The effect of educational intervention based on encourage autonomous self-enrichment program on dialysis adequacy in patients undergoing hemodialysis

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A R T I C L E   I N F O

A B S T R A C T

Introduction: One of the essential criteria for managing the disease in a hemodialysis patient is the adequacy of dialysis. Patient education, as an alternative method, can be useful to improve the adequacy of dialysis.
Objectives: The present study aimed to investigate the effect of educational intervention based on EASE (Encourage Autonomous Self-Enrichment) program on dialysis adequacy in patients undergoing hemodialysis.
Patients and Methods: The target population included the patients referred to the hemodialysis ward of Imam Khomeini hospital of Piranshahr. A total of 74 hemodialysis patients were randomly allocated into the intervention (n=37) and the control (n=37) groups. Data collection was conducted using a researcher-made checklist including demographic information and dialysis adequacy. Independent t-test and repeated measures ANOVA were used to test statistical differ.
Results: We found a significant difference in dialysis adequacy between the two groups ($P < 0.05$). Furthermore, the difference between the mean scores of dialysis adequacy before and after the intervention was statistically significant in the intervention group. Repeated measures ANOVA at four-time points of pre-test and one month, two months and three months after the intervention showed that the difference in dialysis adequacy mean scores were not similar in the two groups and also showed improvement in dialysis adequacy mean score in the intervention group compared to the control group.
Conclusion: Based on the results of our study, EASE program made improvements in dialysis adequacy.

Introduction

Chronic kidney disease (CKD) is the last stage of a progressive and irreversible disorder that disrupts the body's ability to maintain fluid and electrolyte balance and results in the accumulation of waste products in the body (1,2). Patients with CKD require complicated treatments, including hemodialysis and making lifestyle changes and the disease has a profound effect on one's life and causes many psychosocial, economic and physical problems for the patient, his/her family and the society because CKD is usually difficult to control (3). At the end of 2014, in the United States, the number of patients with end-stage renal disease (ESRD) reached more than 678,000 (4). Based on the statistics published in Iran, at the end of 2015, the population of patients with ESRD receiving renal replacement therapy reached more than 55,000 (5).

Current treatment options for patients with CKD consist of hemodialysis, peritoneal dialysis and renal transplantation (6). Hemodialysis is recognized as the main treatment of ESRD and despite the longevity of

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the affected individuals, it may cause several side effects such as hypertension, painful muscular contraction, bleeding, arrhythmia, air embolism, chest pain, dialysis disequilibrium syndrome, decreased level of consciousness and convulsion (7) and the mortality rate of dialysis patients remains alarming, especially in the first year of hemodialysis treatment (8). Furthermore, hemodialysis patients experience high levels of disability and do not effectively and successfully manage their chronic conditions (9, 10).

One of the important criteria for managing the disease in a hemodialysis patient is the adequacy of dialysis (11). Dialysis adequacy is a mathematical term that quantifies the process of dialysis, provides a parameter that is relevant to the patient's clinical symptoms. Dialysis adequacy depends on the three parameters of urea clearance, duration of treatment and urea distribution volume and also its continuous assessment primarily identifies the changes in the dialysis process. Based on the NKF-K/DOQI (National Kidney Foundation-Kidney Disease Outcomes Quality Initiative) clinical practice guidelines for hemodialysis adequacy, the urea reduction ratio (URR) of at least 65% is an a valid marker of optimal dialysis adequacy (12).

Adequate dialysis is of considerable importance, while due to the lack of dialysis machines and the hemodialysis intolerance, these patients can rarely be dialyzed more than three times a week or more than four hours, although more dialysis sessions will have better results on its adequacy. Increasing blood flow rate due to the type of vascular access and complications such as hypotension and muscle cramping and subsequent dialysis intolerance will eventually decrease the blood flow during the process of dialysis, and therefore dialysis will be inadequate (13). Alternative methods should be employed to improve the adequacy of dialysis, thereby it can reduce the mortality rate and the cost and frequency of hospitalization too (14,15).

One of these alternative methods is patient education. Educational intervention programs for specific groups of patients, including those with chronic disease, are particularly important through which nurses can design interventions to help patients with chronic disease and improve their adaptation to the chronic disease (14). EASE (Encourage Autonomous Self-Enrichment) program is of those educational intervention methods first designed in 1997 by Oka et al (16,17). The main concepts of the intervention methods used in the EASE program are based on three models that identify the factors influencing health behaviors: Bandura's self-efficacy theory, Cox's interaction model of client health behavior and Pender's health promotion model (17).

The EASE program is developed to increase patient autonomy and encourage positive behavioral changes and self-care behaviors. The goal of the program is to support and maintain patient autonomy and increase knowledge and self-efficacy to improve self-management behaviors. Through the EASE program, patients with CKD are motivated to improve their lifestyle, which can lead to increased autonomy and self-management. This program improves self-efficacy along with the provision of knowledge, which in turn can cause improvements in autonomy and self-management behaviors (17,18).

Objectives
Regarding the importance of disease management in hemodialysis patients, the increasing number of hemodialysis patients and their numerous problems, the high costs imposed on the health care system, the need to use new educational intervention methods to improve the management of these patients, and the lack of similar studies conducted in this field, the present study aimed to investigate the effect of educational intervention based on EASE program on hemodialysis adequacy in hemodialysis patients.

Patients and Methods
Design and Sample
The present study was a semi-experimental study conducted at the hemodialysis ward of Imam Khomeini hospital of Piranshahr.

According to Pocock's formula and the results of a similar study (19), the minimum sample size was calculated to be 68 patients considering a significance level (α) of 0.05, confidence interval of 0.95, and statistical power of 0.8 (1-β). Subsequently, a total of 74 patients were enrolled regarding the sample attrition of 10% and were allocated into the intervention (n = 37) and the control (n = 37) groups using the simple random sampling method by the random number table (Figure 1).

Inclusion criteria consisted of willingness to participate in the study, filling in the written informed consent, having no infectious diseases and hepatitis, having no history of psychiatric treatment and mourning in the past six months, having no mental and neurological disorders regarding the patient's medical records, being in 40-65 age group, being dialyzed at least three times a week, and not participating in the similar educational sessions. Exclusion criteria included withdrawal from the study because of any reason, patient death during the study period, and renal transplantation.

Data collection
Data collection tools included a demographic questionnaire and a checklist containing information on dialysis adequacy as calculated by the URR formula. To calculate the URR, a quantitative urea assay kit with a measurement range of 10-300 mg/dL manufactured by Man Health and Pharmaceutical Company was utilized.

Procedures
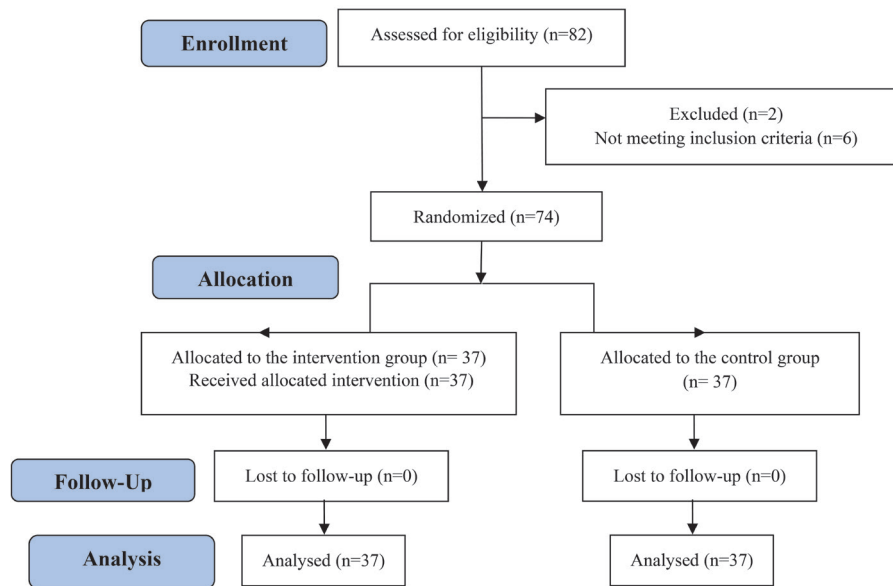The methodology comprised three phases of

Figure 1. Process of the study according to the Consort flow diagram.

pre-intervention, EASE program (intervention) implementation and post-intervention. In the pre-intervention phase, the researcher referred to the research setting and first identified and recruited the patients based on the inclusion and exclusion criteria. Then the researcher, after introducing himself to the participants and expressing the objectives and methods of the study, asked them to fill in the written informed consent. Intervention implementation consisted of the following six stages;

At stage one, data were collected on patients' demographics and the current treatment plan. At this stage, the researcher was assured of the participants' physical and mental fitness to participate in the study. Moreover, the patient's condition and the issues affecting his/her health and treatment were identified. The nurse-client relationship is an interaction affecting the development of healthy behaviors and it has been attempted to improve this relationship. The objectives of the study were explained to the participants and a therapeutic relationship was established with a comprehensive understanding of the patients' condition and factors affecting their health and treatment, showing interest in resolving their problems and empathizing with the patient.

At stage two, the researcher encouraged participants to individually identify their lifestyle problems regarding dialysis adequacy (mentioning factors and behaviors that improve or lower dialysis adequacy).

At stage three, the patients participate in setting personal goals to improve dialysis adequacy and achieving the goals independently too. Then, they received the necessary support and guidance from the researcher.

At stage four, techniques for achieving these goals were selected by the researcher with the patient's involvement.

The technique employed in this study consisted of providing up-to-date educational content over three sessions and breaking long-term goals into several short-term goals in order to make them achievable for the patients (encouraging success achievements, setting specific goals to achieve success and gain positive experiences, verbal and non-verbal encouragement to increase behavior repetition, causing optimism and giving hope for success.

Stage five included the researcher support for patients' achievements conducted through face-to-face follow-up and weekly or twice-weekly telephone calls or email messages (guidance and encouragements were given to promote positive behaviors and support patients' achievements in reaching goals).

At stage six, the achievement of the goals was evaluated using a questionnaire and laboratory tests examination.

Generally, stages one to four were conducted for each patient in the first session. Then, stages two to five were conducted based on patients' stated needs. Stage five included the support for patients, and it was examined through a phone call one month after the interview. In the meanwhile, the control group received no intervention other than routine care. The content of the patient education program based on dialysis adequacy was designed after stage two. After an agreement with the patients, a particular time and place were determined to hold the educational sessions therefore, the sessions were held with groups of 10 to 12 patients in a class located in the hemodialysis ward of the hospital. The sessions were held 30 minutes after hemodialysis (time for rest and recovery). Each session lasted 30-45 minutes. After providing educational content, the participants were given ten minutes to ask their questions. After completion of the sessions, they were asked to implement the content of the

provided education in their daily lives. To answer potential questions, a telephone number was given to them to call if necessary. After completion of the intervention (12 weeks after the intervention), the dialysis adequacy checklist was completed for the two groups of intervention and control and the results were compared.

Statistical analysis

To analyze quantitative data, measures of central tendency and dispersion index (mean and standard deviation) were utilized and for qualitative variables, absolute frequency and percentage frequency were used. After the determination of normal distribution, data were analyzed using statistical tests of independent t-test and repeated measures ANOVA. All statistical analyses were conducted using SPSS software for Windows, version 16.0 (SPSS Inc., Chicago, Ill., USA). A P value of less than 0.05 was considered statistically significant.

Results

The mean age of the patients in the intervention and the control group were 56.59 and 58 years, respectively. We found no significant difference in the mean score of dialysis adequacy between the two groups before the intervention. Nonetheless, the difference between the two groups in the mean score of dialysis adequacy 1, 2 and 3 months after the intervention was statistically significant (Table 1).

We also found that changes in the mean score of dialysis adequacy were not similar in the two groups and indicated improvement of dialysis adequacy in the intervention group compared with the control group. Moreover, the results of the interaction of time and intervention in this test showed that these two variables affect the mean score of dialysis adequacy and have statistically significant

differences in the measured time intervals (Table 2).

Discussion

One of the most important criteria for disease management in hemodialysis patients is dialysis adequacy, and the present study was aimed at investigating the effect of educational intervention based on the EASE program on dialysis adequacy in hemodialysis patients. The results of our study showed no significant difference in the mean score of dialysis adequacy between the two groups before the intervention. Nonetheless, the difference between the two groups in the mean score of dialysis adequacy of one, two and three months after the intervention was statistically significant.

In a study by Saei et al on the effect of continuous care model on dialysis adequacy in hemodialysis patients of selected Iranian army hospitals, the results are consistent with our study. They assessed dialysis adequacy in two phases of pre- and post-intervention. The results of their study showed, after the intervention, dialysis adequacy was significantly increased in the intervention group, although there was no significant difference in the control group (20). In our study, no significant difference was also detected in the mean score of dialysis adequacy in the control group. In the study by Saei et al, Kt/V formula was applied to calculate dialysis adequacy. However, in our study, the URR formula was conducted for this assessment (20).

The results of a study by Joboshi and Oka showed that the EASE-based educational intervention caused a significant improvement in self-efficacy and self-management in the intervention group compared to the control group. Based on this study, no difference in blood pressure or renal function between the groups was detected; however, serum potassium levels decreased in the intervention

Table 1. Comparison of the mean scores of dialysis adequacy between the two groups

Variable	Group	Quantity	Mean	Standard deviation	t test/P value
Pre-intervention dialysis adequacy	Intervention	37	59.76	4.29	t=-0.75, P=0.45
	Control	37	60.62	5.44	
One month after intervention	Intervention	37	62.54	3.92	t=-3.76, P < 0.001
	Control	37	58.59	4.39	
Two months after intervention	Intervention	37	64.49	3.09	t=-4.65, P < 0.001
	Control	37	59.95	5.060	
Three months after intervention	Intervention	37	66.95	3.064	t= - 10.23, P < 0.001
	Control	37	58.76	3.78	

Table 2. Repeated measures analysis of the adequacy of dialysis in four times measurement in the study subjects

Source	Sum of squares	df	Mean square	F	P value	Partial Eta squared
Time (original effect)	345.68	3	115.23	12.329	<0.001	0.146
Time * Groups (Interactive effect)	769.09	3	256.36	27.431	<0.001	0.276
Intergroup	1113.09	1	1113.09	26.02	<0.001	0.265

group and increased in the control group (17). In line with our stydy, the results of the study by Bogataj et al demonstrated functional training added to intradialytic cycling can improve dialysis adequacy (21).

Conclusion
Based on the results of our study on the effectiveness of EASE-based educational intervention on dialysis adequacy, not only is this program an effective educational method for nurses to improve the quality of life of hemodialysis patients and improve dialysis adequacy, but also it can be effective as a method of patient education in hemodialysis wards to reduce costs and improve the quality of care for patients undergoing hemodialysis.

Limitations of the study
Uncontrolled variables include emotional, psychological, personality, cultural attitudes, and financial problems of patients were a limitation of this study. The hemodialysis adequacy requires further investigation, and similar studies should be performed for a more extended period, taking into account the underlying variables and the greater number of samples.

Authors' contribution
HJ, YM, and NK conducted the research. NK collected the data. JR interpreted the data for the work. HJ, YM, and NK prepared and critically revised the final manuscript. All authors read and signed the final paper.

Conflicts of interest
The authors declared no competing interests.

Ethical issues
The research followed the tenets of the Declaration of Helsinki and was approved by the ethics committee of the Urmia University of Medical Sciences (#IR. UMSU.REC.1397.493). Accordingly, informed consent was obtained from all the patients. Moreover, ethical issues (including plagiarism, data fabrication, double publication) have been completely observed by the authors. This paper was extracted from the thesis of Naseh Khezrzadeh, Department of Nursing and Midwifery, the Urmia University of Medical Sciences.

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