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Effect of education based on “PRECEDE” model on self-care behavior in hemodialysis patients

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Abstract:

BACKGROUND AND OBJECTIVE: Patients undergoing hemodialysis due to multiple drug therapies, special diet plans, and need to acquire the ability to adapt to physical and mental disabilities require special monitoring. The PRECEDE-PROCEED model is a process for behavior change and can lead to the promotion of self-care behavior. The aim of this study was to evaluate the effect of a health promotion program based on the PRECEDE-PROCEED model on self-care behaviors in hemodialysis patients.

METHODS: This was a clinical trial study that was performed on 67 patients undergoing hemodialysis in Lordegan Hospital that has been distributed in two groups randomly. Data were collected using self-care assessment form according to the PRECEDE-PROCEED model. Based on the results of this questionnaire, five educational sessions were held in the fields of knowledge, attitude, enabling factors, reinforcement, and behavioral factors for the samples. Data were analyzed using descriptive and analytical statistics with SPSS version 21 software.

RESULTS: According to statistical analysis before intervention, no significant difference was observed between the mean scores of self-care among the two groups. However, instantly and 3 months after intervention, the mean score of self-care ($P = 0/03$), knowledge, attitude, reinforcement factors, and behavioral factors ($P < 0.05$) significantly increased in the experimental group.

CONCLUSION: Based on the results of this study PRECEDE-PROCESS model, the health promotion program increased the mean self-care score of hemodialysis patients. This program has been able to improve their self-care behaviors by changing knowledge, attitudes, and reinforcement and behavioral factors of patients and is recommending as an application in the nursing of these patients.

Keywords:

Hemodialysis patient, PRECEDE model, self-care behavior

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Introduction

Chronic advanced renal failure is a progressive and irreversible kidney disease. At this stage, the body's ability to maintain metabolism and balance water and electrolytes destroyed, resulting in uremia.^[1] This kidney dysfunction causes many problems in patients' lives, and when the kidneys fail to perform their duties properly, kidney replacement therapies such as hemodialysis, transplantation, and peritoneum dialysis are used.^[2]

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Unfortunately, chronic renal failure, due to its high morbidity and mortality, is recognized as a major health problem in recent years, affecting approximately 11% of the world's adult population, that a large percentage of them will be needed to replacement therapies.^[3]

Although dialysis prolongs the life span of these patients, it will have many problems and complications that affect the quality of life in these patients.^[4]

The prevalence and incidence of renal disease worldwide in 2105 is about 242 cases

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per million people, with 8% of annual incidence, or about 29,000, that 14,000 of them are treated with hemodialysis.^[3]

According to statistics available in Iran, averages of 1200–1400 people develop kidney failure each year. According to statistics from the Department of Transplantation and Special Diseases of the Ministry of Health in 2013, approximately 32,686 kidney patients have been identified in the country, and the number of hemodialysis patients in the country will double in the next 5 years.^[5]

In the US Centers for Medicare and Medicaid Services guidelines (2009), patients treated with dialysis are considered as a member of their care team. Based on this definition of caring for these patients, rather than focusing on the words obedience and adherence, the patients' self-care should be emphasized and created a new paradigm in the care of dialysis patients.^[6]

Patients undergoing hemodialysis require special and continuous monitoring because of their multiple drug treatments, specific nutritional plans, and the need to acquire the capacity to adapt to physical and mental disabilities. Furthermore, it is important to increased patient compliance with self-care behaviors in all possible ways.^[7]

These people are not fully capable for resolving their self-care deficits and need to increase their awareness about hemodialysis process and ways to prevent complication through careful and continuous assessment of patients' health needs and health literacy.^[8]

Self-care activities in patients undergoing dialysis can play a significant role in adapting patients to the disease process, promoting quality of life, reducing the frequency and length of hospital stay, and reducing medical costs and mortality rate.^[9] Studies show that people with desirable self-care abilities have a greater ability to rehabilitate and maintain their independence.^[8]

In Carrillo Algarra and Díaz study in Colombia, only half of the patients treated with peritoneal dialysis had suitable self-care ability.^[10] Unsar *et al.* in Turkey reported that patients' self-care ability was moderate.^[11]

Limited studies have been done on the self-care ability of patients undergoing hemodialysis in Iran. Atashpeikar *et al.* (2012) reported that 78.3% of patients have undesirable self-care ability.^[9] Self-care ability has been shown to be directly related to patients' quality of life, and the higher degree of self-care leads to a better quality of life.^[12] Malecian study (2013) points to the importance of self-efficacy in self-care as an important

factor that affects the quality of life in hemodialysis patients. Finally, the researchers argue that we should seek strategies to increase the self-care ability of patients to improve the quality of life.^[13]

Growing evidence suggests that theory-based interventions are effective programs for health education, and the PRECEDE model is one of them. This model is used to identify health education needs and analyze health problems and factors affecting peoples' health status. This model emphasizes on two components of intervention and evaluation.^[14]

The framework of this model defines intervention as a systematic process and identifies health problems and their determinants.^[15]

In 2005, Greene and Cotter point out that this model is flexible, measurable, committed to the principle of participation and has a process structure.^[16] In order to improve the self-care behaviors of hemodialysis patients, it is necessary to investigate the factors related to their behaviors. In this regard, it is recommended to use behavior study models, which PRECEDE is one of the most applicable and appropriate models in this field. Components of this model include predisposing structures (individual and social characteristics that motivate health behavior), reinforces (physical and spiritual rewards that reinvigorate and sustain health behavior), and enablers (environmental characteristics that facilitate the emergence of health behaviors or any skill in the individual).^[17]

In educational-environmental diagnostics and evaluation, the predisposing factors are factors that prioritize behavior change and provide motivation for behavior (knowledge, attitudes, beliefs, and values). Enabling factors are necessary for behavioral or environmental change that allows for the realization of an environmental motivation or policy (access to resources, accessibility, rules, and skills). Reinforcement factors are the factors that guide behavior and provide ongoing rewards for maintaining behavior (such as family, peers, teachers, employers, and health workers).^[18] On the other hand, the selection of educational model is the first step in educational planning process. Therefore, this study aimed to design and evaluate a health promotion program based on the PRECEDE-PROCESS model on self-care behaviors of patients undergoing hemodialysis.

Methods

The present study is a double-blind clinical trial conducted on 67 patients undergoing hemodialysis at Shohada- Hospital (Chaharmahal and Bakhtiari Province) (IRCT20190301042872N1 clinical trial code).

All patients were enrolled in the study by census method based on inclusion criteria. Based on a the previous study^[18] and considering the following formula, with 95% confidence level and 80% test power and the given sample loss, the sample size was estimated to be 70 (35 in each group).

$$n = R \left\{ \frac{2(z_{1-\alpha/2} + z_{1-\beta})^2}{\Delta^2} + \frac{z_{1-\alpha/2}^2}{4} \right\};$$

$$R = \left[\frac{1 + (w-1)\rho}{w} - \frac{v\rho^2}{[1 + (v-1)\rho]} \right]$$

Research units were randomly divided into intervention and control groups using random allocation software. Criteria for entering the study were agreeing to participate in the study, passing more than 6 months from the first hemodialysis session and no verbal, psychological, and hearing impairment.

In the case of dissatisfaction or going for transplantation, the sample was excluded from the study. This study was approved by the Ethics Committee of Shahrekord University of Medical Sciences (IR.SKUMS.REC.1397.167). All the participants fill the informed consent form, and after the intervention, the educational content of the intervention group was provided to the control group.

Data were collected using demographic questionnaire, standard questionnaire of self-care ability in hemodialysis patients, and researcher-made questionnaire based on the PRECEDE model constructs. A standard self-care questionnaire was also used. The modified version of the Chinese version of this scale was originally designed by Ors *et al.* in 1989 and has 24 items with a score of 1–5 based on the Likert scale.

The self-care ability of research units was divided into three levels of good (100–175.1), moderate (75–50.1), and poor (\geq 50%). In the study of Vosoughi *et al.* (2015), the reliability of the instrument was confirmed by test–retest method with Spearman’s correlation coefficient of 0.85. The internal consistency of the instrument was confirmed by Cronbach’s alpha of 0.83.^[7]

Furthermore, a model-based researcher-made questionnaire including items such as knowledge (8 questions), attitude (9 questions), enabling factors (10 questions), and reinforcing factors (10 questions) was designed by a researcher. The validity of the questionnaire was confirmed by ten experts in health education and it was validated by several lecturers of health education and nephrologist for validity of face and content, and their comments were used for validity. The reliability of the questionnaire was measured using twenty of patients undergoing hemodialysis by internal correlation ($\alpha = 0.94$) (this group was not included in the original study).

After completing the researcher-made questionnaires in the pretest phase, the results of questionnaire were analyzed by the researcher. The training program was designed according to the results and approved by five nephrologists and ten faculty members of the School of Nursing and Health. In the context of these models, low self-care ability of hemodialysis patients was considered as the most important health problem and individual, behavioral, and environmental factors considered as factors that affecting this condition. Careful diet observance has been identified as a target behavior in the behavioral diagnosis stage.

Then, in the educational and ecological diagnostic stage, predisposing factors (including patient awareness and attitudes), reinforcing (including encouragement, family and health-care worker support, self-esteem, autonomy, and awareness of educational resources), and enabling factor (including access to educational resources and health-care facilities) have been investigated. according to results the specific objectives of program designed and after preliminary investigations and coordination, the training program was designed in accordance with the designed content for the intervention group in five 40-min training sessions.^[19,20]

Four training sessions were held for hemodialysis patients and one training session for family members that are responsible for patient care as influencing factors (to enhance reinforcement factors) Table 1. In

Table 1: Educational sessions for hemodialysis patients based on the PRECEDE model

| Educational session | Session topic | Factors | Educational strategy |
|---------------------|---|----------------------|--|
| First session | Increased awareness of self-care behaviors (diet, physical activity, sleep, improved home environment, and ways to cope with stress). | Predisposing factors | Lecture, group discussion, and question and answer |
| Second session | Changing attitudes (the benefits of a change in lifestyle and its costs and obstacles) | Predisposing factors | Group discussion and brainstorming and group problem solving |
| Third session | Understanding the associations and organs that help patients and how to get proper education in the disease | Enabling factors | Lecture, group discussion, and question and answer |
| Fourth session | Training sessions with family caregivers of patients (training on how to care for patients) | Reinforcing Factors | Lecture, group discussion, and question and answer |

the present study, educational resources including educational pamphlets, educators, educational classes, a CD, educational photos, and slides were used through lecture methods, group discussions, and questions and answers with families.

Patients were given daily checklists to enhance their behavioral goals. In the designed intervention, discussions on promoting knowledge and attitude were considered as predisposing factors. Topics include diet, physical activity, sleep, improving your home environment, and ways to cope with stress.

During the intervention, achieving goals was evaluated regularly, which enabled the training program to continue in accordance with learners' needs and in line with predetermined goals. During the follow-up period, patients were evaluated for behavioral changes, and self-care levels were assessed immediately and 3 months after the intervention.

After intervention and follow-up, the educational content of the intervention group was given to the control group. Posttest questionnaires were completed by the researcher immediately after the intervention and 3 months after the intervention, and the data were analyzed using SPSS software version 21 (SPSS Inc., Chicago, IL, USA) and descriptive tests (mean, standard deviation, frequency, and percentage) and analytical

tests (*t*-test, Mann–Whitney, repeated measures analysis, and Friedman) [Figure 1].

Results

The mean age of the participants was 24.7 ± 51.35 years. There was no significant difference between the experimental and control groups in terms of age ($P = 0.25$). Other demographic characteristics of patients are listed in Table 2.

Totally, both the groups were similar in background characteristics. Statistical tests did not find any differences between the two groups ($P > 0.05$).

There was no significant difference between the two groups in terms of mean score of self-care before intervention, but immediately after and 3 months after the intervention, there was a significant difference between the two groups; the self-care score in the intervention group was significantly higher than the control group ($P < 0.001$) [Table 3].

The results showed that there was no significant difference between the two groups in the mean scores of knowledge, attitude, reinforcing factors, behavioral, and self-care before the intervention.

However, this difference was significant at immediately and 3 months after the intervention on the independent

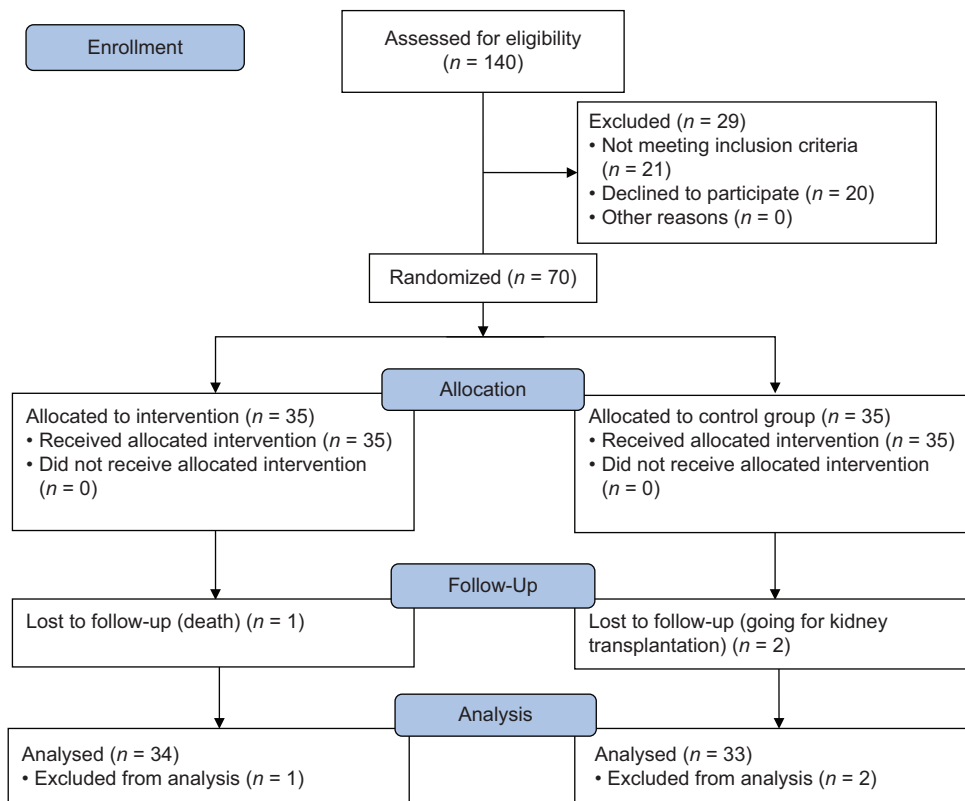


Figure 1: Effect of education based on "PRECEDE" model on self-care behavior in hemodialysis patients

t-test ($P < 0.05$). The variance with repeated measures showed a significant difference in the process of mean score change in the three measurement stages (before the intervention, immediately after the intervention, and 3 months after the intervention) ($P < 0.001$). Whereas, for the variables of enabling factors, analysis of variance with repeated observations showed that the mean score changes in the three measurement stages were not significant $P = 0.21$ [Table 4].

Table 2: Demographic characterization of participants

| Variable | Group | Intervention, n (%) | Control, n (%) | P |
|-----------------|-----------------------|---------------------|----------------|---------------------------|
| Sex | Male | 21 (61.8) | 19 (57.6) | $\chi^2=3.72$ $P=0.16$ |
| | Female | 13 (38.2) | 14 (42.4) | |
| | Total | 34 (100) | 33 (100) | |
| Married status | Single | 1 (34.3) | 1 (8.6) | $\chi^2=3.97$ $P=0.11$ |
| | Married | 33 (665.5) | 33 (91.4) | |
| | Total | 34 (100) | 33 (100) | |
| Education level | Illiterate | 26 (77.8) | 20 (58.8) | $\chi^2=1.06$ $P=0.31$ |
| | Primary school | 5 (18.5) | 11 (23.4) | |
| | Less than high school | 3 (3.7) | 2 (5.9) | |
| | Diploma | 0 | 1 (2.9) | |
| | Total | 34 (100) | 33 (100) | |

Discussion

The present study aimed to investigate the effect of PRECEDE-based education on self-care behaviors of patients undergoing hemodialysis. This model is one of the planning models in health education that is used to identify needs and promote health.^[21]

Based on the educational and ecological diagnostic stage of model, predisposing, enabling, and reinforcing factors are potentially effective factors on a health problem. In this study, the awareness and attitude of patients undergoing hemodialysis were considered as predisposing factors.

Before the intervention, the two groups were at a poor level of the educational and ecological diagnostic stage of the PRECEDE model (knowledge, attitude, enabling and reinforcing factors, and behavioral causes). Therefore, these results emphasize the necessity of intervention for increasing the knowledge of patients about improving safe behaviors. Umeukeje *et al.* in their study reported that lack of awareness about self-care in patients can lead to numerous problems and even death in them.^[20]

Table 3: Comparison of changes in mean self-care scores in the two groups before and after the intervention

| Self-care | Mean±SD | | Independent t-test |
|-----------------------------|----------------------|---------------------------|--------------------|
| | Control group (n=33) | Intervention group (n=34) | |
| Before intervention | 32.3±6.55 | 35.61±8.86 | $t=0.31, P=0.35$ |
| After intervention | 33.31±8.45 | 45.21±10.17 | $t=2.36, P=0.022$ |
| 3 months after intervention | 33.83±9.58 | 41.87±8.86 | $t=1.92, P=0.059$ |
| ANOVA | $F=2.36$ | | |
| Repeated measure | $P=0.033$ | | |

SD=Standard deviation

Table 4: Descriptive-analytic comparison of mean scores of educational and ecological diagnostic stage of PRECEDE-PROCESS and self-care model before, 1, and 3 months after intervention in the two study groups

| Stage | Group | Mean±SD | | | ANOVA Repeated measure |
|---------------------|--------------------|---------------------|----------------------------|----------------------------|------------------------|
| | | Before intervention | Instant after intervention | 3 month after intervention | |
| Knowledge | Intervention | 9.33±1.24 | 10.73±1.47 | 10.21±2.65 | $F=3.45$ $P=0.041$ |
| | Control | 9.62±2.14 | 9.64±1.94 | 9.01±2.46 | |
| | Independent t-test | $t=0.31, P=0.35$ | $t=2.36, P=0.022$ | $t=1.92, P=0.059$ | |
| Attitude | Intervention | 26.85±4.14 | 28.21±4.43 | 29.21±3.84 | $F=5.10$ $P=0.005$ |
| | Control | 25.12±4.22 | 26.01±4.73 | 27.18±4.91 | |
| | Independent t-test | $t=2.41, P=0.095$ | $t=2.41, P=0.016$ | $t=2.06, P=0.043$ | |
| Enabling factors | Intervention | 7.67±1.36 | 7.61±1.55 | 7.29±1.29 | $F=16.1$ $P=0.21$ |
| | Control | 7.34±1.61 | 7.72±1.36 | 7.9±1.62 | |
| | Independent t-test | $t=0.84, P=0.41$ | $t=0.96, P=0.66$ | $t=1.92, P=0.059$ | |
| Reinforcing factors | Intervention | 2.72±1.25 | 3.32±1.99 | 3.21±1.15 | $F=3.06$ $P=0.05$ |
| | Control | 2.51±0.87 | 2.72±0.46 | 2.78±0.91 | |
| | Independent t-test | $t=0.76, P=0.44$ | $t=2.43, P=0.018$ | $t=1.97, P=0.52$ | |
| Behavioral factors | Intervention | 1.14±0.65 | 1.47±0.74 | 1.41±0.82 | $F=3.06$ $P=0.03$ |
| | Control | 1.06±0.49 | 1.09±0.45 | 1.03±0.58 | |
| | Independent t-test | $t=0.61, P=0.54$ | $t=2.49, P=0.015$ | $t=2.18, P=0.033$ | |

SD=Standard deviation

The results of this study showed that patients' self-care was significantly related to their self-care awareness, which was also increased with their self-care awareness, which is consistent with similar studies.^[22-24]

Self-care is one of the most important factors in enhancing the quality of life for patients with chronic illnesses, so they can increase their quality of life despite the many long-standing problems that they are involved with. These results are in line with the results of the study by Lii *et al.*,^[25] He *et al.*,^[26] Azizzadeh Pormehr and Shojaezadeh,^[27] and Rahimi *et al.*^[28]

A similar study about the impact of an education program based on the PRECEDE model on the self-care ability of patients undergoing hemodialysis was not found. In similar studies on patients with beta-thalassemia, this model has a positive effect on lifestyle of these patients.^[29]

In another study by Yuxue *et al.* in an article entitled "The Effect of Using the PRECEDE Model-on Diabetic patients," seventy patients were divided into two intervention and control groups. Intervention groups received education about blood sugar control according to the PRECEDE model after need assessment.

This study proposes the PRECEDE model as a very useful health promotion model in the control of hyperglycemia of chronic diabetes.^[30]

The results of the study by Rastgarimehr *et al.* with regard to improving the quality of life of elderly patients in Tehran have reported similar results.^[31]

In the present study, the PRECEDE model focuses not only on predisposing factors but also examines other behavioral factors including reinforcing and enabling factors. In a Zendehtalab study (2012), the effect of implementing a program based on the PRECEDE model on adolescents' mental health scores after the intervention was significantly higher than the control group.^[32]

The results of the study by Hazavei *et al.* with regard to improving the depression in patients after bypass surgery confirm such changes.^[33]

This study is one of the few studies on self-care in hemodialysis patients, and considering the positive results of this study, it can be applied in education, research, and clinical fields. Predisposing, enabling, and reinforcing factors influence behavioral factors and lead to the acquisition of healthy behaviors.

In addition, these behaviors affect the level of health and consequently increase the quality of life. Therefore, this model can be used to design interventions to improve the

quality of life of chronic patients, including hemodialysis patients. Furthermore, the findings of this study can be used by nurses in the clinic and can eliminate the educational needs of patients.

Conclusion

Based on the results of this study, the health education program based on the PRECEDE model can improve the self-care of patients undergoing hemodialysis.

In summary, this program increases the knowledge and attitude score of participants, so it had a positive effect on the predisposing factors, and by reinforcing the predisposing and reinforcing factors, this model increased the self-care ability of participants.

Researchers hope that regarding the positive effects of this program on enhancing the self-care ability of patients undergoing hemodialysis, health authorities, planners, and research centers can implement and evaluate the health education programs through defined stages of this model.

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Conflicts of interest

There are no conflicts of interest.

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