Decision-tree Model of Treatment-seeking Behaviors after Detecting Symptoms by Korean Stroke Patients

Hyo-Sook Oh, RN, PhD[1], Hyeoun-Ae Park, RN, PhD[2]

Purpose. This study was performed to develop and test a decision-tree model of treatment-seeking behaviors about when Korean patients visit a doctor after experiencing stroke symptoms.

Methods. The study used methodological triangulation. The model was developed based on qualitative data collected from in-depth interviews with 18 stroke patients. The model was tested using quantitative data collected from interviews and a structured questionnaire involving 150 stroke patients. The predictability of the decision-tree model was quantified as the proportion of participants who followed the pathway predicted by the model.

Results. Decision outcomes of the model were categorized into immediate and delayed treatment-seeking behavior. The model was influenced by lowered consciousness, social-group influences, perceived seriousness of symptoms, past history of hypertension or stroke, and barriers to hospital visits. The predictability of the model was found to be 90.7%.

Conclusions. The results from this study can help healthcare personnel understand the education needs of stroke patients regarding treatment-seeking behaviors, and hence aid in the development of educational strategies for stroke patients.

Key Words : Decision making, Stroke, Health care-seeking behavior

INTRODUCTION

Once symptoms or signs of a disease manifest, most people seek diagnosis and treatment. Korean people often use over-the-counter drugs and folk remedies, or they visit health care facilities such as a drugstores, public health agency, herbal clinic, or hospital depending on their health care decision making. The behavior of individuals generally involves a process of perceiving and judging symptoms after experiencing physical discomfort, followed by the taking of appropriate measures. Thus, appropriate measures are realized mainly within treatment-seeking behaviors.

Stroke is the second most-common cause of death in South Korea after malignant neoplasm, and is the most-common cause of death involving one organ. Stroke is more common in the elderly, and hence its prevalence has increased dramatically as the proportion of elderly has increased. The prevalence of stroke among people in their 60s and over 70 years old were 29.7 and 56.7 per 1,000 respectively and the mortality rate in the same age group of 253.4 and 1080.4 per 100,000 respectively in Korea (National Statistics Office, 2002). Stroke is caused by disruption of the blood supply to part of the brain that results in loss of brain function. The function of

1. Assistant Professor, Department of Nursing, Daebul University
2. Professor, College of Nursing, Seoul National University
Corresponding author: Hyo-Sook Oh, RN, PhD, Department of Nursing, Daebul University, 72, Sanho-ri, Samho-up, Youngam-gun, Jeonnam, Korea
Tel: 82-61-469-1478   Fax: 82-61-469-1317   E-mail: ohs0@mail.daebul.ac.kr

damaged sections of the brain cannot be fully recovered, and hence treatment at the acute stage is crucial. The stroke results from thrombosis, embolism, ischemia or hemorrhage. For cerebral hemorrhage, surgery can be used to remove a hematoma depending on the location of the lesion. Nonsurgical treatments are also available, such as blood pressure control and the use of osmotic diuretics. More rapid treatment after the onset of stroke results in a better treatment prognosis, with the timing being particularly important for ischemic stroke. Tissue damage by cerebral infarction is reversible for 4-6 hours depending on the collateral blood supply (Fieschi et al., 1988). Emerging thrombolytic therapies for the treatment of ischemic stroke have shown good results (Barsan et al., 1994; Hickenbottom & Barsan, 2000), but only if reperfusion is achieved within the time for reversibility after the onset of the stroke (Cho, 1996). Thrombolytic therapy for acute stroke ? in the form of the administration of rt-PA (recombinant tissue plasminogen activator) within 3 hours of the onset of symptoms - has been shown to improve the neurological outcome (NINDS, 1995). Hence, for the treatment of acute stroke, the most important factor is how fast the patient arrives at a hospital after the onset of symptoms.

Unlike other countries, a dual health care system of Western and Oriental medicines operates in Korea. Korean patients experiencing stroke symptoms tend to seek treatment from Oriental medicine and other folk remedies rather than from Western medicine (Cho, 1996; Byun, 2000). However, the types of treatment-seeking behavior exhibited by stroke patients in order to obtain diagnosis and treatment once they feel symptoms, how fast they visit a doctor, and the decision-making strategy used by the stroke patients when they visit a doctor are still unclear.

The present study attempted to construct and verify a decision-tree model describing the delay between the initial onset of stroke and visiting a doctor, and the factors influencing the delay. The results from this study will contribute to reducing the time to diagnosis and treatment, and hence minimizing stroke-related disorders.

BACKGROUND

A survey of treatment-seeking behavior upon the onset of stroke in Korea has revealed that many stroke patients did not undergo medical examination and treatment; instead, they relied on Oriental herbal medicine and folk remedies (Kim, 1989). In particular, the lack of neurological knowledge on stroke made stroke patients unaware of the disease prognosis. Furthermore, the survey revealed that due to the misconception that visiting a doctor made things worse, 14.6% received no treatment and 37% of treated people received Oriental medicine or acupuncture (Choi, Kim, & Cho, 1991).

Until recently, supportive care has been the main treatment for acute stroke. There is proof that thrombolytic therapy for acute stroke can improve neurological outcomes, but this treatment is time-dependent. The current guideline of NINDS (1995) recommends that thrombolytic therapy is received within 3 hours of the onset of stroke, emphasizing the importance of prompt and efficient treatment. Hence, the appropriate treatment of stroke requires the prompt arrival at a hospital.

Various studies have analyzed hospital arrival delays and related factors among stroke patients, and found that the median time interval between the onset of stroke symptoms and arrival at a hospital was 6 hours: 6 hours in Taiwan (Chang, Tseng, & Tan, 2004), 6 hours in Australia (Broadley & Thompson, 2003), 2.6-3 hours in the United States (Morris, Rosamond, Madden, Schultz, & Hamilton, 2000; Rosamond, Gorton, Hinn, Hohenhaus, & Morris, 1998), 6 hours in the United Kingdom and Dublin (Harraf et al., 2002), 4.8 hours in Sweden (Wester, Rådberg, Lundgren, & Peltonen, 1999) and 5.2 hours in China (Wang, Niu, Wang, & Zhang, 2002). The factors that reportedly influence the delay to arriving at hospital included lowered consciousness, recognition of stroke by bystanders, the use of emergency ambulance services, expressions about sense of urgency, and greater neurological deficit when arriving at hospital. The factors delaying the arrival at hospital were referral of primary health care agencies, cerebral infarction, gradually developed symptoms of onset of stroke, mild neurological deficit, living alone, no contact with other people during the onset of stroke, and less concern about stroke onset (Chang et al., 2004; Broadley & Thompson, 2003; Morris et al., 2000; Rosamond et al., 1998; Harraf et al., 2002; Wester et al., 1999; Wang et al., 2002).

Few studies have been conducted in Korea on the factors influencing the delay to arrival at hospital for acute stroke (Cho, 1996; Jung, 1995). This study attempted to construct and verify a model describing the treatment-seeking behavior for a prompt arrival at hospital after

the onset of stroke symptoms.

METHODS

This study used methodological triangulation, applying qualitative and quantitative research methodologies. Methodological triangulation employs a variety of research methods simultaneously, and the purpose is to compare and verify the results from one study method with those acquired through the use of other study methods (Kimchi, Polivka, & Stevenson, 1991). The type of methodological triangulation used in this study was hybrid blending as proposed by Gladwin (1989), who described the ethnographic method using qualitative research paradigms and the cognitive ethnographic decision-tree model methodology embodying quantitative research paradigms. This study was thus carried out in two phases: the first phase of developing models through the use of a qualitative research method, and the second phase of verifying models using a quantitative research method.

In the first phase, data were collected on the decision-making experiences of stroke patients on treatment-seeking behavior using the developmental research sequence of Spradley (1979). The research procedure was a cyclic process involving a repetition of collecting ethnographic data, analyzing data, developing better questions, and asking further ethnographic questions. Data were collected using open and descriptive questions in the early stage of the study, and using more structural and comparative questions in the later stage. According to Gladwin (1989), there are two ways of conducting the first phase of study: direct and indirect. Using the direct method, the researcher can develop a decision tree for each individual interviewed and then build a composite tree at the end; whereas in the indirect method, the researcher builds the decision tree as the interviews proceed. The present study adopted the indirect method: the decision tree was built and modified step by step as interviews proceeded, thereby improving the predictability of the model. A new pathway was added to the decision tree if a new theme as a decisional factor was found from the interview and kept it if it appears more than three times, otherwise deleted it to simplify the model.

Qualitative research method for developing the decision tree model

Data for qualitative analysis were collected through semi-structured in-depth interviews conducted from January to June 2003 with 18 stroke patients from a general hospital. Most interviews were performed in a closed area inside a hospital room. Patients who are over 18 years were recruited with the help of head nurses. Patients without knowledge of their diagnoses and verbal communication skill were excluded.

The purpose of the study was explained to the participants prior to interviews. They were also informed that the interview would be recorded, that they could refuse to answer any of the questions or terminate the interview at any time, and that their anonymity was guaranteed. The study was approved by the internal review board at the hospital from which the selected study participants were recruited.

The interview began with an open question, such as "Can you explain the treatment process from the time you discovered symptoms to now?" Interviews lasted 60–120 minutes using prearranged open questions as a reference such as 'Please tell me what you did for diagnosis and treatment after you felt the symptoms of stroke?, 'How did you feel after you were diagnosed of a stroke?'. The data were analyzed using domain analysis and taxonomic analysis, which are the ethnographic analysis methods introduced by Spradley (1980). Domain analysis was used first to analyze data through descriptive questions. The researcher attempted to find semantic relations between meaningful vocabularies, phrases, and clauses while reading related qualitative data. Cultural domains were determined by reflective thinking on the interview data. Line-by-line analyses and highlighting analyses were conducted for searching inclusion relations between cultural domains and the decision theme. The results of this analysis were written down, with similar contents being classified into the same categories. A long written list of cultural domains was prepared, and general terms were selected including the domains while examining the similarities and differences among the domains.

Taxonomic analysis determines how the study proceeds, and determines the organization of the cultural domains. The theme of decision making was selected by analyzing study data covering these domains through additional questions. Data collection was stopped and the model was considered complete when no more new

information was collected during the process of composing and correcting the decision-tree model. The details of interviews held with each participant and the outcomes of questions were checked continuously while constructing the decision-tree model.

Quantitative research method for testing the decision-tree model

For the model-testing phase, data were collected through the use of a questionnaire and interviews from July 2003 to March 2004. One hundred and fifty stroke patients were identified based on the medical records maintained by the five Oriental-medicine centers and general hospitals in Seoul and Mokpo. Patients without knowledge of their diagnoses or patients who could not communicate were excluded.

The researchers developed data-collection tools centering round the factors that affect the decision making identified from qualitative investigations and a literature review. The questionnaire consisted of the subjects' demographic characteristics (7 items), the current hospital treatment (11 items), decision factors regarding the delay to arrival at hospital (9 items) including lowered consciousness, social group influence, perceived seriousness, and the subjects' perceptions regarding the treatment of stroke (5 items) such as perceived cause of disease, curability, perceived stress. The questionnaire consisted of 32 items with yes/no and open questions.

The models of the treatment-seeking behavior of stroke patients were verified through interviews using the decision-tree model developed during the qualitative part of the study. Next, The data from the stroke patients were then collected using a questionnaire, with each interview lasting 20 to 40 minutes.

The predictability of the decision-tree model was measured by its success rate as calculated by dividing the number of participants who followed the pathway predicted by the model by the total number of participants. Data were analyzed using SPSS (V10.0). Frequencies were counted and logistic regression analyses were performed.
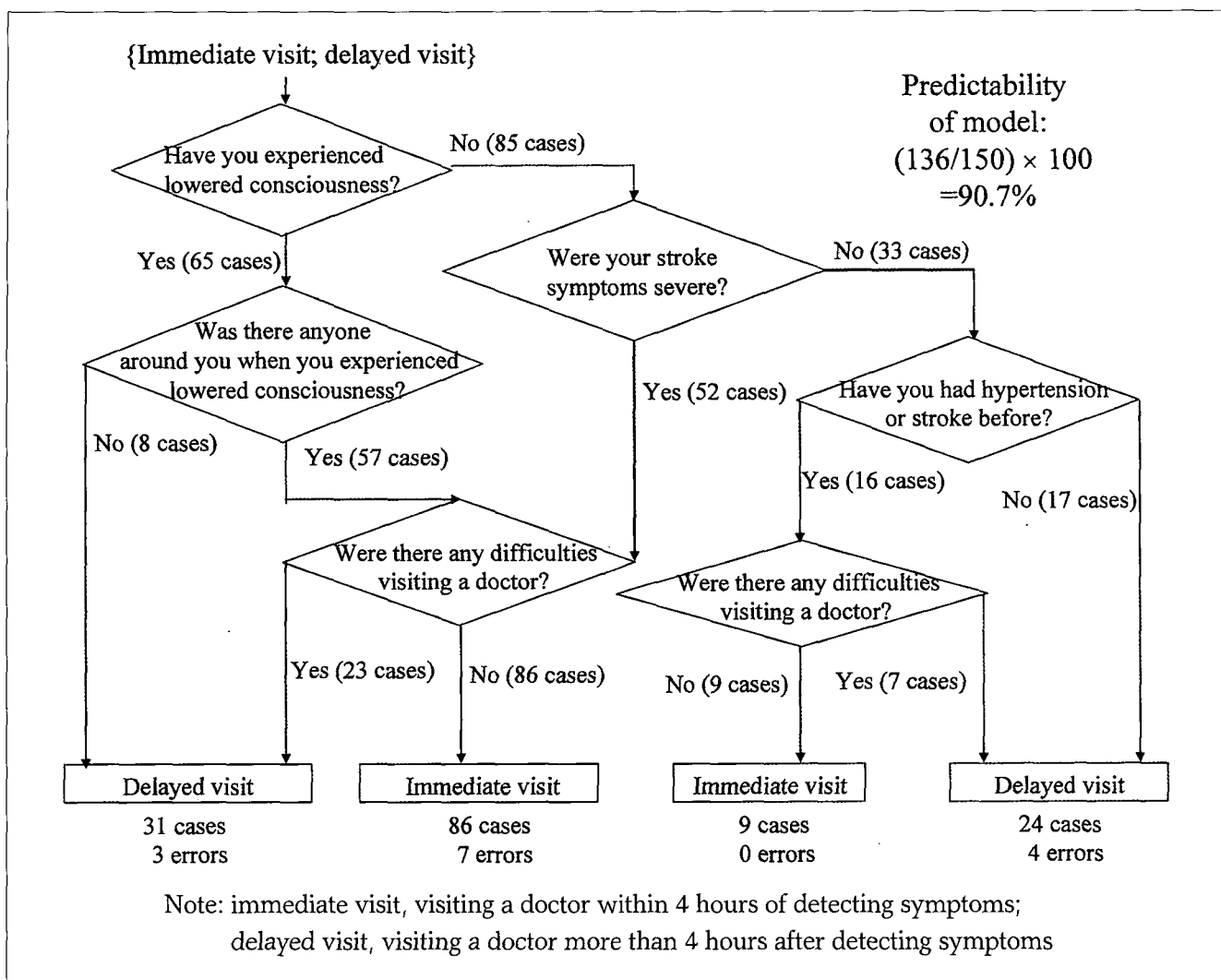
RESULTS

Decision factors affecting treatment-seeking behaviors

The decision factors influencing treatment-seeking time after the first symptom onset included lowered consciousness, influence of the social group when symptoms appear, perceived seriousness of symptoms, past history of hypertension or stroke, and barriers to hospital visits. The treatment-seeking time - the delay between the onset of symptoms and the hospital visit - was categorized into immediate type (within 4 hours) and delayed type (more than 4 hours). A cutoff of 4 hours was chosen because the interviews revealed that the decision criteria of patients clearly differed for delays shorter and longer than this time. Also, arriving at hospital within 4 hours of the onset of symptoms allows treatments that minimize brain damage, such as thrombolytic therapy (Table 1).

Table 1. Decision Factors Affecting Treatment-seeking Behavior

Taxonomy	Subject statements
Lowered consciousness	I was brought unconscious to the hospital after I suddenly fainted at home. My husband must have brought me here because the last thing I remember was being home (Case 12).
Influence of the social group at the onset of symptoms	While I was having a meal with my family, they told me I looked a bit pale. I started feeling dizzy, and I could not see my rice bowl clearly. I didn't know I was eating the rice of my husband who was sitting next to me. My husband and children thought I was behaving unusually, so they brought me to the hospital emergency room (Case 3).
Perceived seriousness of symptoms	I started feeling severe nausea, followed by paralysis. My tongue was partially uncontrollable, so I went to a hospital immediately. My doctor told me to go to the emergency room of a bigger hospital instead (Case 8).
Barriers to hospital visits	While I was still conscious, I suddenly started vomiting. I thought it was a simple case of indigestion, so I went to a drugstore to buy medicine, and visited an acupuncturist. But they did not alleviate the symptoms. With a sense of foreboding, I took a bus to a hospital in Uijeongbu, and upon my arrival was told by the medical personnel that I had visited a bit too late (Case 14).
Past history of stroke or hypertension	In 1990 I suddenly fainted, and was taken to a hospital. Fourteen days after the operation, I regained consciousness and subsequently fully recovered. I later experienced severe headache and nausea again, and thought that I was having a relapse. I immediately called the emergency ambulance service (Case 4).

{Immediate visit; delayed visit}

Predictability
of model:
(136/150) × 100
=90.7%

Have you experienced lowered consciousness?   No (85 cases)

Yes (65 cases)

Were your stroke symptoms severe?   No (33 cases)

Was there anyone around you when you experienced lowered consciousness?

Yes (52 cases)   Have you had hypertension or stroke before?

No (8 cases)   Yes (57 cases)

Yes (16 cases)   No (17 cases)

Were there any difficulties visiting a doctor?

Were there any difficulties visiting a doctor?

Yes (23 cases)   No (86 cases)   No (9 cases)   Yes (7 cases)

Delayed visit	Immediate visit	Immediate visit	Delayed visit
31 cases	86 cases	9 cases	24 cases
3 errors	7 errors	0 errors	4 errors

Note: immediate visit, visiting a doctor within 4 hours of detecting symptoms;
delayed visit, visiting a doctor more than 4 hours after detecting symptoms

Figure 1. Decision-tree model of treatment-seeking behavior after detecting symptoms of stroke (N = 150)

Decision-tree model of treatment-seeking behaviors

The decision-making model of the delay between the detection of the first symptom to seeking treatment from a doctor is shown in Figure 1. The predictability of this model was 90.7%: only 14 of the 150 interviewed patients did not follow the pathway predicted by the model.

Comparison of the demographic characteristics and decision factors between the two types of treatment-seeking behavior

The analysis of the demographic and decision factors between the two treatment-seeking times revealed that a large family, perceived seriousness of symptoms, presence of bystanders, lowered consciousness, regular health concerns, absence of barriers to hospital visits, use of an emergency ambulance service, and past history of hypertension or stroke were statistically significant decision factors in immediate treatment-seeking (Table 2, Table 3).

Logistic regression analysis of factors influencing the types of treatment-seeking behavior

Logistic regression analysis was performed to elucidate the factors that influence treatment-seeking time. The model fitted well, with a probability value of less than 0.0001, and the success rate of the model was 86.0%.

The probability of immediate treatment-seeking was increased by lowered consciousness, influence of the social group (presence of bystanders), perceived seriousness of symptoms, and past history. Only barriers to visiting a doctor were negatively correlated with immediate treatment-seeking. All the variables except lowered consciousness were statistically significant at the 0.05 level.

Table 2. Comparison of Demographic Characteristics Between the Two Types of Treatment-seeking Behavior (immediate and delayed)

Variables	Categories	Immediate	Delayed	p
		N (%)/Mean±SD	N (%)/Mean±SD	
Sex	Male	55 (57.3)	29 (53.7)	.399
	Female	41 (42.7)	25 (46.3)	
Size of family		3.22±1.38	2.61±1.19	.005*
Age (years)		60.12±11.23	60.05±8.29	.965
Monthly income	< 100	25 (26.0)	14 (25.9)	.449
(×10,000 won)	100 to < 300	43 (44.8)	29 (53.7)	
	≥ 300	28 (29.2)	11 (20.4)	
Marital status	Married	83 (86.5)	45 (83.3)	.385
	Single	13 (13.5)	9 (16.7)	
Education	≤ High school	82 (85.4)	42 (77.8)	.173
	≥ College	14 (14.6)	12 (22.2)	
Place of residence	Urban area	76 (79.2)	39 (72.2)	.221
	Rural area	20 (20.8)	15 (27.8)	

*p < 0.05

Table 3. Comparison of Decision Factors Between the Two Types of Treatment-seeking Behavior (immediate and delayed)

Variables	Categories	Immediate	Delayed	p
		N (%)/Mean±SD	N (%)/Mean±SD	
Perceived seriousness of	Severe	80 (83.3)	28 (51.9)	.001*
initial symptoms	Not severe	16 (16.7)	26 (48.1)	
Social-group	Yes	88 (91.7)	34 (63.0)	.001*
Influence	No	8 (8.3) ·	20 (37.0)	
Lowered consciousness	Yes	51 (53.1)	14 (25.9)	.001*
	No	45 (46.9)	40 (74.1)	
Regular health concerns	Yes	58 (60.4)	23 (42.6)	.027*
before onset of symptoms	No	38 (39.6)	31 (57.4)	
Barriers to visiting a Doctor	Yes	3 (3.1)	36 (66.7)	.001*
	No	93 (96.9)	18 (33.3)	
Transportation	Emergency ambulance	56 (58.3)	15 (27.8)	.001*
	Automobile, taxi, others	40 (41.7)	39 (72.2)	
Past history of hypertension	Yes	69 (71.9)	24 (44.4)	.001*
orStroke	No	27 (28.1)	30 (55.6)	
Family history of hypertension	Yes	40 (41.7)	24 (44.4)	.436
or stroke	No	56 (58.3)	30 (55.6)	
Medical diagnosis	Ischemic stroke	62 (64.6)	39 (72.2)	.220
	Hemorrhagic stroke	34 (35.4)	15 (27.8)	

*p < 0.05

Table 4. Logistic Regression Analysis of Factors Related to Immediate Treatment-seeking After the Onset of Symptoms

Parameter	Estimate	Odds ratio	95% Wald confidence limits	
Lowered consciousness	0.417	1.517	0.581	3.959
Social-group influence	1.282*	3.603*	1.181	10.993
Perceived seriousness	1.242*	3.462*	1.260	9.516
Past history	1.023*	2.782*	1.107	6.991
Barriers to visiting a doctor	-3.384*	0.034*	0.012	.093

*p < 0.05

The odds ratio of immediate treatment-seeking in the presence of bystanders compared to the absence of bystanders after controlling for other variables in the logistic regression model was 3.6. Similarly, the odds ratio of immediate treatment-seeking for recognizing the seriousness of symptoms compared to not recognizing the seriousness of symptoms was 3.4 (Table 4).

DISCUSSION

This study examined the time interval between the onset of initial symptoms and arrival at a hospital, since early diagnosis is extremely important in the prognosis of stroke patients. The studies conducted in Korea by Cho (1996) and Jung (1995) revealed that 39.9% and 52.6% of subjects visited the emergency room of a general hospital within 6 hours of the onset of stroke symptoms, respectively. The median time interval between the onset of acute stroke symptoms and arriving at hospital in other countries has varied from 3 to 6 hours, with most studies using 3 hours as a baseline (Broadley & Thompson, 2003; Chang et al., 2004; Rosamond et al., 1998) because the American Heart Association recommends that thrombolytic therapy be performed within 3 hours of the onset of symptoms in order to improve neurological results for acute ischemic stroke. Thus arriving at a hospital within 2 hours of the onset of symptoms is necessary to allow for diagnosis and evaluation by doctors.

The predictability of the developed treatment-seeking model was 90.7%, which is at the upper bound of the range considered by Gladwin (1989) to indicate a successful model (85-90%). The present study showed that the factors influencing the delay to seeking treatment after the onset of symptoms among stroke patients included lowered consciousness, social-group influences, perceived seriousness of symptoms, past history of hypertension or stroke, and barriers to hospital visits.

This study showed that lowered consciousness was an important factor in an early hospital visit. In many other studies, consciousness disturbance had the greatest effect on an early hospital visit (Derex, Adeleine, Nighoghossian, Honnorat, & Trouillas, 2002; Cho, 1996).

In addition, the social group influenced the treatment-seeking behavior. That is, when stroke symptoms include lowered consciousness or a self-control disorder, the presence of bystanders reduced the delay to arriving

at hospital. This study showed that arriving at hospital was delayed for elderly people living alone and patients without access to outside help at the onset of symptoms. These findings are similar to previous results: that recognition of symptoms by bystanders facilitated an early arrival at hospital (Derex et al., 2002; Rosamond et al., 1998); and elderly people living alone, patients without access to outside help, and patients who do not maintain contact with others experience a delayed arrival at hospital (Wester et al., 1999). Hence, the difficulties experienced by many stroke patients in taking quick and appropriate action by themselves makes it necessary to comprehensively educate families, friends, neighbors, and community as well as the patients themselves.

This study showed that the perceived seriousness of symptoms influenced the delay to arrival at hospital. A sudden onset of stroke, rapidly progressing symptoms, and continuous symptoms resulted in a higher seriousness of symptoms. These findings are similar to those other studies: a higher NIHSS (National Institutes of Health Stroke Scale Score) (Derex et al., 2002; Chang et al., 2004; Bohannon, Silverman, & Ahlquist, 2003) and more severe neurological symptoms when arriving at hospital (Wester et al., 1999; Goldstein, Edwards, & Wood, 2001; Wang et al., 2002) facilitated an earlier arrival at hospital.

On the other hand, patients with a past history of hypertension or stroke recognized the symptoms more quickly and had fewer emotional difficulties with deciding to visit a doctor because of their past experience of visiting a doctor; thus they visited the hospital early. This finding is similar to the studies that a past history of myocardial infarction (Smith et al., 1998) and strokes (Bohannon et al., 2003) shortened the delay to arriving at a hospital. Accordingly, thoroughly educating stroke patients on taking prompt action in response to the onset of symptoms for hypertension or stroke is necessary before they are discharged from hospital. On the other hand, another study showed that the past history of stroke did not influence the delay to the hospital visit (Cho, 1996), and even though patients who had previously experienced stroke quickly recognized the symptoms, this did not influence the delay to the hospital visit (Williams, Bruno, Rouch, & Marriott, 1997). Hence, this issue still requires verification.

Finally, this study has shown that barriers to hospital visits increased the delay to arriving at hospital. Such barriers include a lack of knowledge regarding stroke

symptoms, absence of bystanders, visiting a hospital after visiting a drugstore or a herbal clinic, a long distance to a hospital, and nonuse of the emergency ambulance service.

In particular, lack of knowledge of bystanders as well as patients regarding stroke symptoms delayed the hospital visit. Patients did not consider it necessary to visit a doctor if a symptom was not severe, which delayed their arrival at hospital until the symptoms worsened. This was consistent with the finding of Bohannon et al. (2003) that the awareness of stroke shortened the delay in arriving at hospital. Moreover, Alberts, Bertels, and Dawson (1990) showed that not recognizing stroke symptoms delayed the arrival at hospital.

A few of the subjects in the present study stated that being far from a hospital delayed the hospital visit, whereas the use of the emergency ambulance service facilitated an early visit. This finding was consistent with the results of other studies (Broadley & Thompson, 2003; Tan, Chang, & Liou, 2002). Similarly, many studies have shown that the use of the emergency ambulance service was the most important factor in an early hospital visit (Bohannon et al., 2003; Derex et al., 2002; Lacy, Suh, Bueno, & Kostis, 2001; Wester et al., 1999). Therefore, an effective patient transport system such as an emergency ambulance - and not public transportation - forms a necessary part of the appropriate treatment of stroke.

Some patients visited drugstores or herbal doctors in addition to visiting a traditional doctor during the initial stage of treatment seeking. A patient should first visit a hospital for early diagnosis and appropriate treatment, since drugstores and herbal doctors can only relieve symptoms, and hence visiting drugstores or herbal doctors act as barriers to the early arrival at a hospital. In particular, stroke has been known in Korea as 'palsy' due to the long-term influence of Oriental medicine, and many stroke patients still first visit an Oriental-medicine center or a herbal clinic. The resulting delays in arriving at hospital and acute treatment are likely to affect many patients in Korea. Thus, a multidimensional program and educational intervention involving medical personnel, patients, and their communities is necessary to increase the number of Korean patients who receive the appropriate acute stroke treatment.

CONCLUSION AND RECOMMENDATIONS

This study employed methodological triangulation to develop and test a model of treatment-seeking time after the onset of symptoms in stroke patients. The outcomes of the model were categorized into immediate treatment-seeking and delayed treatment-seeking. The model was influenced by lowered consciousness, social-group influences, perceived seriousness of symptoms, past history of hypertension or stroke, and barriers to hospital visits. The predictability of the model was 90.7%. By providing an understanding of the comprehensive educational needs relating to the treatment-seeking time after the onset of symptoms in stroke patients, the results from this study could be used to establish a nursing education strategy to guide the correct treatment-seeking behaviors.

Based on the study results, we recommend that the following work is performed:

1. The relationship between the degree of functional recovery of stroke patients and the delay to arriving at hospital after the onset of symptoms needs to be elucidated.

2. A comprehensive nursing intervention program to ensure the early arrival at hospital of acute ischemic stroke patients should be developed and evaluated.

References

Alberts, M.J., Bertels, C., & Dawson, D.V. (1990). An analysis of time of presentation after stroke. *JAMA, 263*(1), 65-68.

Barsan, W.G., Brott, T.G., Broderick, J.P., Haley, E.C. Jr, Levy, D.E., & Marler, J.R. (1994). Urgent therapy for acute stroke. Effects of a stroke trial on untreated patients. *Stroke, 25*(11), 2132-2137.

Bohannon, R.W., Silverman, I.E., & Ahlquist, M. (2003). Time to emergency department arrival and its determinants in patients with acute ischemic stroke. *Conn Med, 67*(3), 145-148.

Broadley, S.A., & Thompson, P.D. (2003). Time to hospital admission for acute stroke: an observational study. *Med J Aust, 178*(7), 329?331.

Byun, Y.S. (2000). Pathway of stroke patients seeking medical care. *J Korean Fund Nurs, 7*(2), 149-163.

Chang, K.C., Tseng, M.C., & Tan, T.Y. (2004). Prehospital delay after acute stroke in Kaohsiung, Taiwan. *Stroke, 35*(3), 700-704.

Cho, Y.J. (1996). *Factors related to hospital arrival time of acute stroke patients who visited a university hospital in Seoul.* Department of Medicine, Seoul National University Graduate School, Master's thesis.

Choi, S.M., Kim, Y.H., & Cho, E.S. (1991). Survey on rehabilitation status and need of out-patients with stroke in rural area. *J Korean Acad Rehabil Med, 15*(2), 67-73.

Derex, L., Adeleine, P., Nighoghossian, N., Honnorat, J., & Trouillas, P. (2002). Factors influencing early admission in a French stroke unit. *Stroke, 33*(1), 153-159.

Fieschi, C., Argentino, C., Lenzi, G.L., Fantozzi, L., Sacchetti, M.L., Pace, A., Rasura, M., Bastianello, S., Bozzao, L., & Zanette, E., et al. (1988). Therapeutic window for pharmacological treatment in acute focal cerebral ischemia. *Ann NY Acad Sci, 522,* 662-666.

Gladwin, C.H. (1989). *Ethnographic decision tree modeling: qualitative research methods, series 19.* Newbury Park, CA: Sage.

Goldstein, L.B., Edwards, M.G., & Wood, D.P. (2001). Delay between stroke onset and emergency department evaluation. *Neuroepidemiology, 20*(3), 196-200.

Harraf, F., Sharma, A.K., Brown, M.M., Lees, K.R., Vass, R.I., & Kalra, L. (2002). A multicentre observational study of presentation and early assessment of acute stroke. *BMJ, 325*(7354), 17.

Hickenbottom, S.L., & Barsan, W.G. (2000). Acute ischemic stroke therapy. *Neurol Clin,* 18(2), 379-397.

Jung, K.Y. (1995). *Variables associated with delayed hospital arrival of stroke patients living in Taejon and its suburban areas.* Department of Medicine, Chungnam National University Graduate School, Master's thesis.

Kim, Y.H. (1989). *Survey on status in patients with motor impairment and residents' attitude in rural community.* Yonsei University Graduate School, Master's thesis.

Kimchi, J., Polivka, B., & Stevenson, J.S. (1991). Triangulation: operational definitions. *Nurs Res,* 40(6), 364-366.

Lacy, C.R., Suh, D.C., Bueno, M., & Kostis, J.B. (2001). Delay in presentation and evaluation for acute stroke: Stroke Time Registry for Outcomes Knowledge and Epidemiology (S.T.R.O.K.E.). *Stroke,* 32(1), 63-69.

Morris, D.L., Rosamond, W., Madden, K., Schultz, C., & Hamilton, S. (2000). Prehospital and emergency department delays after acute stroke: the Genentech Stroke Presentation Survey. *Stroke,* 31(11), 2585-2590.

NINDS (1995). Tissue plasminogen activator for acute ischemic stroke. National Institute of Neurological Disorders and Stroke rt-PA Stroke Study Group. *N Engl J Med,* 333(24), 1581-1587.

National Statistical Office (2002). *Annual report on the cause of death statistics: based on vital registration.* Seoul: National Statistical Office.

Rosamond, W.D., Gorton, R.A., Hinn, A.R., Hohenhaus, S.M., & Morris, D.L. (1998). Rapid response to stroke symptoms: the Delay in Accessing Stroke Healthcare (DASH) study. *Acad Emerg Med,* 5(1), 45-51.

Smith, M.A., Doliszny, K.M., Shahar, E., McGovern, P.G., Arnett, D.K., & Luepker, R.V. (1998). Delayed hospital arrival for acute stroke: the Minnesota Stroke Survey. *Ann Intern Med,* 129(3), 190-196.

Spradley, J.P. (1979). *The ethnographic interview.* Toronto: Holt, Rinehart and Winston.

Spradley, J.P. (1980). *Participation observation.* New York: Holt, Rinehart, and Winston.

Tan, T.Y., Chang, K.C., & Liou, C.W. (2002). Factors delaying hospital arrival after acute stroke in southern Taiwan. *Chang Gung Med J,* 25(7), 458-463.

Wang, S., Niu, S., Wang, Y., & Zhang, G. (2002). Evaluation of the factors leading to delay from stroke to arrival at hospital. *Zhonghua Nei Ke Za Zhi,* 41(11), 728-731.

Wester, P., Rådberg, J., Lundgren, B., & Peltonen, M. (1999). Factors associated with delayed admission to hospital and in-hospital delays in acute stroke and TIA: a prospective, multicenter study.Seek- Medical-Attention-in-Time Study Group. *Stroke,* 30(1), 40-48.

Williams, L.S., Bruno, A., Rouch, D., & Marriott, D.J. (1997). Stroke patients' knowledge of stroke. Influence on time to presentation. *Stroke,* 28(5), 912-915.