warning signs and symptoms, and the requisite immediate actions if signs and symptoms are present. The test was conducted in written format with answer sets provided as multiple-choice options. All questions had one correct answer weighted equally for a total possible score of 13. Each educational method covered all the information needed to complete successfully the quiz.

We pilot-tested the quiz on 100 subjects of varying educational backgrounds prior to this and our previous project.¹⁹ There was a positive correlation between test scores and educational level/medical experience. Results from the pilot test

indicated that the test accurately reflects stroke knowledge.

After completion of the intervention, the participants in the intervention groups were again given the same test (post-test). At one-month follow-up, the participants were given the identical 13-question quiz by phone. The participants were not provided with correct answers or their final test scores at any time during the study.

Methods of measurement

The 13-question test was used to assess baseline stroke knowledge. Measurement of improved stroke knowledge was determined by increased scores from pre-test to post-test. There was no predetermined score for clinically sufficient stroke knowledge. The main outcome measurement was comparison of pre-test to post-test scores.

Primary data analysis

We employed linear models to conduct pairwise comparison between groups in term of testing scores: $Y \sim G$, where Y denotes the testing scores and G denotes groups defined by education methods or time points. Given multiple tests were performed in this study, we corrected the P value using Bonferroni methods assuming 10 independent tests, that is $p_{\text{corrected}} = p_{\text{nominal}} \times 10$. The level of Bonferroni corrected statistical significance was set at $P < 0.05$. A power analysis determined 45 subjects per group as the sample size needed for 80% power to detect 20% differences in test scores. Data were analyzed using SPSS 9.0 for Windows (SPSS Inc., Chicago, IL), and presented as a Mean \pm Standard Deviation.

Results

Of the 231 participants, there were a total of 87 men and 144 women enrolled in the study. The male/female ratios, age of the participants, race, and educational-level distribution did not differ between the groups (Tables 1 & 2). Approximately half of the study participants had completed high school. No statistically significant differences in the pre-test scores existed for gender, age, or race in each group.

Table 1: Patient demographic parameters

Groups	Gender (%)		Race (%)		Age (years)
	Male	Female	African-Americans	Other	
Video (n=43)	44	56	79	21	35.3±13.7
Counseling (n=45)	33	67	73	27	36.2±14.5
Brochure (n=51)	33	67	76.5	23.5	35.5±12.7
Combo (n=47)	42.5	57.5	75	25	38.6±15.7
Control (n=45)	36	64	82	18	33.3±10.9

All differences among the compared groups are insignificant

Table 2: Participants' level of education

Level of Education	Control (%)	Intervention (%)
Elementary School	1.4	2.5
Incomplete High School	18.3	17.7
Completed High School	42.3	44.3
Vocational School	1.4	3.4
Incomplete College	23.2	22.8
Completed College	10.5	6.3
Advanced Degree	2.1	2.5
Unknown	0.8	0.5

Immediately after the intervention, all four groups demonstrated significant improvement in stroke knowledge. All post-intervention test scores were significantly higher than pre-intervention and control values (Table 3). Absolute values of post-intervention scores did not significantly differ among the groups. However, the relative increase in pre-test to post-test intervention test scores was the highest in the Combination group: 72±44.9% *vs.* 53±48.2% for the Video group, 45±42.8% for the Counseling group, and 36±38.1% for the Brochure group, respectively.

Table 3: Stroke knowledge test results

Groups	Pre-Intervention Score	Post-intervention Score	1 Month Follow-Up Score
Video (n=43)	6.9±2.4	9.7±2.5*	6.7±2.3x
Counseling (n=45)	7.7±2.3	10.3±2.0*	8.2±2.4xz
Brochure (n=51)	7.2±2.5	9.4±2.5*	8.3±2.5z
Combo (n=47)	6.7±2.6	10.1±2.4*	9.4±2.4y
Control (n=45)	6.7±2.6	-	-

P<0.01 vs. Pre-Intervention Score & Control/*x* *P*<0.01 vs. Post-Intervention Score

z *P*<0.01 vs. Control/*y* *P*<0.01 vs. Pre-Intervention Score, Control & Video 1 Month Follow-Up Score

We successfully contacted 90 (39%) of the participants for the one-month follow-up (Figure 1). We made up to 10 attempts at contact for each participant. At one-month follow-up, the Combination group again demonstrated the best stroke knowledge. However, this difference was statistically significant only compared to the Video group. The Combination group did not show a significant decrease in test scores compared with the immediate post-intervention test. Follow-up test scores for the Brochure group did not significantly decrease compared with the immediate

post-intervention scores and remained higher compared with the Control group; however, they no longer exceeded pre-intervention values. For the Counseling group, follow-up test scores significantly decreased compared with the immediate post-intervention values. The lowest one-month follow-up results were seen in the Video group and were significantly lower than their immediate post-intervention test results. Additionally, these follow-up test scores did not exceed either pre-intervention or control values.

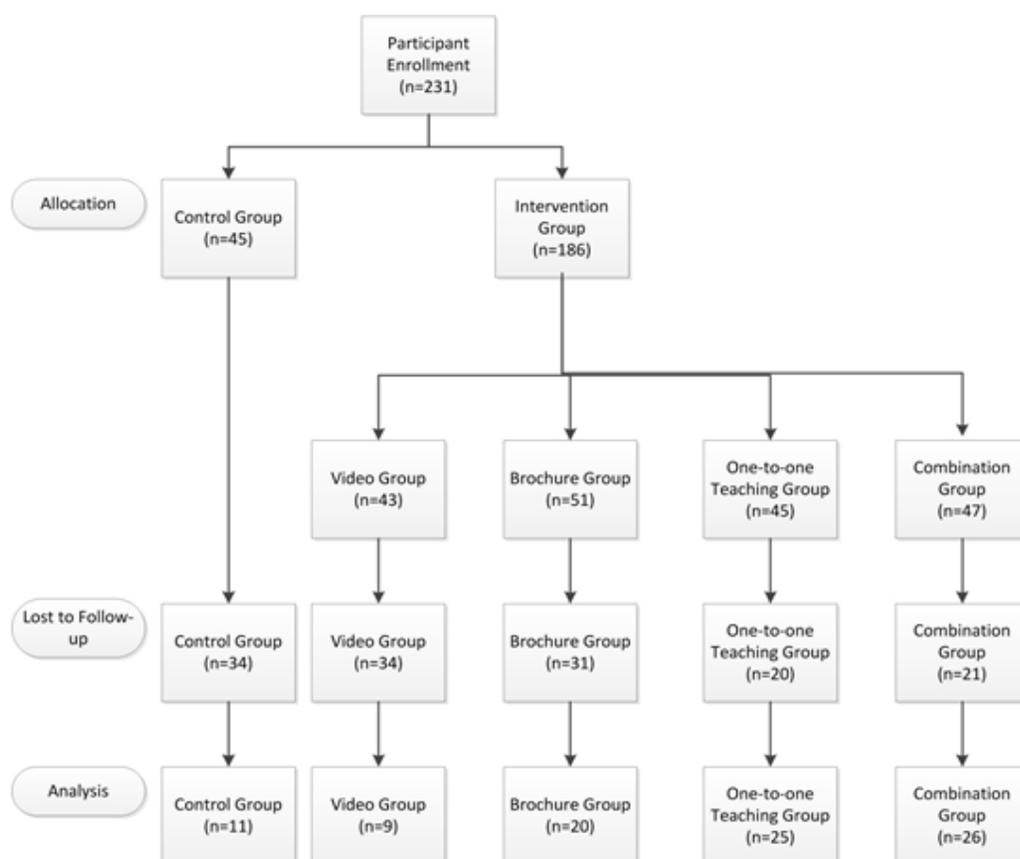


Figure 1: Enrollment flow diagram

Discussion

Our pilot study demonstrated that all of the various methods of stroke education used, namely a video program, individual counseling, and a brochure all produced measurable, immediate results. However, each method failed to provide a long-lasting increase in knowledge when assessed separately. Only participants in the Combination group did not show a decrease in their test scores at one-month follow-up versus their immediate post-test results.

Our data show that a combination of different educational methods can be successfully implemented in ED waiting rooms to educate patients about stroke. These results are similar to those obtained by other programs focusing on educating stroke patients and their caregivers. For example, the program of Rodgers et al. included a one-hour in-

patient seminar followed by six one-hour sessions after hospital discharge.⁸ The authors provided information about the nature of stroke, rationale of treatment, and prevention of future strokes. Test scores six months afterwards were significantly higher among members of the intervention group than among the control group.

A very limited number of studies examine stroke knowledge retention after community educational programs. DeLemos et al. have shown that a community program that includes health screening, stroke education, and counseling resulted in a 35% increase in knowledge of stroke symptoms.¹² Three months after the intervention, the average stroke knowledge score of the participants decreased by 17%, however, these scores remain significantly higher than prior to the intervention.

A public campaign was able to increase stroke knowledge.²¹ The main tools used by mass media for this campaign included board advertising, brochures and posters, radio and television public service announcements, and news stories. The authors demonstrated a decline from 43% to 22% in the number of people who were unable to name even a single warning sign of stroke. Unfortunately, the study design did not assess knowledge retention following the conclusion of the campaign.

The effectiveness of different methods of education for the public in this manner has not yet been extensively studied. It may be that public education about such topics as stroke awareness needs to take into account language and reading ability, educational level, and the specific modes by which people learn best.

Limitations

Our study had several potential weaknesses. The low follow up rate may bias the results and conclusions of the study. It examined individuals over a large age range instead of focusing on patients 60 and over who are most affected by stroke. Since this age group is most at risk for stroke, they may be more interested in learning about it. We did not enroll non-English speaking subjects or control for race/ethnicity so we do not know if different ethnicities/cultural groups respond differently to the various educational methods. We did not assess our subjects' literacy or evaluate for possible differences in effectiveness between the assistants providing counseling. Another limitation of our study was that it did not examine whether the participant could identify warning signs and take appropriate action during an actual stroke. Lastly, it remains unclear whether interventions will influence patients to modify their behavior positively.

Conclusion

Numerous studies have demonstrated the need for stroke education because public knowledge of signs and symptoms of this disease remains low.

The present study assessed the effectiveness of different educational techniques used in an ED waiting room. The study demonstrates that the exposure to any of the four educational interventions (videotape, one-to-one teaching, brochure reading, or a combination of the three) significantly improves short-term awareness and understanding of stroke. However, only a combination of these methods provides knowledge retention at one-month follow-up. Additional studies are needed to determine the best method to improve retention of stroke knowledge.

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Appendix 1

The test

Emergency Department Patient Education Center Stroke Quiz

Circle the correct answer(s) for each of the following questions:

- 1) Where does stroke rank among the nation's leading causes of death?
 - a. First
 - b. Third
 - c. Fifth
 - d. Twelfth
- 2) What is a stroke?
 - a. A blood clot that stops the flow of blood to a limb
 - b. The heart slows and nearly stops functioning
 - c. Blood flow to the brain is interrupted or a blood vessel in the brain bursts
 - d. All of the above
- 3) Where in the body does a stroke occur?
 - a. Heart
 - b. Brain
 - c. Lung
 - d. Stomach
- 4) Which of the following is a risk factor for stroke? (There is more than one correct answer)
 - a. High blood pressure
 - b. Asthma
 - c. Diabetes
 - d. Obesity
 - e. Cancer
- 5) Which of the following will LOWER your chances of having a stroke?
 - a. Reading every day
 - b. Having high blood pressure
 - c. Exercising 30 minutes a day
 - d. Being overweight or obese
 - e. All of the above
- 6) What will INCREASE your risk of having a stroke?
 - a. Intense physical activity
 - b. Taking drugs like aspirin
 - c. Having low cholesterol
 - d. Smoking cigarettes
- 7) What can cause a stroke?
 - a. Bleeding into the brain
 - b. Blockage of blood vessel to the brain
 - c. Both of the above
 - d. None of the above
- 8) On average, *compared to other Americans*, African-Americans...
 - a. Are five times more likely to die from a stroke
 - b. Are twice as likely to die from a stroke
 - c. Are less likely to die from a stroke
 - d. Are just as likely to die from a stroke
- 9a) Which of the following is a warning sign of stroke? (There is more than one correct answer)
 - a. Trouble speaking
 - b. Chest pain
 - c. Severe headache
 - d. Sudden numbness
 - e. Shortness of breath
- 9b) Which of the following is a warning sign of stroke? (There is more than one correct answer)
 - a. Trouble walking
 - b. Pain in the left arm
 - c. Sudden blurry vision or loss of vision
 - d. Sudden confusion
 - e. Racing heartbeat
- 10) What should you do if you see someone with the warning signs of stroke or if you are experiencing them yourself?
 - a. Call your doctor
 - b. Call 911
 - c. Drive to the hospital
 - d. Lie down and rest
 - e. Take an aspirin
- 11) How long after you see signs of stroke in either yourself or someone else should you call for help?
 - a. In a half an hour if the person is not at all better
 - b. Up to 24 (twenty-four) hours
 - c. Right away
 - d. Right away after you take an aspirin
- 12) Untreated stroke may result in which of the following (There is more than one correct answer):
 - a. Inability to speak
 - b. Paralysis
 - c. Death
 - d. Heart failure
 - e. Weight loss