

# Effective Education Materials to Advance Stroke Awareness Without Teacher Participation in Junior High School Students

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*Background:* Youth stroke education is promising for the spread of stroke awareness. The aim of this study was to examine whether our stroke awareness teaching materials without teacher's participation can increase student awareness to act fast on suspected stroke signs. *Methods:* We used the face, arm, speech, and time (FAST) mnemonic derived from the Cincinnati Prehospital Stroke Scale. Seventy-three students of the second grade and 72 students of the third grade (age range, 13-15 years) in a junior high school were enrolled in the study. The students were divided into 2 groups: students who received a teacher's lesson (group I) and those who did not receive a teacher's lesson (group II). Students in group II watched an animated cartoon and read a Manga comic in class. All students took the educational aids home, including the Manga comic and magnetic posters printed with the FAST message. Questionnaires on stroke knowledge were examined at baseline and immediately and 3 months after receiving the intervention. *Results:* At 3 months after the intervention, a significant improvement in understanding the FAST message was confirmed in both the groups (group I, 85%; group II, 94%). Significant increases in the knowledge of risk factors were not observed in each group. *Conclusions:* Our education materials include a Manga comic, an animated cartoon, and a magnetic poster, without an accompanying teacher's lesson can increase stroke awareness, including the FAST message, in junior high school students. **Key Words:** Stroke education—Manga—animated cartoon—comic—FAST.

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## Introduction

Stroke is the major cause of disability and mortality in developed countries. Intravenous alteplase administered within 4.5 hours after stroke onset can improve the overall

odds of good stroke outcome in patients with ischemic stroke,<sup>1</sup> and mechanical thrombectomy for severe stroke with proximal large-vessel occlusion up to 6 hours after stroke onset has been shown to be effective and safe in recent randomized trials.<sup>2-4</sup> Reducing avoidable delay as much as possible to increase the opportunity for thrombolysis or thrombectomy is essential for good outcome in patients with acute ischemic stroke. To reduce the prehospital delay, several public educational campaigns concerning stroke awareness have been conducted to improve stroke knowledge,<sup>5-11</sup> in spite of the limited behavioral change.<sup>12</sup> Previously, we showed that stroke education for multidisciplinary medical personnel was effective in increasing hospital visits of acute stroke patients and improving stroke knowledge.<sup>13</sup> In addition to those reports of stroke education for adults, we and others have reported studies of stroke educational

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programs for youth.<sup>14-16</sup> Results from these studies indicate that youth education is effective in spreading stroke knowledge to their families indirectly by communication among their family members. This is expected if their family members including children are to react appropriately by calling emergent medical services when observing an incidence of suspected stroke. However, if teacher participation is required for the youth to obtain stroke knowledge in a school-based intervention, the spread of information may be limited.

The aim of this study was to examine whether our teaching materials of stroke knowledge without an accompanying teacher lesson, such as an animated cartoon and a Manga comic,<sup>17</sup> would achieve the same education levels as that obtained with an accompanying teacher lesson.

## Subjects and Methods

### *Subjects*

The study was performed at a public junior high school in Suita City, Osaka Prefecture, Japan, from July 2011 to October 2012. We enrolled 73 students in 3 classes of the second grade and 72 students in 3 classes of the third grade (age range, 13-15 years). The students were divided into 2 groups: third-grade students who received stroke lessons by a schoolteacher of health and physical education (group I) and second-grade students without stroke lessons by a schoolteacher (group II).

### *Stroke Education*

For the recognition of stroke awareness, we used the face, arm, speech, and time (FAST) mnemonic derived from the Cincinnati Prehospital Stroke Scale.<sup>5,18</sup> In group I, the schoolteacher performed a lesson using our stroke education system, which consists of an online system with the instruction by a stroke neurologist (T.A.), as described previously.<sup>19</sup> Students in group II watched an animated cartoon for 10 minutes and read a Manga comic for 10 minutes in class. All students were given the Manga comic and magnetic posters recorded with the FAST message by the schoolteachers. The schoolteacher asked all the students to take the education materials to home and put the magnet poster on the refrigerator to share with their families.

### *Assessments*

Multiple-choice and closed-type questionnaires on stroke knowledge (including 12 items for stroke signs, 10 items for risk factors, and 1 item for calling an ambulance at the onset of stroke) were answered by all students at baseline and immediately and 3 months after the intervention, as described previously.<sup>19</sup> Briefly, the 12 items for stroke signs included 6 symptoms of stroke and 6 atypical symptoms. The 10 items for risk factor consisted of

7 stroke risk factors and 3 atypical risk factors. In addition, the meaning of the "FAST" mnemonic was also tested by a single-choice test immediately and at 3 months after the lesson. All data were collected without personal identifiers.

The present research was carried out in partnership with the Suita City Board of Education. The Board of Education approved this study, and this study obtained exempted approval from the institutional review board.

### *Statistical Analysis*

Statistical analysis was performed using JMP 10.02 (SAS Institute, Inc., Cary, NC). Data were compared between 2 groups in each time point and among the 3 time points in each group by Fisher exact test. A value of *P* less than .05 was defined as a significant difference statistically.

## Results

A total of 14 students were excluded from the analysis because questionnaires could not be collected at 3 months after the lesson. At 3 months after the lesson in group I, the frequencies of correct answers of facial weakness in 1 side and unclear speech were significantly higher than those observed at baseline, whereas the frequency of correct answers of headache was significantly lower than that at baseline (Table 1). The correct answer rates of visual impairment and arm or leg weakness on 1 side increased significantly immediately after the lesson compared with those at baseline; however, both were decreased at 3 months. The correct answer rates of all questions of risk factors at 3 months were similar to those at baseline. The rate of calling an ambulance on observing a suspected stroke sign at 3 months and that at immediately after the lesson increased significantly compared with that at baseline.

In group II, the correct answer rates of facial weakness in 1 side, unclear speech, and arm or leg weakness on 1 side were significantly higher than those at baseline during 3 months (Table 1). The correct rates of headache and visual impairment decreased significantly at 3 months compared with those at baseline. As risk factors, the frequency of correct answers of all risk factors was similar as that at baseline at 3 months. The rate of calling an ambulance increased significantly at immediately after the lesson over that at baseline; however, the rate of it decreased at 3 months.

Correct answer rates of stroke signs other than FAST mnemonic in the group II in each time point were significantly lower than those in the group I; however, there were no significant differences in correct answer rates of FAST mnemonic at 3 months between the 2 groups (Table 1). Significant increases in correct answer rates of risk factors compared with those at baseline were not observed in both 2 groups. There were no significant

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