

Effect of a care plan based on Roy adaptation model biological dimension on stroke patients' physiologic adaptation level

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ABSTRACT

Background: Stroke is a stressful event with several functional, physical, psychological, social, and economic problems that affect individuals' different living balances. With coping strategies, patients try to control these problems and return to their natural life. The aim of this study is to investigate the effect of a care plan based on Roy adaptation model biological dimension on stroke patients' physiologic adaptation level.

Materials and Methods: This study is a clinical trial in which 50 patients, affected by brain stroke and being admitted in the neurology ward of Kashani and Alzahra hospitals, were randomly assigned to control and study groups in Isfahan in 2013. Roy adaptation model care plan was administered in biological dimension in the form of four sessions and phone call follow-ups for 1 month. The forms related to Roy adaptation model were completed before and after intervention in the two groups. Chi-square test and *t*-test were used to analyze the data through SPSS 18.

Results: There was a significant difference in mean score of adaptation in physiological dimension in the study group after intervention ($P < 0.001$) compared to before intervention. Comparison of the mean scores of changes of adaptation in the patients affected by brain stroke in the study and control groups showed a significant increase in physiological dimension in the study group by 47.30 after intervention ($P < 0.001$).

Conclusions: The results of study showed that Roy adaptation model biological dimension care plan can result in an increase in adaptation in patients with stroke in physiological dimension. Nurses can use this model for increasing patients' adaptation.

Key words: Adaptation, Roy adaptation model, stroke care plan

INTRODUCTION

Stroke is the most common chronic disease in the world, and the most important known cause for disability and reduction of independency and quality of life (QOL) in adults. As stroke causes lifelong complications in nervous system,^[1] it is counted as one of the common health problems.^[2] About 5.5 million people

die of this disease each year worldwide, and it is known as the third cause for mortality in the world of which two thirds occur in developing countries such as Iran.^[3] The incidence of stroke was reported as 139 out of 100,000 in Iran,^[4] which is notably higher than in the western countries.^[5] As stroke is usually accompanied with functional dependency, the above rate of prevalence cannot show the real impact of cerebral vascular accident (CVA) alone.^[5] It is the cause for a high number of lifelong and serious major disabilities,^[5] and is the main cause that results in an increase the number of the patients with sensory and motor defects as well as absence of function.^[6]

About one-third of stroke patients experience a lifelong disability.^[7] Stroke is the most common disabling disorder in the nervous system that leaves a deep impact on the patients and their families. The patients think their personality and life style have been changed after stroke.^[3] Although about 80% of the stroke survivors are discharged from hospital after passing the acute stage of the disease and having a stable condition,^[8] they suffer from numerous social, physical, sensory, conceptual, mental, psychological, cognitive, and^[9] social complications such as a defective consciousness,

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motor disorder, paralysis, muscular atrophy, imbalance, dysphasia and its risk of aspiration pneumonia, incontinency, constipation,^[10] pressure sore, dermal irritations, urinary retention, deep vein thrombosis (DVT), thromboembolism, pulmonary embolism, unstable hypertension, and shoulder pain.^[11] Among the other complications, immobility, spasticity, problem in standing and walking, hemiplegia, and oral and motor disorders can be counted.^[12] These disorders result in loss of patients' independency and an increased dependency on relatives, reduced self-confidence, mental complications such as depression, a reduction in satisfaction and QOL,^[13] and a disorder in appropriate function and individuals' independency during participation in everyday life activities.^[14] These problems are the major challenges for such patients and their caregivers after their discharge from hospital.^[15] Therefore, making a vast range of functional changes in various biological, psychological, mental, and social dimensions of human beings, especially in biological dimension, stroke causes some internal changes including individuals' reaction and usage of coping mechanisms against these changes to adapt with. These reactions are coping strategies in terms of active and passive behavioral and cognitive efforts in response to stressful conditions (diseases), as well as overcoming the disease-related challenges, reduction of their negative outcomes,^[3] and tolerating the impacts of stroke to preserve the personal value and integrity of patients' personality.^[16] On the one hand, human being is a psychobiological and social creature and a stimulation imposed to any of his/her dimensions influences the other dimensions. On the other hand, he/she is constantly changing in response to the environmental, physical, social, and mental changes, and should have interactions with them and show adaptive reactions toward them. Individuals' power in preservation of their health depends on having the ability and needed energy to positively adapt with the stimulations.^[17] Adaptive responses reduce the needed energy for coping with existing situations in patients.^[18] Adaptation also results in feeling of safety, and in case of an imbalance in adaptation, the patients experience stress, anxiety, and lack of safety.^[17] In such situations, as adaptation strategies are weakened and individuals' usual efforts for adaptation are inefficient, nursing care is needed,^[19] as nurses play a pivotal role in supporting the patients with chronic diseases.^[19,20]

Meanwhile, there are numerous challenges in this regard. The first and most important question that flashes in nurses' mind in a clinical setting is how they can help their clients and give them care. In this regard, scholars have suggested several important models and strategies.^[17] One of the nursing models that has vastly and deeply worked on adaptation in psychobiological and social dimensions in chronic disease is Roy adaptation model,^[21] which aims

at administration of nursing interventions for improvement of adaptive responses in each dimension (physiological, self-concept, interdependence, and role function).^[22] Research showed the positive effect of Roy adaptation model on improvement of disease control and increase of adaptive responses in chronic diseases.^[21-24] Based on Roy adaptation model, the patient is precisely detected and his/her adaptive behaviors are increased through nursing intervention and manipulation of their causes as their stimulants, and consequently, a better physiological and psychological adaptation is obtained. It goes without saying that adaptation with a chronic disease is a dynamic process through which the patients can achieve more appropriate self-control by increasing their physical and cognitive adaptation level, as an ultimate goal in the management of chronic diseases.^[25] Based on this model, detection of unknown behavioral stimulants leads to precise exploration of the causes of patients' maladaptive behaviors and helps the nurses to design an accurate care plan to solve the patients' problems (through adaptive behaviors). Therefore, it is predicted that adaptive behaviors (healthy behaviors) are increased in patients by application of a care plan that is designed based on this model, which results in a reduction in complication, the most important goal in stroke patients.^[26] With regard to vast involvement of stroke patients' biological dimension, one of the interventions that could be administered by nurses is giving care in this dimension.^[17] Search conducted in several databases revealed the absence of this model among the nursing interventions provided in taking care of stroke patients in Iran, especially in biological dimension. Therefore, the present study aimed to investigate the effect of biological dimension care plan on stroke patients' physiological adaptation level based on Roy adaptation model, in order to make suggestions to the nursing society based on its findings.

MATERIALS AND METHODS

This is a two-group (study and control), two-stage, before-after clinical trial. The sampling followed was convenient sampling. The researcher attended Al-Zahra and Kashani hospitals in Isfahan and selected the patients who met the inclusion criteria and were hospitalized in neurology wards as the subjects. Those who were interested to participate filled the informed consent form, and then the demographic characteristics form. After selection of the patients through convenient sampling, they were randomly assigned to two groups of study ($n = 25$) and control ($n = 25$) by random number [Table 1]. Then, 2 weeks after discharge and by making necessary coordination, Roy adaptation questionnaire was filled by researcher's referral to the patients (at their home, physician's office, or a clinic) in

both groups. After filling the questionnaires, the researcher reviewed the data obtained using Roy questionnaires in two stages. At the first stage, subjects' maladaptive behaviors were detected in biological dimension. At the second stage, stimulants for each of these maladaptive behaviors were determined in this dimension. After investigating the data and determination of the patients' maladaptive behaviors and the related stimulants in biological dimension, the researcher designed the care plan. It was tried to follow

Roy adaptation model steps in designing the care plan. Researcher formed a health care team including a nurse (the researcher), neurologist physician, and a psychologist. Then, in the study group, the subjects were divided into four- or five-member groups, if there was no limitation for an interventional plan (determined by the related physician), and the theoretical and practical care plan, in addition to an educational booklet, were given to them. This care plan included four 60–90 min educational sessions held

Table 1: Comparison of the frequency distribution of demographic characteristics of patients with stroke in both study and control groups

Demographic profile	Test		Control		Test	
	Number	Percent	Number	Percent	Type of test	P value
Sex						
Male	15	60	17	68	Chi-square test	0.56
Female	10	40	8	32		
Level of education						
Illiterate	12	48	11	44	Mann–Whitney	0.96
Under diploma	8	32	11	44		
Diploma	4	16	2	8		
Higher than diploma	1	4	1	4		
Employment						
Farmer	3	12	3	12	Chi-square test	0.62
Working	2	8	3	12		
Employee	0	0	1	4		
Self-employed	1	4	0	0		
Homemaker	10	40	7	28		
Unemployed	2	8	1	4		
Retired	7	28	10	40		
Marital status						
Single	1	4	0	0	Chi-square test	0.40
Divorcee	1	4	0	0		
Married	19	76	20	80		
Widowed	4	16	5	20		
Residential area						
Urban	20	80	18	72	Chi-square test	0.50
Rural	5	20	7	28		
Hemiplegia						
Right	19	76	21	84	Chi-square test	0.48
Left	6	24	4	16		
Dominant hand						
Right	22	88	24	96	Fisher's exact test	0.30
Left	3	12	1	4		
Type of stroke						
Hemorrhagic	12	50	15	60	Chi-square test	0.48
Ischemia	12	50	10	40		
Insurance coverage						
Yes	23	92	24	96	Fisher's exact test	0.74
No	2	8	1	4		

during 2 weeks (twice a week) for the stroke patients and their families.

The administered care plan contained an educational regular protocol including theoretical and practical education. After ending the educational program sessions, there were phone follow-ups for the patients for 1 month (once a week).^[27] Inclusion criteria were age over 18 years, having obtained permission from the physician for administration of the care plan, absence of any problem in consciousness level, patients' complete orientation to time, place, and recognition of their relatives, no defect in patients' vision and hearing ability, absence of any muscular problem that would prevent administration of the care plan, having the first stroke, being familiar with Persian language, having motivation and being interested in education and the designed care plan administered, being fit for the interventional program, and absence of conceptual or global aphasia.^[2,13,26]

Exclusion criteria were patients' loss of interest to go on with the care plan and absence for more than two sessions during the study.^[14] The sample size was calculated as 25 in each group by confidence interval of 95% (error of 5%). Research tools included Roy adaptation assessment form and a demographic questionnaire. Roy assessment form was designed through library resources and internet search and consideration of related tools. To determine face and content validity, it was distributed to 10 academic members of Isfahan Nursing and Midwifery School and two academic members in the School of Medicine, and necessary modifications were made based on their indications.

Reliability of the questionnaire was established by conducting a pilot study and calculation of Cronbach's alpha (76.6) among 10 patients. This form included patients' assessment in physiological dimension. Roy recognition and assessment form consists of 28 items in patients' physiologic dimension, including questions on activity, rest, nutrition, defecation, circulation and oxygenation, fluids and electrolytes, and endocrine system. These items are scored through a five-point Likert's scale (0 = never, 1 = for a short time, 2 = sometimes, 3 = often, and 4 = always). Each subject obtains scores ranging 0–112 in physiologic dimension. Maladaptive behaviors and their stimulants in physiologic dimension were determined and compared once before intervention and another time after administration of the care plan in the two groups using this form. The subjects in the control group underwent conventional and routine care, and after 8 weeks, their adaptation was assessed using the form again. After the end of the study, an educational booklet was given to them and they received necessary explanations in a session. Care plan was designed and administered in four sessions with regard to determination

of maladaptive behaviors (unhealthy behaviors) and their stimulants in the subjects of the study group to achieve the study goal (development of healthy behaviors).

The first session included patients' awareness of the disease, its signs, and familiarization with personal health obedience to do everyday life activities.

In the second session, the education was on exercises of the limbs in their range of motion, balance, self-care methods in cases of sensory and motor disorders, and defecation and urinary disorders.

The third session contained psychological counseling to cope with anxiety and depression and the subjects were referred to a psychologist if needed. In the fourth session, the group of nutrients and the diet were discussed and patients were educated. At the end of the course, all presented materials were given to the patients in form of an educational booklet; a phone call was made to the patients in the study group once a week for a month,^[25,27] and their questions on their condition and motor exercises were answered. In fact, a sort of feeling of being supported was formed among the patients. At the end, Roy adaptation assessment form was filled again and the obtained data were analyzed by independent *t*-test, paired *t*-test, and Wilcoxon test with confidence interval of 95% through version 18 SPSS [Figure 1].

Ethical considerations

- It has been explained the goal of accompanying the study to head nurse and ward's personnel and it has been attracted their competition
- It has been explained the goal and the manner of studying and it has been received their written satisfaction mindfully
- It has been explained to the studied wards and the head of hospital that if they get the results of study, they will be give them
- The participants can exist the study whenever they want
- It has been favor literature right and honesty completely in using science references, books and text translating.

RESULTS

Most of the subjects were male. Mean (SD) ages were 67.5 (9.8) years (range 49–81 years) and 69.04 (8.9) years (range 49–80 years) in the study and control groups, respectively. In order to ensure homogeneity of the groups concerning personal characteristics and baseline variables, the groups were investigated before intervention and statistical tests showed no significant difference. A review on Roy adaptation assessment showed

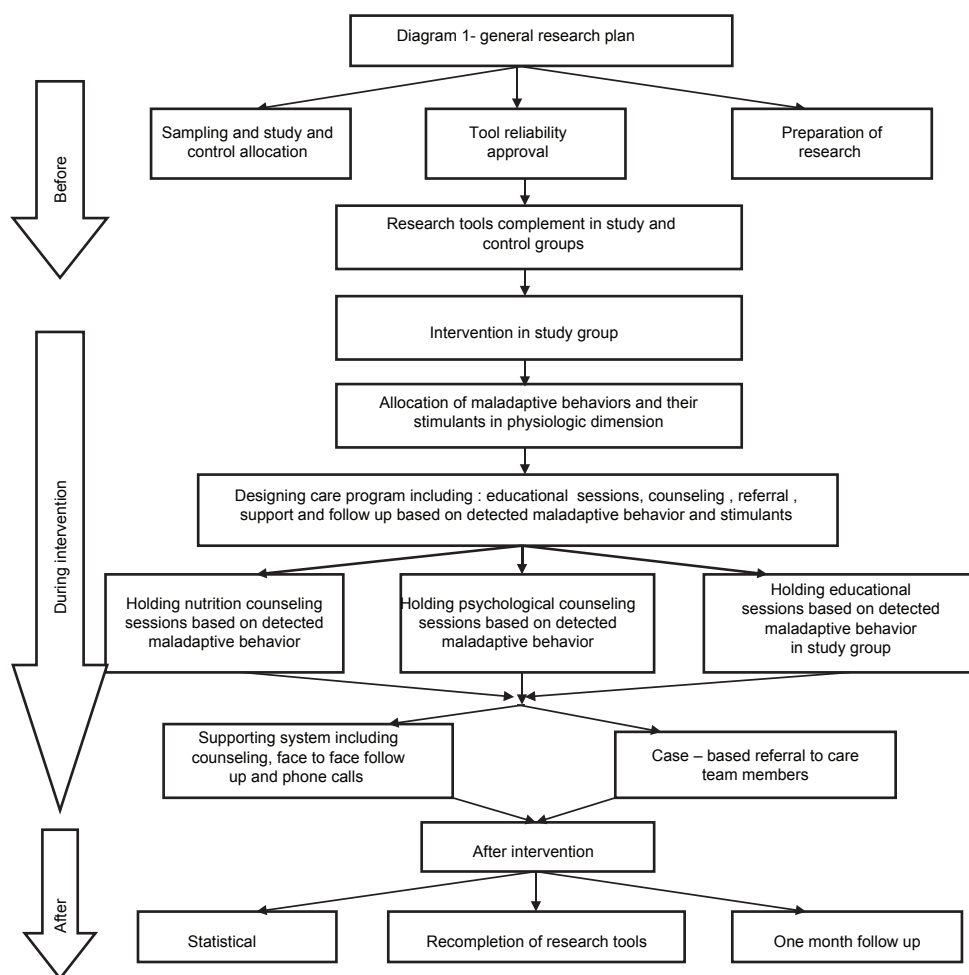


Figure 1: General research plan

that mean adaptation score in physiologic dimension increased from 49.7 before intervention to 50.7 after intervention, with no significant difference in the control group ($P = 0.21$). Meanwhile, in the study group, mean score of adaptation significantly increased from 47.4 to 94.7 after intervention ($P < 0.0001$) [Table 2].

DISCUSSION

It goes without saying that patients’ adaptation with long-term problems and complications of the diseases plays a pivotal role in their disease control and improvement of their QOL in all chronic diseases. The present study pursued the same goal to investigate the effect of one of the nursing models, Roy adaptation model. The results showed that a self-care plan, designed based on this model, could efficiently influence stroke patients’ physiologic condition. Roy (2002) emphasizes that physiologic adaptation is a factor that stabilizes chronic disease process and prevents its complications.^[21] Our results showed a significant increase in mean adaptation score in physiologic domain in the study group ($P < 0.0001$). Meanwhile, in the control group, the

Table 2: Comparison of mean scores of physiological adaptations in stroke patients in the study and control groups

Physiological dimension (mean (SD))			
Study group		Control group	
After intervention	Before intervention	After intervention	Before intervention
50.7 (5.1)	49.7 (50.1)	94.7 (7.) 8	47.4 (8.4)
$P=0.21$		$P<0.0001$	

SD: Standard deviation

increase was not significant. Therefore, it can be stated that the designed care plan increased the level of adaptation in physiologic dimension among stroke patients. As patients’ participation in care-related intervention, as a team work with the cooperation of nurses and other professionals such as psychologists and nutritionists, is a valuable action in disease control, it was used in the present study to fulfill patients’ needs with the coordination of nurses and their constant support, and a notable change was observed in patients’ adaptation during 2 months of intervention. As humans have a holistic approach, patients’ and their families’ education can notably affect their self-concept and self-efficacy.

In other words, patients' empowerment can be accompanied with their self-concept in the formation of a positive attitude toward the lifestyle change and leads to adaptation.^[21,28,29] Shokati, in a study, investigated the effect of participative self-care among stroke patients on their QOL and showed that intervention in one dimension resulted in modification of all dimensions such as everyday life activities (personal hygiene, bathing, nutrition, going to toilet, combing hair, defecation and urine control, mobility and using a wheelchair) among stroke patients.^[30]

Sadeghnejad investigated the effect of Roy model based self-care on adaptation of diabetic patients in 10 group education sessions and a 1-month follow-up, and showed that patients' urea and potassium levels were reduced and their level of albumin increased. Analysis of Roy assessment form showed that mean score of maladaptive behaviors in physiologic dimension significantly decreased to 1.9 after intervention, compared to before intervention (5.7) ($P < 0.001$).^[25] Rogers and Keller used Roy model to increase physical activity in the sedentary older adults. He held a weekly 1 h educational session in the form of a 15-member class for 12 weeks. Physical and physiological dimensions were measured through measurement of level of physical activity and function. Finally, the intervention resulted in a 6-min walk increase in patients, reduction of hypertension, and an increase in their muscular power and modification of their balance.^[28] Burns, in a study on physical and psychological dimension of adaptation in hemodialysis patients, measured and recorded their BP, weight, and potassium level before dialysis. The patients used various adaptation mechanisms such as trusting God, positive thinking, positive attitude toward God's blessing in life, thinking about positive issues in life, being humorous, listening to relaxing music, and calling up the family members. They finally observed no significant association between intervention using adaptation mechanisms and the incidence of physiologic problems including the ones in BP, level of potassium, and weight ($P < 0.05$).^[31] Romino *et al.* studied parental presence during anesthesia induction in children based on Roy model. In physiologic dimension, parental presence during anesthesia induction resulted in a reduction in anxiety and catecholamine release, increase of oxygenation, decreased hospitalization, reduction of postoperative nausea and vomiting, and reduction in the need for pain relief.^[32] Marry (2003) investigated the effect of biologic nursing intervention and relaxing massage on physiologic effects in premature neonates (27–32 weeks of gestational age) who were medically weak. After administration of relaxing massage, conducted from day 7 to 17 post birth, the subjects' pulse and O_2 saturation level became stable.^[33] Hakari and Mohammadzadeh,

in a study on women's adaptation with coronary artery diseases based on Roy four-dimensional model, reported a significant decrease in mean maladaptive behavior in physiologic dimension from 5.7 to 1.9 after intervention.^[34] These results show that through formation of adaptive behaviors, the patients could achieve the goal of controlling disease and its complications. Involvement of the patients in maladaptive behaviors is an important variable in adaptation with a chronic disease. Therefore, changing and manipulation of maladaptive behaviors' stimulants is an important issue to achieve an appropriate control for a chronic disease. However, patients' active participation in this process were helped in their physical and psychological adaptation.^[21]

Most of the studies emphasize on improvement of nursing activities by focusing, organizing, and directing the nurses' thought and function toward taking care of chronic patients and increasing their adaptive responses in all four dimensions of Roy model during administration of nursing interventions.

CONCLUSION

Modification of stroke patients' health status is valuable. Health care providers, especially nurses, should pay close attention to this issue in their planning for these patients' health promotion. As Roy model-based self-care plan is a non-invasive, non-medication, and cost-effective method in control of physical and psychological problems and is conveniently applicable by the nursing staff, it can be used for chronic patients and their problems, especially for stroke patients, to increase their adaptation.

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