

# The Effect of Barrow Card Education Method on the Promotion of Insulin Therapy Self-Care Behaviors in Type II Diabetic Patients

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## Abstract

**Introduction:** Self-care in relation to insulin therapy is the most important self-care action in diabetes management. The aim of this study was to determine the effect of Barrow card education method on insulin therapy self-care behaviors in type 2 diabetic patients referring to diabetes clinic of Ganjavian Hospital of Dezful. **Methods:** This is a randomized controlled clinical trial study conducted on 66 type II diabetic patients. Participants were randomly divided into two groups of experimental and control. The barrow card method was performed for the experimental group while control group received the usual education of the clinic. Data were collected using a questionnaire before intervention and one month after the end of it. Data were analyzed using SPSS software version 22 and t-test, independent paired t-test and Chi-square statistical tests. **Results:** The findings showed that the mean score of insulin therapy self-care between the two groups was not significant before the intervention ( $p < 0.225$ ). After intervention, there was a significant difference in insulin therapy self-care ( $p < 0.001$ ), maintenance of insulin ( $p < 0.001$ ), insulin preparation ( $p < 0.001$ ), insulin injection ( $p < 0.001$ ), prevention of complications ( $p < 0.001$ ), and intervention during the onset of complications ( $p < 0.001$ ) between the two groups. **Conclusion:** According to findings patient education by using Barrow card have a positive effect on improving self-care behavior of insulin therapy in diabetic patients and can play an effective role in preventing and reducing the side effects of insulin therapy. Therefore, it is strongly recommended to be applied by nurses in patient education.

**Keywords:** Education, Problem Solving, Self-Care Behavior, Insulin Therapy, Type 2 Diabetes.

## Introduction

Diabetes is one of the most common and most prevalent metabolic diseases in humans which nowadays is known as a major health problem in the world due to its high prevalence (Shaw et al., 2010). In 2013, about 382 million people (8.3% of adult population) had type 2 diabetes in the world, rising to 55% by the year 2035 (Batais & Schanter, 2016). Type 2 diabetes is usually diagnosed after the age of 40 and is the result of a progressive deficiency in insulin secretion with insulin resistance, which both genetic and environmental factors play a role in it (Habibi et al., 2012).

Half of patients with type 2 diabetes, after 5 years of taking oral glucose-lowering medicines, such as sulfonylureas, are faced with a lack of response oral medicines and prescription of insulin is usually needed (Azhari & Rajabian, 2007). In fact insulin is the main drug for controlling diabetes, and in case of missing dose, wrong and inappropriate injection, the disease will not be controlled and the patient will be exposed to short-term complications such as ketoacidosis, hypoglycemia, fatigue and disability in management of life and long-term complications such as nephropathy, neuropathy, retinopathy, atherosclerosis, and gangrene as well as psychosocial problems caused by chronic illness, and ultimately these complications can make the patient exhausted (Rezaie et al., 1999).

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Patients with type 2 diabetes whom their treatment is switched from oral drugs to insulin therapy need self-care skills (Phillips, 2007). Studies show that some diabetic people do not have good information about insulin injection (Rostambeigy et al., 2014; Mégarbane et al., 2007). Studies have also shown that only a small proportion of chronic illnesses, such as diabetes, are managed and cured by specialized staff, and most of diseases are managed by the individuals and their family (Shojaeezadeh et al., 2013). Self-care improves the quality of life and is effective in reducing health care costs (Ghaedi et al., 2016). But still numerous studies in the world, including our country, continue to indicate a lack of knowledge and performance of patients in diabetes care (Tabatabaimalazi et al., 2009; Shamsi et al., 2011; Golchin & Ghorbani, 2008).

Among the educational interventions in the world and Iran for people with diabetes, education via the Internet, computer, training camps, telephone training and follow-up, home care education, individual and group education, and problem solving can be mentioned (Saeid Pour et al., 2013). Problem solving education is a method that gives people the opportunity to manage their illness and increase their longevity by changing their behavior in order to gain recovery (Hill-Briggs, 2003). The results of the researches done on the basis of problem solving show that this method is an applicable and client centered approach (Albanese & Mitchell, 1993). Studies have shown that there is a close relationship between problem solving and awareness of insulin injections, blood sugar test, nutrition and exercise in adolescents and adults (Johnson et al., 1982; McCaul et al., 1987).

Barrow Card or Portable Patient Problem Pack which were first designed by Barrows and Tamblyn in 1977 (Tamblyn et al., 1980), is a method of education based on problem solving. Portable Patient Problem Pack used to improve self-care in chronic patients, and allows patients and nurses to make the right decisions in order to improve their health and thus feel better (20). A study conducted in Italy, revealed that this method significantly improved the status of patients who received immunosuppressive treatment and also reduced Re-admission and the costs of treatment in adults with leukemia (Bagnasco et al., 2016).

Given attention to the inadequate knowledge of patients about insulin injection and its complications, patients need adequate information on how to inject insulin, measuring the desired dose, how to store insulin, the type of insulin used and the side effects of inappropriate use as well as proper performance in relation to the way of insulin injection, and on the other hand, nurses should evaluate the self-care skills and behaviors in patients who have diabetes for years. Considering the deficiency of self-care behaviors and the prevalence of complications related to insulin therapy in diabetic patients and considering that the Barrow card method is a patient-centered approach and adaptive to clinical environment and its changes, and that no study has been done in this regard so far, this study aimed to investigate the effect of Barrow Card on insulin therapy self-care behaviors in type 2 diabetic patients in order to provide an effective step to improve self-care in diabetic patients.

## Materials and Methods

This study is a randomized clinical trial conducted in Dezful Ganjavian Hospital. The sample size was calculated with 95% confidence and 5% error and based on Cook et al. study (Jacobs et al., 2008). The values of  $X_1$ : 0.6 and  $X_2$ : -0.1,  $S_1$ : 0.8 and  $S_2$ : 1.1, and the values of  $\alpha$ : 0.05 and  $\beta$ : 0.2 are considered.

$$n = \frac{(S_1^2 + S_2^2)^2 (Z_{1-\alpha} + Z_{1-\beta})^2}{(\bar{x}_1 - \bar{x}_2)^2}$$

The sample consisted of 66 patients with type II diabetes who were eligible to participate in the study. The inclusion criteria were age of over 18 years, diagnosis of type 2 diabetes by the doctor, treatment with NPH and regular insulin, having at least reading and writing skills, awareness of time and place and person, lack of cognitive and communicative disorders. The exclusion criteria included hospitalization or death of patients during the study and Change of the insulin combination to insulin pen during the study.

The data collecting tools included demographic questionnaire and a researcher made questionnaire of self-care behaviors for insulin therapy. The demographic questionnaire includes questions such as age, gender, marital status, and education level. Questionnaire of self-care behaviors has five dimensions and consists of 30 questions with scores ranging from 30 to 150. The five domains of the questionnaire includes insulin maintenance (4 questions), insulin preparation (8 questions), insulin injections (6 questions), prevention of insulin therapy complications (8 questions) and intervention at onset of insulin therapy complications (4 questions). Scoring of each question is based on a five-option Likert scale from always to never and the score of 1-5.

In order to determine the content validity of the researcher- made questionnaire of self-care behaviors, 10 faculty members of Ahvaz Jundishapur University of Medical Sciences invited to evaluate the questionnaire and the content validity rate (CVR) and content validity index (CVI) calculated. For the entire researcher-made questionnaire CVR was equal to 0.90 and CVI equal to 0.96. The first version of the questionnaire included 33 questions, but after applying the opinions of the experts and calculation of CVR and CVI, 30 question were remained and the rest were deleted. For determining the reliability of the questionnaire, a two-week test-retest method was used for a

sample size of 10 people. The Pearson correlation coefficient for all questions was 0.7 which is acceptable. Cronbach's alpha was calculated to determine the internal consistency of the questionnaire which was equal to 0.72.

Sampling was started after approving the project at Research Deputy of Ahvaz Jundishapur University of Medical Sciences and obtaining the Code of Ethics from the Ethics Committee (IR.AJUMS.REC.1396.347) and IRCT code (IRCT2017080735539N1). For data collection the researcher referred to the diabetes clinic of Ganjavian Hospital of Dezful, selected the participants according to inclusion criteria, presented a general description of the study to the participants, obtained written informed consent for participation in the study, and then assigned the sample randomly to experimental (N = 33) and control (N = 33) groups using the six blocks technique of randomization (Figure 1).

After performing the pre-test, the control group received the usual self-care training using from leaflet according to the routine of diabetes clinic. For the experimental group, self-care behaviors' training through barrow cards and problem solving included. The barrow cards (containing 26 cards) were designed according to the goals of the research and based on the evidences. The barrow cards were reviewed by diabetes specialists and nurses working at the diabetes clinic and their comments were applied. Finally in order to determine the comprehensibility and attractiveness of the cards, they were given to five patients and if they confirmed, they were used (Figure 2).

At first the cards were handed to the patients. They were asked to read the contents of the card, to find out that it is correct or incorrect, and find a solution for the situation on the card, and then refer to the back of the card which the solution is given. After the training, the patients took their cards for one month and used the training notes. During this period, the intervention group were followed each week either in person at the center or by telephone, and their questions were answered. At the end of the specified period, post-test was done in both experimental and control groups.

Data was analyzed by SPSS software version 22. To compare the quantitative demographic characteristics of the two groups, the Mann-Whitney test was used and the Chi-square test was used for qualitative variables. To analyze the effectiveness of the barrow card training method on self-care in terms of the normal distribution of data, paired t-test and independent t-test were used.

## Findings

Table 1 indicates the demographic characteristics of the participants in both groups. The results of chi square test showed that there was no significant difference between the two groups in terms of demographic characteristics. According to the findings, the majority of the studied units were women (59.1%), married (84.4%), and housekeeper (53%), Fars (92.4%), had a positive familial history of diabetes in their first degree relatives (75.8%), and the highest education degree among them was junior high school (37.9%). Majority of participants (71.2%) were not admitted to the hospital due to insulin complications.

Table 2 indicates the disease information of the participants in both groups. The results of t- test showed that there was no significant difference between the two groups in terms of disease information except for patients age ( $p > 0.05$ ). Considering the significant different in age of the patients in two groups, in order to control the effect of age-related confounding on the outcome, covariance analysis was used to control the effect of age difference between the two groups. The adjusted average was 31.52 for the intervention group and 3.89 for the control group.

Table 3 shows the comparison of the mean of different dimensions of self-care behaviors in insulin storage, insulin preparation, insulin injections, prevention of insulin therapy complications and intervention in the incidence of insulin therapy complications between the two groups of case and control before and after the intervention. Independent t-test before education in two groups showed that there was no significant difference between the mean scores of self-care behaviors in five areas of maintenance, preparation, injection, complications prevention and intervention in the incidence of insulin complications ( $p > 0.05$ ). However, after intervention, the comparison of mean and standard deviations of insulin therapy self-care behaviors in participants showed that the level of self-care behaviors in the intervention group was significantly higher than the control group ( $p < 0.001$ ). The difference between intra-group self-care scores based on the paired t-test before and after the intervention in the control and experimental groups in five domains of insulin maintenance, preparation and injection, prevention from insulin therapy complications and intervention at the onset of complications was statistically significant. This change was due to receiving routine clinical training by the control group.

Table 4 shows the general self-care scores in the two groups of experimental and control before and after intervention. Intergroup comparison of means of general self-care scores was performed using paired t-test. Both groups showed significant changes ( $p < 0.001$ ). Between groups comparison conducted using t-test, showed that there was no difference between the two groups in terms of self-care scores before the intervention ( $p < 0.25$ ), but after intervention, an increase in self-care score was observed in the experimental group, which was statistically significant ( $p < 0.001$ ).

## Discussion

The findings of this study showed that following the barrow card method of education in a one month period, the self-care behaviors of patients with diabetes showed a significant improvement compared to before intervention. This improvement can be attributed to the sense of responsibility that diabetic patients have to take care of themselves. Improving adherence to self-care behaviors is the first step in helping patients to manage their illness better. It seems that the information that the individuals experience as in problem solving is more durable than the information they learn from others (Taghdisi et al., 2011; Allen et al., 2011). Considering that the barrow card method is designed based on the problem solving method, it can be said that it has a great impact on the long-term learning of self-care behaviors in the field of insulin therapy. The Bagnasco et al. study showed that the use of the barrow card method in educating patients with cancer improves their self-care behaviors (Bagnasco et al., 2016). Hill Brig in his research, reported that problem-solving training was effective on improving self-care in controlling diabetes (Albanese & Mitchell, 1993). Also, Allen et al., found that problem solving interventions had a significant positive effect on blood sugar control in diabetic patients (Gee et al., 2017). A study by Gee et al., found that behavioral interventions with problem solving method greatly reduced the hypoglycemia caused by insulin injection (Habibi et al., 2012).

Our findings indicated positive post-intervention behavior change in the experimental group in insulin storage aspect of insulin therapy self-care behaviors. In a study by Habibi et al. 38.8% of diabetic patients described insulin storage as a reason for refusing to use insulin, which is due to poor information and insufficient knowledge and insight into insulin storage (Shahraki et al., 2014). Therefore, barrow card can be used as an inexpensive and easy to understand method for improving self-care behaviors related to insulin storage.

Based on the findings from the present study in the field of insulin preparation, it was found that after intervention the experimental group had positive changes in the aspect of preparation of insulin. The results of Shahraki et al. study showed that 93% of patients did not know the amount of drug and how to prepare insulin, which, after conducting training classes, declared their self-care status as good (Chowdhury & Chakraborty, 2017).

Another aspect of insulin therapy self-care considered in the present study is attention to insulin injection. Findings showed a significant increase in positive behavior change in the intervention group. In this regard, the results of the Shahraki et al. study showed that 91% of diabetic patients did not know well about insulin injection, and 70% of them had an inappropriate rotation pattern (Chowdhury & Chakraborty, 2017). Chowdhury and Chakraborty in their study found that the proper method for insulin injection and regular assessment of the injection site could lead to a decrease in glycosylated hemoglobin of about 0.6% within 3 months (Salar et al., 2009). Also, Salar et al. indicated that patients had the lowest level of awareness in the field of insulin absorption (Afshar et al., 2000).

In this study, the results show a significant difference in self-care behaviors in preventing complications of insulin therapy aspect between the control and experimental groups after intervention. Actually, appropriate patient education regarding the prevention of complications of insulin therapy can be associated with improving self-care status, reducing complications and hospital costs (Chowdhury & Chakraborty, 2017; Lalić et al., 2017; Oshvandi et al., 2014). The study of Afshar et al. showed a direct correlation between self-care and prevention of complications (Lalić et al., 2017) Shahrakie et al. also determined that 81% of diabetic patients did not know the effect of necessary attentions after insulin injection in controlling their blood glucose and insulin complications, which was improved after the self-care program (Chowdhury & Chakraborty, 2017).. Nebojsa et al. in their study found that improving self-care in insulin-dependent diabetic patients by comprehensive training reduces HbA1c, hospitalization due to metabolic complications, cardiac complications and stress, and improves patients' quality of life (Oshvandi et al., 2014).

Lacking of training or insufficient training for diabetics at the onset of insulin therapy can lead to many problems, including irrational fears, misinformation from unknowing people, and irreparable complications (Bondset al., 2010). The results of this study showed that Barrow card education allows for the correct decision in difficult situations. Bonds et al., showed in their study that diabetic patients under treatment with insulin are at greater risk for hypoglycemia (Chan et al., 2017). Bun Chan et al., also said that fear of hypoglycemic experience in patients may lead them to arbitrarily reduce the insulin dose and thus result in lack of access to optimal blood glucose control . However, using Barrow Card by reducing mistakes can help to prevent complications, reduce hospitalization and hospital costs.

Because the questionnaire items and barrow cards' notes were designed based on the NPH and Regular insulin, therefore, patients who used pen insulin were not included in the study and our study population was limited to patients using NPH and Regular insulin.

## Conclusion

The results of this study showed that training self-care behaviors of insulin therapy with barrow card method would increase self-care of patients in the field of insulin storage, preparation, and injection, prevention of complications and correct intervention at the onset of

complications in type 2 diabetic patients under treatment with insulin. Therefore, the findings of this study enable nurses and nursing students to use the barrow card method as an interactive problem solving method for educating patients, especially chronic patients, such as type II diabetics, and can use it as a mean to improve communication with patients.

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## References

- Afshar M, Sadr F, Sharifi H, Mohamadi E. Study of The Effects of Self-Care Training on the Signs of Insulin Injection. *Journal of Sabzevar University of Medical Sciences*. 2000;7(3):33-38 .[persian]
- Albanese MA, Mitchell S. Problem-based learning: a review of literature on its outcomes and implementation issues. *Academic medicine*. 1993 Jan 1;68(1):52-81. [PMID: 8447896]
- Allen N, Whittemore R, Melkus G. A continuous glucose monitoring and problem-solving intervention to change physical activity behavior in women with type 2 diabetes: a pilot study. *Diabetes technology & therapeutics*. 2011 Nov 1;13(11):1091-9. [DOI: 10.1089/dia.2011.0088]
- Azhari P,Rajabian R. Treatment with insulin resistance in type 2 diabetes Sulfanylurea. *mjms*.2004;47(84):188-193.[Persian]
- Bagnasco A, Calza S, Petralia P, Aleo G, Fornoni L, Sasso L. Investigating the use of Barrows Cards to improve self-management and reduce healthcare costs in adolescents with blood cancer: a pilot study. *Journal of advanced nursing (JAN)*. 2016 Jan 1. [DOI: 10.1111/jan.12883]
- Batais MA, Schantter P. Prevalence of unwillingness to use insulin therapy and its associated attitudes amongst patients with Type 2 diabetes in Saudi Arabia. *Primary care diabetes*. 2016 Dec 31;10(6):415-24.[DOI: <https://doi.org/10.1016/j.pcd.2016.05.007>]
- Bonds DE, Miller ME, Bergenstal RM, Buse JB, Byington RP, Cutler JA, et al. The association between symptomatic, severe hypoglycaemia and mortality in type 2 diabetes: retrospective epidemiological analysis of the ACCORD study. *Bmj*. 2010 Jan 8;340:b4909. [PMID: 20061358]
- Chan WB, Chen JF, Goh SY, Vu TT, Isip-Tan IT, Mudjanarko SW, et al. Challenges and unmet needs in basal insulin therapy: lessons from the Asian experience. *Diabetes, metabolic syndrome and obesity: targets and therapy*. 2017;10:521. [DOI: 10.2147/DMSO.S143046]
- Chowdhury S, Chakraborty PP. Errors of insulin therapy: Real-life experiences from developing world. *Journal of family medicine and primary care*. 2017 Oct;6(4):724. [PMID: 29564252]
- Cook S,Herold K, Edidin D, Briars R. increasing problem solving in adolescents with type1 diabets:The choices diabetes program. *AADE Pract*.2002;1(28):115-124. [DOI: 10.1177/014572170202800113]
- Gee BT, Nansel TR, Liu A. Reduction of hypoglycaemic events with a behavioural intervention: a randomized clinical trial for paediatric patients with Type 1 diabetes mellitus. *Diabetic Medicine*. 2017 Mar 1;34(3):340-7. [DOI: 10.1111/dme.12744]
- Ghaedi M, Banihashemi F, Latifi M, Soleymaninejad M. The Relationship between Health Literacy and Self-care among Patients with Type 2 Diabetes Residing in the City of Bastak. *Iranian Journal of Endocrinology and Metabolism*. 2016 Jul 15;18(2):90-6.[persian] [URL: <http://ijem.sbmu.ac.ir/article-1-1998-en.html>]
- Golchin M, Ghorbani A. Knowledge and Practice on insulin self-injection procedure in Diabetic patientsat Qazvin Diabetes unit. *The Journal of Qazvin University of Medical Sciences*. 2008;12(1): 89-91.[persian]
- Habibi R, Soltani M, Habibi Gh. Investigating the Factors Affecting the Absence of Insulin Therapy by Diabetic Patients. *Iranian Journal of Diabetes and Metabolism(ijdld)*. 2012; 11 (4) :366-376.[persian]
- Habibi R,Soltani M,Habibi GH.the effective factors rejection of insulin therapy by diabetics. *J Diabetes Metab Disord* 2012;11(4):366-376.[Persian]
- Hill-Briggs F. Problem solving in diabetes self-management: a model of chronic illness self-management behavior. *Annals of Behavioral Medicine*. 2003 Jun 1;25(3):182-93.[DOI: 10.1207/S15324796ABM2503\_04]
- Jacobs J, Omori J, Oda Y, Kasuya R, Tam L. Problem-based learning: emergence of vertically stable study groups among first and second-year JABSOM students. *Hawaii Med J* 2008; 67(4): 104-6. [PMID: 18524145]
- Johnson SB, Pollak RT, Silverstein JH, Rosenbloom AL, Spillar R, McCallum M, et al. Cognitive and behavioral knowledge about insulin-dependent diabetes among children and parents. *Pediatrics*. 1982 Jun 1;69(6):708-13. [PMID:7043386]
- Lalić NM, Lalić K, Jotić A, Stanojević D, Živojinović D, Janićijević A, Parkin C, et al. The impact of structured self-monitoring of blood glucose combined with intensive education on HbA1c levels, hospitalizations, and quality-of-life parameters in insulin-treated patients with diabetes at primary care in Serbia: the multicenter SPA-EDU study. *Journal of diabetes science and technology*. 2017 Jul;11(4):746-52. [DOI: 10.1177/1932296816681323]

- McCaul KD, Glasgow RE, Schafer LC. Diabetes regimen behaviors: Predicting adherence. *Medical Care*. 1987 Sep 1:868-81. [PMID:3320598]
- Mégarbane B, Deye N, Bloch V, Sonnevile R, Collet C, Launay J-M, et al. Intentional overdose with insulin: prognostic factors and toxicokinetic/toxicodynamic profiles. *Critical Care* 2007;11(5): 1.[ DOI:10.1186/cc6168]
- Oshvandi K, Jokar M, Khatiban M, Keyani J, Yousefzadeh MR, Sultanian AR. The effect of self care education based on teach back method on promotion of self-care behaviors in type II Diabetic patients: a clinical trial study. *Iranian Journal of Diabetes and Metabolism*. 2014 Jan 15;13(2):131-43.
- Phillips A. Experiences of patients with type 2 diabetes starting insulin therapy. *Nursing standard*. 2007 Feb 14;21(23):35-41. .[PMID: 17348595]
- Rezaie J, Rezaie M, Khaledi B, et al. The rate Adherence self-management of insulin therapy inpatients with type 1 diabetes referring to Kermanshah diabetes research center (1999). *JBehood*;2002;6(4):47-54.[persian]
- Rostambeigy P, Ghaemi SZ, Shirazi FM, Hashemi N. The Effects of Nutrition Education and Insulin Injection Training on Glycemic Control in Iranian Patients with Type 1 Diabetes. *Adv Biores*. 2014;5(2): 143-7. [persian] Journal's URL:<http://www.soeagra.com/abr.html>CODEN: ABRDC3ICV 7.20 [Poland]
- Saeid Pour J, Jafari M, Ghazi Asgar M, Daryani Dardashti H, Teymoorzadeh E. The impact of self-care education on life quality of diabetic patients. *J Heal Admin (JHA)*. 2013;16(52):26-36.[persian]
- Salar A, Robabi H, Safarzadeh A. The rate of self-care insulin therapy in adults with type 1 diabetes who were referred to Zahedan Diabetes Clinic in 2009. *J Diabetes Nurs*2013;1(1): 21-9.[persian]
- Shahraki Vahed A, Asadi Bidmeshki E, Shahraki H. Determine self-care assessment with educational needs diabetic patients. *J Nursing Zabol Univ Med Sci* 2014; 2(2):29-41 .[persian]
- Shamsi M, Shrif Rad Gh, Kachouee A, Hsanzadeh A, Dejam S. Knowledge, attitude and practice of female patients with type 2 diabetes about walking out. *Payesh Journal(Quarterly)*. 2011;10(4):477-484.[Persian]
- Shaw JE, Sicree RA, Zimmet PZ. Global estimates of the prevalence of diabetes for 2010 and 2030. *Diabetes research and clinical practice*. 2010 Jan 31;87(1):4-14. [DOI:<https://doi.org/10.1016/j.diabres.2009.10.007>]
- Shojaeezadeh D, Tol A, Sharifirad G, Alhani F. Effect of education program based on empowerment model in promoting self-care among type 2 diabetic patients in Isfahan. *Razi Journal of Medical Sciences*. 2013 May 15;20(107):18-31.[persian]
- Tabatabaialazi O, Peyman M, Heshmat R, Pajohi M. Diabetes Care in Elderly Patients with Diabetes Referred to Diabetes Clinic of Shariati Hospital. *Iran J Diabetes Lipid Disord*. 2009;10(2):161-9.[persian]
- Taghdisi M, Abdi N, Shamsavari S. Health promotion among cancer patient by the problem based learning (PBL) method. *Health System Reserch*2011;7(4):434-440.[persian]
- Tamblyn RM, Barrows HS, Glivia G. An initial evaluation of learning units to facilitate problem solving and self-directed study (portable patient problem pack). *Medical education*. 1980 Nov 1;14(6):394-400. [PMID:7442578]

**Table 1-** comparison of demographic characteristics of experimental and control groups

Variable		Experimental group N=33	Control group N=33	Between groups p-value*
Gender	Female	20 (51.3%)	19 (48.7%)	0.802
	Male	13 (48.1%)	14 (51.9%)	
Marital status	Single	4 (44.4%)	5 (55.6%)	0.720
	Married	29 (50.9%)	28 (49.1%)	
Ethnicity	Fars	30 (49.2%)	31 (50.8%)	0.642
	Arab	3 (60%)	2 (40%)	
Education degree	Primary	8 (44.4%)	10 (55.6%)	0.858
	Junior high school	13 (52%)	12 (48%)	
	Diploma and higher	11 (47.8%)	12 (52.2%)	
Occupation	Employee	5 (45.5%)	6 (54.5%)	0.943
	Housekeeper	18 (51.4%)	17 (48.6%)	
	Free	7 (46.7%)	8 (53.3%)	
	Retired	3 (60%)	2 (40%)	
Family history	Positive	24 (72.7%)	26 (78.8%)	0.566
	Negative	9 (27.3%)	7 (21.2%)	
Hospitalization due to the complications of insulin therapy	Positive	10 (30.3%)	9 (27.3%)	0.786
	Negative	23 (69.7%)	24 (72.7%)	

\* Chi-square test

**Table 2-** Comparison of medical characteristics of experimental and control groups

Variable	Experimental group N=33 (mean±SD)	Control group N=33 (mean±SD)	p-value**
Age	49.45±11.603	43.61±10.863	0.038
Duration of disease	14.09±8.680	11.58±5.739	0.170
Duration of insulin injection	7.06±5.141	5.70±4.164	0.241

\*\* T-test

**Table 3-** Comparison of mean measure of different aspects of insulin therapy self-care behaviors in experimental and control groups

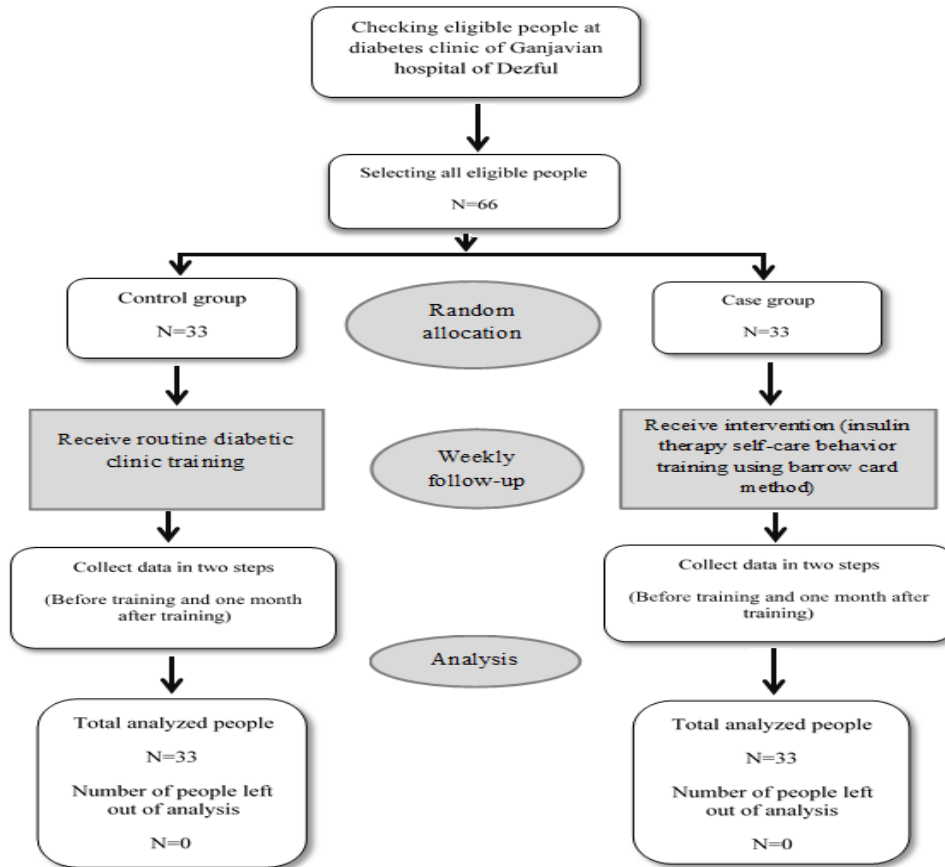
Self-care	Group	Experimental group N=33 (Mean±SD)	Control group N=33 (Mean±SD)	Between groups p-value*
Insulin storage	Before intervention	17.27±1.77	17.42±1.32	0.695
	After intervention	3.77±2.69	1.17±0.60	<0.001
	Intergroup p-value**	<0.001	<0.006	<0.001
Insulin preparation	Before intervention	31.96±2.20	32.27±2.87	0.632
	After intervention	7.66±2.16	1.10±0.66	<0.001
	Intergroup p-value**	<0.001	<0.002	<0.001
Insulin injection	Before intervention	22.3±2.02	22.36±2.42	0.912
	After intervention	6.84±1.64	0.91±0.72	<0.001
	Intergroup p-value**	<0.001	<0.001	<0.001
Prevention of insulin therapy complications	Before intervention	27.15±2.17	28.33±2.76	0.085
	After intervention	11.84±2.76	2.11±1.30	<0.001
	Intergroup p-value**	<0.001	<0.001	<0.001
Intervention at onset of insulin therapy complications	Before intervention	17.33±2.58	17.63±1.61	0.570
	After intervention	2.60±2.58	3.75±3.02	<0.001
	Intergroup p-value**	<0.001	<0.017	<0.001

\* T-test, \*\* paired t-test

**Table 4.** Comparison of mean of insulin therapy self-care total score in experimental and control groups

General Self-care	Experimental group N=33 (Mean±SD)	Control group N=33 (Mean±SD)	Between groups p-value*
Before intervention	116.03±6.6	118.03±66.6	0.225
After intervention	147.69±1.89	121.78±6.24	<0.001
Intergroup p-value**	<0.001	<0.001	

\* T-test, \*\* paired t-test

**Fig. 1:** Research process flow chart**Fig. 2.** Sample of borrow cards

A: I may faint during drop of blood sugar. I should always have needed information with me.

B: Right! You should always carry a note including information such as your disease, drugs and your family.

C: I injected my insulin. It's better to rub the site of injection.

D: Wrong! You shouldn't rub the site of injection because it accelerates the insulin absorption and causes drop in blood sugar.