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Presentation Time to Hospital and Recognition of Stroke in Patients with Ischemic Stroke

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Background : Recent advances in stroke therapies require patients to be treated very early after the onset of symptoms. To reduce the delay in time upon stroke and arriving at the hospital, we assessed the time delay, stroke recognition, and awareness before and after a public education program designed to increase recognition and awareness. **Methods** : Prospective standardized and structured interviews were performed in 155 patients with ischemic stroke who were admitted to the Severance hospital before and after the public education program. The educational program included local newspaper articles, distribution of pamphlets, and lectures to 119 emergency care teams. Time delay, variable factors, stroke recognition, and stroke awareness of patients were then assessed (75 pre-education and 80 post-education groups). **Results** : 52% of the pre-education group and 52.5% of the post-education group arrived at the hospital within 24 hours. Those who arrived within 3 hours were only 21.3% and 15% respectively. A direct visit to the hospital and a cardioembolic infarction appeared to be associated with a shorter time delay. About half of the patients recognized their symptoms as a stroke before a diagnosis was made by a doctor. Most of them had known that a stroke should be treated urgently. However, the stroke recognition and awareness was not associated with an early arrival, which suggests that their knowledge was not solid. The efforts to inform the public using local newspaper articles and pamphlets geared towards the local residents for the limited time period was not effective in shortening arrival times. **Conclusions** : Many of the stroke patients did not arrive within the therapeutic time window. Our findings suggest that extensive and multidirectional campaigns should be performed to reduce the time delay. Our findings also suggest that educational aims should include the need for the rapid treatment of stroke and a therapeutic time window as well as stroke recognition.
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Key Words : Presentation time, Arrival, Cerebrovascular disorders, Cerebral infarction, Education

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plasminogen activator(t-PA)   .

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                  .   .   SAS   ,   t-test,
                                 ANOVA, chi-test   (multiple regres-
                                 sion analysis)   .
      ,   (log transformation)   .
                    .[2]   ±   .

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                  [3,4]
            .   75   ,
                                       80   155   (Table 1).

           .   45   ,   51
                                                  .   Table 1
                                              .   ,
                                                 (54.7%,   60.0%)   (
                                         36.0%,   25.0%)   ,
           .
                                                 56.1%,   54.2%
  1995   8   1996   10   .
                                                   .
        , 1996   1
                                      2.
                .
                                 68.6± 112.5   (20.33   ),
                                    68.9± 103.9   (24   )
                      .   (p=0.27). t-PA
             (3
   , 1994)   3   21.3%,   15.0%   , 24
              ,   ,   52.0%   52.5%   (Fig. 1).
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                       2   ,   ,   ,   ,
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  2   ,   .
        1   2~ 4   ,   ,   ,
      .   119
    2   ,   (Table 2).
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           ,   (Table 3, Fig. 2,3).

Table 1. Demographic charateristics of patients

Characteristics		Pre-education	Post-education	Total
Number of patients		75	80	155
Sex	men	43 (57.3)	49 (61.3)	92 (59.4)
	women	32 (42.7)	31 (38.8)	63 (40.6)
Age (year)	mean	61.0	62.5	61.8
	SD	12.0	11.1	11.5
Occupation	unemployed	21 (28.0)	37 (46.3)	58 (37.4)
	housewife	17 (22.7)	16 (20.0)	33 (21.3)
	office worker	6 (8.0)	10 (12.5)	16 (10.3)
	outdoor labor	7 (9.3)	2 (2.5)	9 (5.8)
	indoor labor	4 (5.3)	4 (5.0)	8 (5.2)
	expert	10 (13.3)	3 (3.8)	13 (8.4)
	others	10 (13.3)	8 (10.0)	18 (11.6)
Education	college	17 (22.7)	17 (21.3)	34 (21.9)
	high school	18 (24.0)	25 (31.3)	43 (27.7)
	middle school	13 (17.3)	9 (11.3)	22 (14.2)
	elementary school	19 (25.3)	19 (23.8)	38 (24.5)
	illiteracy	7 (9.3)	9 (11.3)	16 (10.3)
	unresponder	1 (1.3)	1 (1.3)	2 (1.3)
Stroke type	atherothrombotic	32 (42.7)	31 (38.8)	63 (40.6)
	cardioembolic	9 (12.0)	9 (11.3)	18 (11.6)
	lacunar	19 (25.3)	20 (25.0)	39 (25.2)
	undeterminate	11 (14.7)	15 (18.8)	26 (16.8)
	TIA	1 (1.3)	5 (6.3)	6 (3.9)

SD : standard deviation, TIA; transient ischemic attack
Numbers in parentheses are percentages.
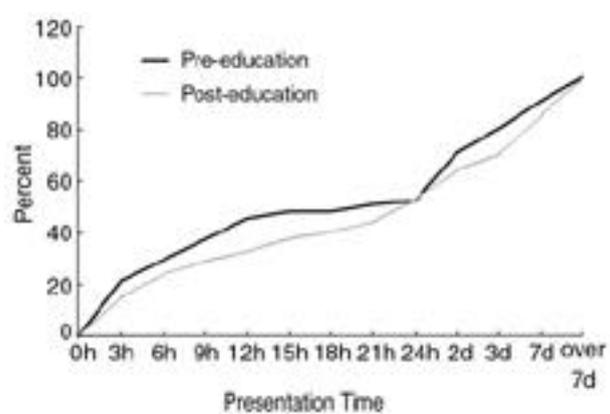
Figure 1. Cumulative line graph of the presentation time from stroke onset to arrival in the hospital.

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60 (38.7%)

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22 (14.2%)

(14 , 9.0%)

, (7 , 4.5%), (4 , 2.6%), (3 ,
1.9%), (3 , 1.9%)

. 63 (40.6%)

.

33 (44.0%), 24 (30.1%) ,

12 (16.0%) 18 (22.5%)
(Fig. 4).

72 46.8% 119
33 21.4%,
27 17.5% .

4.

44.4%,
40.4% . 50.0%,
65.5% .
"

?"

86.7%, 86.2%,
84%, 93.1% " "

. "

?"
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1 (Table 4).

Table 2. Clinical factors affecting on the time delay to hospital arrival

		Yes		No		
		Patients N	Time delay (hours) mean (SD)	Patients N	Time dealy (hours) mean (SD)	p-value
Neurologic deficits	weakness	105	64.7 (119.5)	50	68.3 (79.1)	0.0468
	somatic sensory	71	76.9 (121.4)	84	56.5 (94.6)	0.7329
	cortical sensory	31	39.7 (85.4)	124	72.4 (112.1)	0.0044
	aphasia	23	46.7 (82.0)	132	69.2 (111.5)	0.2602
	dementia	4	39.7 (34.6)	151	66.5 (109.1)	0.9641
	neglect	21	52.8 (106.8)	134	67.9 (108.3)	0.0181
	apraxia	6	123.3 (135.4)	149	63.5 (106.5)	0.1624
	dysarthria	61	64.3 (102.9)	94	66.9 (111.5)	0.9034
	visual field defect	46	39.2 (62.4)	109	77.1 (120.6)	0.0857
	facial palsy	9	34.5 (64.3)	146	67.8 (109.8)	0.4886
	EOM disturbance	33	27.2 (63.3)	122	76.3 (115.0)	0.0008
	ataxia	47	54.7 (92.8)	108	70.7 (113.9)	0.8177
	vertigo	27	76.5 (149.4)	128	63.6 (97.5)	0.5905
Past history	stroke	23	97.1 (114.2)	132	60.4 (106.2)	0.0886
	TIA	3	24.9 (35.6)	152	66.7 (108.7)	0.551
	DM	10	42.4 (42.7)	145	67.5 (110.8)	0.9426
	Hypertension	19	38.9 (66.5)	136	69.6 (112.1)	0.2866

N : number of patients, EOM; extraocular movement, TIA : transient ischemic attack, DM : diabetes mellitus, SD : standard deviation

Table 3. Multiple regression analysis of factors affecting on the time delay

	Variables	Coefficient	t-value	p-value
Neurologic deficits	weakness	-0.4618	-1.538	0.1264
	cortical sensory	-0.1067	-0.232	0.817
	neglect	0.2982	0.531	0.596
	EOM disturbance	-0.6711	-1.844	0.0673
Stroke type	cardioembolic	-1.2175	-2.646	0.0091
	lacunar	0.3698	1.098	0.274
	undeterminate	0.134	0.355	0.7228
	TIA	-0.9115	-1.604	0.1109
Referral way	western medical facilities	0.6526	2.148	0.0335
	oriental medical facilities	1.743	4.774	0.0001

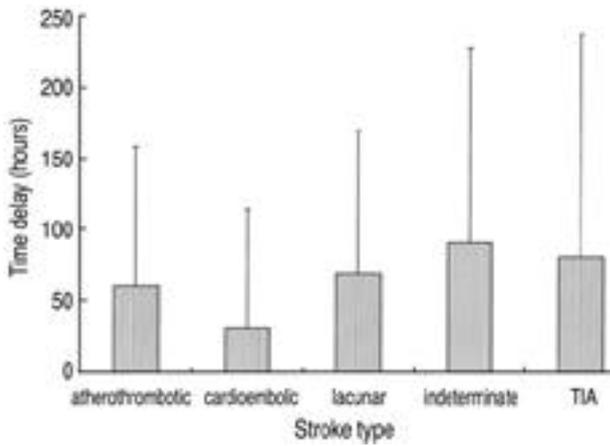EOM : extraocular movement, TIA : transient ischemic attack
Western medical facilities include clinics, general hospitals, and university hospitals.
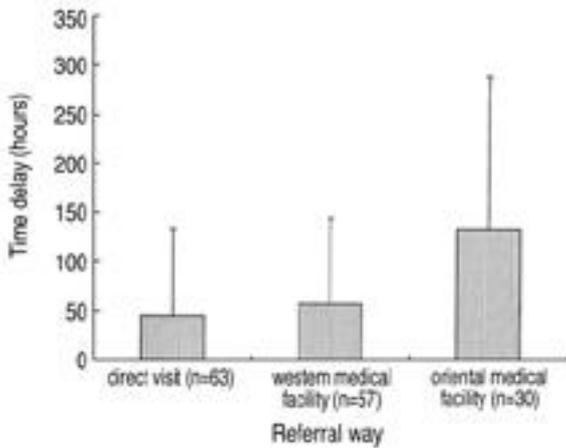Oriental medical facilites include oriental medicine clinics and hospitals.
The reference categories of stroke type and referral way were atherothrombotic and direct visit, respectively.
R square of this model was 28.3%.

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3 , 122
46.7% 6
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. 7

, 24 . 2.5~ 3.5
. t-PA 18%~ 34%,[5-10] 24
3 20% 42~ 75%[11-14] ,
6 29.3%,
23.8% . .

Figure 2. Time delay by stroke subtype. Patients with cardioembolic infarction showed a shorter presentation time to the hospital.

Figure 3. Time delay by referral. Western medical facilities include clinics, general hospitals, and university hospitals while oriental medical facilities include oriental medicine clinics and hospitals. Patients who directly visited the hospital presented earlier than those who went through other medical facilities, especially oriental medicine.
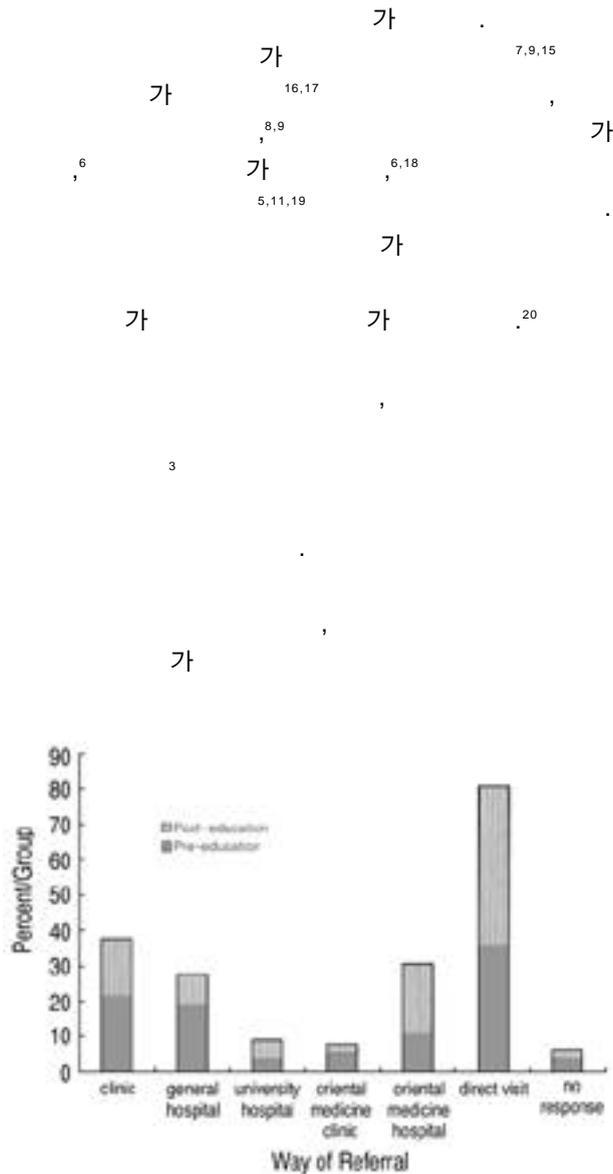
Figure 4. The path of referral routes.

Table 4. The way of getting knowlege on the necessity of urgent stroke treatment

	Pre-education	Post-education	Total
Common sense	47 (73.4)	57 (80.3)	104 (77.0)
Doctor	8 (12.5)	9 (12.7)	17 (12.6)
Neighbors or relatives	5 (7.8)	3 (4.2)	8 (5.9)
Education	2 (3.1)		2 (1.5)
Television		1 (1.4)	1 (0.7)
Pamphlets		1 (1.4)	1 (0.7)
Newspaper			0 (0.0)
Magazine			0 (0.0)
Radio			0 (0.0)
Others	2 (3.1)		2 (1.5)
Total	64 (100)	71 (100.0)	135 (100.0)

Numbers are numbers of patients.
Numbers in parentheses are percentages.

83.5%

3

60%

t-PA

119

1

t-PA

12.6%

20%

70~80%

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