

None-Insulin Dependent Diabetes Mellitus Related to Self-Care Management Behaviors: A Protocol of Care

Shereen Abd Elmoneam Ahmed^{1,*}, Madiha Hassan Nabih Mohamed²

¹Medical-Surgical Nursing Department, Suez Canal University, Ismailia, Egypt

²Medical-Surgical Nursing Department, Mansoura University, Mansoura, Egypt

*Corresponding author: Shabd.gimsct@gmail.com

Received November 16, 2018; Revised January 19, 2019; Accepted February 13, 2019

Abstract Background: The incidence of diabetes is growing especially in developing countries. Implementation of a protocol of care can increase the self-care management behaviors of the patients. **Aim:** To evaluate the effect of a protocol of care on patients with none-insulin dependent diabetes mellitus related to self-care management behaviors. **Methods:** A quasi-experimental one group (pre/post-test), design was utilized in this study, on a purposeful sample of 100 adult patients aged (30-50) years old, diagnosed with (NIDDM), and were enrolled in the medical inpatient and the outpatient units affiliated to Suez-Canal University Hospitals and the Specialized Medical Hospital, Mansoura University, Egypt, between October 2016 and September, 2017. A structured interview technique used to collect the data three times throughout the study (pre-intervention, 2 weeks post, and 3 months follow-up). Patients received the diabetic protocol of care after assessing the baseline data and implementation of the program. The study instruments were the socio-demographic and medical history questionnaire; knowledge and attitudes questionnaire; the summary of diabetes self-care behaviors scale (SDSCA), and observational checklist to assess the related procedures to be practiced by the patients. **Results:** Significant increase in the level of the participants' knowledge, attitudes, and self-care management behaviors score was observed after implementation of the protocol of care by 2 weeks and 3-months compared with the pre-implementation scores. **Conclusion/Implication for future practice:** The findings of the current study concluded that there is a positive significant correlation between the study variables as the protocol of care appraised the level of self-care management behaviors among the studied patients. The current study will help the participants to manage themselves, and reduce complications of the disease that can occur with inefficient care. **Recommendations:** The study recommended the need for implementing a structured protocol of care at the hospitals as ordinary patient services with stress on self-care behaviors.

Keywords: protocol of care, self-care management behaviors, none-insulin dependent diabetes mellitus

Cite This Article: Shereen Abd Elmoneam Ahmed, and Madiha Hassan Nabih Mohamed, "None-Insulin Dependent Diabetes Mellitus Related to Self-Care Management Behaviors: A Protocol of Care." *American Journal of Nursing Research*, vol. 7, no. 2 (2019): 185-192. doi: 10.12691/ajnr-7-2-10.

1. Introduction

Diabetes mellitus (DM) is one of the terrible threats to human health in the current century. Diabetes is classified into four main categories, type1 diabetes mellitus (T1DM) which identified as insulin dependent diabetes mellitus; it encompasses 5-10% of patients. Type2 diabetes mellitus (T2DM) which known as none-insulin dependent DM; it encompasses 90-95% of patients. Gestational diabetes mellitus that develops during pregnancy, it affects 2% to 4% of all pregnancies. Finally, other types of DM account for 1 to 5 % of all cases [1].

Diabetes leads to some complications for people like increasing morbidity, disability, and reducing the life expectancy and quality of life. The care of diabetes reduces productivity, absorbs the healthcare budgets, and slows the economic growth. Globally; Diabetes is one from the top 10 causes of death. The problem of diabetes

is that 30-80% of patients with diabetes are undiagnosed. About 79% of patients with DM are in the low and middle-income countries. There are 326.5 million people age from (20-64 years) suffered from diabetes; the number expected to increase to 438.2 million. Also, 122.8 million People aged 65-99 years have diabetes, and the number will increase to 253.4 million in 2045 [2].

Diabetic patients are liable to life-threatening complications as heart diseases, nephropathy, neuropathy, eye complications, and foot complications. Such, complications will affect patients' ability of self-care management behaviors [1].

Management and prevention of DM complications depends mainly on patients' readiness to self-manage their care on regular basis. However, a global survey found that only 16.2% of patients with DM reported that, they carried out all of the recommendations that they had given about self-care management. The poor outcome in patients with DM is caused by the lack of their participation in the disease management. The patients' participation is an important success factor in DM management that

needs motivation, knowledge, and compliance by the patients [3].

According to the increasing rates of (NIDDM) all over the world and especially in Egypt; active patient education, support, and evaluation is needed to increase patients' involvement in their care and prevent complications. Therefore, this study will implement to evaluate the effect of protocol of care on patients with none-insulin dependent diabetes mellitus related to self-care management behaviors (NIDDM).

The researchers interested to implement this study as the prevalence of D.M markedly increase, and the researchers hope to make difference for patients and help them live safely with minimum complications throughout their life with the disease.

The current research problem was discusses nationally and internationally from different point of views, For example: A randomized controlled trial, implemented on sixty-four patients with type 2 diabetes at the Khorramabad, diabetes center - Iran by [4], reported that there was a significant improvement in nutrition, physical activity and self-measurement of blood glucose after training program, but there is no significant improvement in foot care and adherence to medication among the intervention group. Therefore, recommended designing an education program for diabetic patients and their families mainly focuses on the self-care behaviors.

A descriptive cross-sectional study on 217 type 2 diabetes patients at the east of Gauteng Province, in South Africa, by [5], stated that the majority of the participants (92.2%) had poor level of knowledge about the benefits of exercise, weight control and diet. The majority (97.7%) had bad practices, although around four-fifths (84.3%) had a positive attitude toward lifestyle modifications.

A Cross-sectional study on the African American female with type 2 diabetes by [6], reported that recipients of diabetes education were under the national benchmarks, while health care providers stress self-care behaviors modifications.

In a randomized controlled trial included 140 volunteer with Type 2 diabetes, in rural Thailand. The researchers reported that diabetes self-management, self-efficacy, and quality of life improved in the management group than the control group [7].

A cross-sectional study conducted on 382 patients referred to the Diabetes Center of Ardabil, using a simple random sampling method; reported that the majority of the participants had poor self-care scores. The lowest score of self-care activities are related to practicing blood sugar test, regular drug adherence, and physical activity. Therefore, the study recommended that regular educational should planned and given at a regular interval for improvement of self-care characteristics in patients with type 2 diabetes [8].

1.1. Aims

The current study aimed to evaluate the effect of protocol of care on patients with none-insulin dependent diabetes mellitus (NIDDM) related to self-care management behaviors.

1.2. Research Hypothesis

H1. Patients who participate in the diabetes protocol of care are expected to have higher levels of self-care

management behaviors than before.

H2. Patients who participate in the diabetes protocol of care are expected to have higher score of Knowledge, attitude and practice than before.

1.3. Significance of the Study

Diabetes Mellitus identified as the century disease as too many people, particularly in the developing countries, suffer from. Prevalence of diabetes mellitus affecting 285 million adults in 2010, and will increase to 439 million adults by the year of 2030 [9]. This disease leads to many complications that affect the patients' different body systems and general health, that in turn increase the burden of the disease. The patient needs to pay too much to save the treatment for the disease and for hospitalization. The present study will help patients to manage their health with minimum complications. In addition, the current study will help change in self-care behaviors of patients with diabetes and increase the awareness about the disease management.

2. Subjects and Method

2.1. Research Design

A quasi-experimental one group (pre/post/ and follow-up) research design was utilized in this study.

2.2. Subjects

A purposeful sample of 100 adult patients diagnosed with NIDDM and enrolled in the Medical inpatients and outpatients affiliated to Suez-Canal University Hospitals and Specialized Medical Hospital, Mansoura University, Egypt, from October 2016 to September 2017. The inclusion criteria included adult patients aged between 30-50 years old as they can care with themselves independently, diagnosed with NIDDM, from both sexes, free from complications and other chronic diseases, able to use a telephone, and willing to participate in this study. The exclusion criteria for the study are patients with audio and visual deficits, or having other comorbid diseases.

The sample size for this study calculated using the following Equation.

$$Sample\ size\ (ss) = \frac{Z^2 * (p) * (1 - p)}{c^2}$$

Where:

Z = Z value (e.g. 1.96 for 95% confidence level)

p = percentage picking a choice, expressed as decimal (.5 used for sample size needed)

c = confidence interval, expressed as decimal (e.g., .04 = ±4).

2.3. Settings

The current study implemented at two settings which are the Medical inpatients and outpatients affiliated to Suez-Canal University Hospitals, Ismailia, Egypt, which serve the East side of Egypt "Ismailia, Port-Said,

Suez, and Sinai." They includes group of hospitals; the educational one includes 460 beds, Special Surgical Hospital includes 180 beds, and the specialized Hospital include 230 beds, In addition to ten medical centers and outpatients. The hospitals serve patients with different types of specialties. In addition to the Diabetic inpatients and outpatients affiliated to the Specialized Medical Hospital, Mansoura University, Egypt, it contains 208 beds in different departments, from which 47 beds at the general diabetic and endocrine glands unit and 22 beds for the hotel rooms at the fourth floor.

2.4. Instruments

2.4.1. Tool I:

A structure Interview questionnaire, which designed by the researchers after reviewing the recent related literature. It includes the following parts:

Part (1) Socio-demographic data that developed by the researchers, and included eight items as age, sex, educational status, marital status, occupation, income, formal health education about the disease, and health insurance in which data was filled subjectively by the patient.

Part (2) Medical history of patients with NIDDM that included five items as family history of DM, diagnosis duration of the disease by years, complications, frequency of insulin injection per day, and frequency of blood glucose monitoring per day; which completed by the researchers through revising the patients' records and asking the patients.

Part (3) Knowledge and Attitude questionnaire: The questionnaire designed and validated by [10]. This questionnaire entitled three dimensions that called knowledge, attitude, and practice. The researchers used only parts related to knowledge and attitudes after translation into simple Arabic language. It composed of 19 questions (14 questions concerned with knowledge about DM as definition, causes, signs and symptoms, and 5 questions concerned with attitudes) of the patients about the disease. Tool validity after translation was 0.85, and the reliability was 0.83. This questionnaire filled using face-to-face interview between the researchers and the patients.

Scoring method for the questionnaire was nineteen as the maximum possible score, by giving each correct answer one point and incorrect or unsure answer zero point. The researchers did not by any way try to improve the knowledge of the subjects. The participants scored 75% and above are classified as high knowledge and attitude level, participants who scored between 51-74% classified as having moderate knowledge and attitude scores, and participants get a score of 50% or less classified as poor knowledge and attitude level.

Part (4) Summary of Diabetes Self-care Activities (SDSCA) Scale: It is a multidimensional tool to measure diabetes self-management with, validity tested by [11]. It is a brief self-report questionnaire and consists of 11 items divided into five self-care activities (4 items for diet, 2 items for exercise, 2 items for blood sugar testing, 2 items for foot care, and 1 item for smoking). The questions ask the patients about the past 7 days diabetes self-care

activities. If patients were sick during these days, ask them to think about the prior 7 days they were not sick. The scoring and interpretation of the SDSCA Scale is by the metric instead of percentages "days per week". The validity of this questionnaire was measured by content validity index (CVI) as 0.91. The reliability of the questionnaire was assessed by pretest and posttest with Cronbach's alpha coefficient of 0.80.

2.4.2. Tool II: Observational Checklist

To assess the patients' ability to self-injecting insulin, the researchers utilized the checklist from [12] it is composed of 10 steps. And a checklist to assess the patients' ability to self-monitor glucose guided by [13], it is composed of 22 step. The scoring for the checklist was two for the accurately practiced step, one for incomplete or moderately practiced step, and the not practiced one scored as zero; with a total score of 64 for both checklists. The total score of practice greater than or equal to 75% was considered as good, this score was chosen as diabetic patients should have the ability to implement these procedures efficiently because it is a chronic disease and need long life management with good and effective self-care.

2.4.3. Protocol of Care

The training booklet was prepared and translated into Arabic by the researchers with reference to the related literature. The booklet guided by and adopted from the National Diabetes Education Program by [14,15,16]. It contains the description of Diabetes Mellitus, types, care and management of DM, avoiding diabetes complications, coping with emotional issues associated with the disease, how to be physically active, healthy eating and cooking, being prepared for an emergency, management of minor and major complications associated with the disease, and the new evidence based practice in diabetes management.

2.4.4. Tool Validity and Reliability

Tools were reviewed by nine expertize in Medical-Surgical Nursing Department after translation into Arabic language to assure their validity with considered reliability to each tool measured separately, and needed modifications were made, then used to interview the patients.

2.5. Pilot Study

A pilot study implemented to test the feasibility of tools and time needed to complete. Ten patients participated in the pilot study and excluded from the sample with a total number of the study sample after exclusion (100).

2.6. Procedure

Data collected through three stages during the study: At the first stage assessment done for all patients using all the study instruments after preparing them according to the related recent literatures. When the patients completed all the study tools; the study intervention performed, followed with follow-up after 3 months. The protocol of care implemented over a period of 12 months from October 2016 to September 2017, as family members and

spouses encouraged to attend as available. The protocol included four teaching sessions (90–120 min) for each one rather than the beginning one and a reinforcement one at three months follow-up for all the study participants "with total six sessions" as follow:

2.6.1. Step 1: (Agree)

During this stage, the researchers obtained an oral agreement on the patients' participation in the program and referral for follow-up visits. This completed after explaining the goal from the study to the participants. In addition, the researchers take agreement from the hospital administration to implement the study.

2.6.2. Step 2: (Assess)

The self-care behaviors, knowledge, attitudes and practice of the patients about their disease evaluated using the previously mentioned tools. The researchers asked the patients and note their response in the questionnaire. At this stage, the researchers assess patients' needs and set objectives of the study by using structured interviews, and observational checklists to evaluate the participants. They informed about the health risks, the advantages of changing behaviors, and its effect on their health, and confirming the complications arising from not controlling the disease. Furthermore, the participants informed about the skills needed to help them succeed in modifying their behaviors and life style in order to control the disease. This stage completed within two months with time consumed of (20-30 minutes) for the session implemented to each group.

2.6.3. Step 3 (Assist)

Through this stage, the researchers planned training sessions for the participants that held immediately after assessment. Each session included a group of 5-10 participants. They informed about the disease and its types, and management of DM, avoiding complications, coping with psychosocial issues associated with the disease, how to be physically active, healthy eating and cooking, being prepared for an emergency, and management of minor complications associated with the disease. Based on patients' needs a small individual or group training sessions planned for participants who had similar problems. During these sessions, the researchers taught the required training to the patients (blood sugar monitoring and insulin injection); and discuss efficient experiences of other participants regarding self-care behaviors in a purposeful manner.

Furthermore, during this stage, the researchers aided the participants to recognize barriers of changing behavior as well as strategies to overcome these barriers. The time of the group sessions ranged from (70 to 90) minutes using power point presentation. In addition, booklet and brochures encounter the training materials presented during the sessions and given to the entire participants. Both assess and assist steps completed in around four months as the researchers visit the settings three times/week during the morning and evening shift to allow participation of the spouses. "Teaching methods included lecture and group discussion for the theoretical part; demonstration and re-demonstration using the injection model for the practical part". The researchers allowed the participants to

practice during the re-demonstration individually using the checklist to evaluate the participants' performance.

2.6.4. Step 4: (Advise)

During this stage, the researchers utilized results of the analyzed data which obtained from the assess stage as a base for continued intervention, and reevaluate the participants using the same tools to evaluate effect of the protocol of care on self-care management behaviors. This stage follows the previous one with two weeks and completed within two months. The researchers interviewed the patients individually at the outpatient during their follow-up visits. The session lasted (20-30) minutes.

2.6.5. Step 5: (Arrange and Evaluate)

The follow-up phase lasted 10 weeks, as it started after the previous phases with 3 months. Here, the researchers followed-up the patients' progress using face-to-face interview. The interview usually takes around half an hour (20-30) minutes as all the participants completed the same previously used tools.

2.7. Ethical Considerations

The researchers informed the participants that their research is to solve their health problems, and they established a friendly relationship between each other's. The researchers obtained an oral consent from all the participants prior any data collection. Participants' confidentiality assured during all phases of the study, as the researchers were the only persons have an access to the participants' data. A cover letter combined to the questionnaires, which includes clarifications of the study procedures and information data of the researchers.

The nature of the current study requires reaching the participants more than once, so the anonymity of participants assured. Moreover, the telephone numbers of the researchers are available to the participants, to establish a continuous communication between the participants and the researchers. The participants assured that they can withdraw from the study as they wish. Certificate of approval was obtained from faculty of Nursing, Suez-Canal University to implement the study.

2.8. Statistical Design

The study data were analyzed using SPSS version 21. Descriptive statistics used for the analysis of nominal data as bio-socio-demographic data, and medical history of the participants. Differences between variables through times of evaluation analyzed using ANOVA. The statistical significance and associations were assessed using, the arithmetic means, the standard deviation (*SD*), (*Z* test), Pearson's and Spearman's test utilized to explore correlation between variables. Significance level was identified at $P < 0.05$.

3. Results

Table 1, clarifies that from total 100 patients aged from 30-50 years; (55%) aged from 30<40 years old with mean

and *SD* (25.92 ± 4.79), (57%) are males, (58%) secondary educated, (60%) single followed respectively with (34%) married, (65%) employed, (74%) have no enough income, (65%) without health insurance, and (89%) have no formal health education.

Table 1. Socio-demographic data of the studied patients: (n=100)

Variable	No	%
Age in years		
30 < 40	45	45
40 - 50	55	55
Mean & SD	25.92 ± 4.79	
Sex		
Male	57	57
Female	43	43
Educational Status		
Non formal education	8	8
Primary education	13	13
Secondary education	58	58
Tertiary education	21	21
Marital status		
Married	34	34
Single	60	60
Divorced	5	5
Widow	1	1
Occupation		
Employed	65	65
Non-employed	35	35
Income		
Enough	26	26
Not enough	74	74
Health insurance		
Yes	35	35
No	65	65
Formal Health education		
Yes	11	11
No	89	89

Table 2, shows that (66%) of patients do not have family history of DM. (44%) of the patients have the disease with confirmed diagnosis since (6-10) years, and (39%) diagnosed from (1-5) years. (51%) of the patients free from complications associated with the disease and the others have minor complications as follow: (23%, 14%, 12%) neuropathy, retinopathy, and foot complications respectively. (40%) of the patients take insulin injection 2 times/day, and (60%) not monitor blood glucose during the day before insulin injection, followed with (20%) monitor their blood glucose once a day.

Table 2. Medical history of the studied patients: (n=100)

Items	No	%
Family History for the disease		
Yes	34.00	34.00%
No	66.00	66.00 %
Diagnosis Duration of DM (in years)		
1-5	39.00	39.00%
6-10	44.00	44.00%
11-15	15.00	15.00 %
DM complications		
Retinopathy	14.00	14.00%
Foot Complication	12.00	12.00 %
Neuropathy	23.00	23.00 %
No Complication	51.00	51.00 %
Frequency of insulin injection/day		
1 time	20.00	20.00%
2 times	40.00	40.00%
None	60.00	60.00%
Frequency of blood glucose monitoring/day		
1 time	20.00	20.00%
2 times	15.00	15.00%
3 times	5.00	5.00%
None	60.00	60.00%

Table 3. Knowledge, attitudes, and practice among the participants throughout all phases of the study: (N=100)

Items	Pre (M ±SD)	Post (M ±SD)	Follow-up (M ±SD)	F	P
Knowledge	13.562±2.58	16.12±3.05	15.73±3.57	26.574	<0.001**
Attitudes	47.469±12.95	47.716±7.97	47.85±7.87	0.049	0.952
Practice	90.392±32.06	120.275±12.53	121.795±13.64	87.65	<0.001**

Table 4. Self-care behaviors among the participants throughout all phases of the study: (n=100).

Items	Pre (M ±SD)	Post (M ±SD)	Follow-up (M ±SD)	Z	P
Diet	9.13 ± 1.36	9.47 ± 1.28	9.30 ± 0.99	-2.851	<0.001**
Physical Exercise	17.70 ± 4.23	21.63 ± 5.42	19.80 ± 4.18	-6.869	<0.001**
Blood Sugar testing	26.80 ± 6.74	30.43 ± 6.04	29.77 ± 5.26	-3.708	<0.001**
Foot care	7.87 ± 2.62	9.00 ± 1.00	8.83 ± 2.04	-5.024	<0.001**
Smoking	15.47 ± 4.99	19.07 ± 6.75	14.83 ± 5.26	-2.547	0.016*

Table 5. Correlation of patients' knowledge, attitude, and practice with self-care behaviors: (n=100)

Items	Knowledge	Attitude	Practice
Diet			
<i>r</i>	0.217	-0.137	0.347
<i>p</i>	0.019*	0.142	0.001**
Physical Exercise			
<i>r</i>	0.022	0.049	0.122
<i>p</i>	0.814	0.597	0.190
Blood Sugar testing			
<i>r</i>	0.265	-0.144	0.519
<i>p</i>	0.004**	0.122	0.001**
Foot care			
<i>r</i>	0.269	0.016	0.608
<i>p</i>	0.003**	0.886	0.001**
Smoking			
<i>r</i>	0.299	0.476	0.725
<i>p</i>	0.001**	0.001**	0.001**

Protocol of care for Non-Insulin dependent Diabetes Mellitus(contents and objectives)	
Objectives	Content
Prepare the patients and motivate for education	Introduction to the protocol of care
	Review of the learning objectives
Increase level of knowledge and attitudes toward DM management	Describe the disease and its types, and management of DM, avoiding diabetes complications, being prepared for an emergency, and management of minor complications associated with the disease
	Explain the new evidence based practice in diabetes management.
Increase level of self-care behaviors	Identify the health risks, the advantages of changing behaviors, and its effect on the patients' health, and confirming the complications arising from not controlling the disease.
	coping with psychosocial issues associated with the disease, how to be physically active, healthy eating and cooking,
	Help the participants to recognize barriers of changing behavior as well as strategies to overcome these barriers
	Discuss efficient experiences of other participants regarding self-care behaviors
	Discuss the skills needed to help the patients succeed in modifying their behaviors and life style in order to control the disease
Increase level of practice	Procedure of insulin injection and blood glucose monitoring using video and demonstration for explanation and checklist for re-demonstration and evaluation.

Table 3 Expresses the level of Knowledge and Attitudes throughout phases of the study; and shows significant increase in the level of patients' knowledge and practice after implementation of the protocol of care with $P < 0.001$. The level of patients' knowledge increases at the post implementation phase and slightly decreased at the follow-up phase. The level of patients' practice significantly increased at the post program phase and follow-up phase. Nevertheless, there is no significant change in patients' attitude through all phases of the program.

Table 4, Expresses the effect of the protocol of care on self-care management behaviors, and shows statistical significant difference in the self-care behaviors among the studied patients at all phases of the study with $P < 0.001$ except in the part concerned with smoking

$P < 0.05$. The high level of improvement occurred at the post- implementation phase with mean and SD for diet is (9.47 ± 1.28) , physical exercise (21.63 ± 5.42) , blood sugar test (30.43 ± 6.04) , foot care (9.00 ± 1.00) , and smoking (19.07 ± 6.75) .

Table 5, Shows significant correlation between level of knowledge, attitudes, and practice of the patients with different items of self-care behaviors, as the diet, blood testing, and foot care are significantly associated with level of patients' knowledge by ($r=0.217$ & $p=0.019$), ($r=0.265$ & $p=0.004$), and ($r=0.269$ & $p=0.003$) respectively. Smoking significantly correlated with KAP of the patients with $p < 0.001$. Improvement in the level of patients' practice significantly correlated with diet, blood testing, and foot care with $p < 0.001$.

4. Discussion

Diabetes mellitus is one of the commonest diseases encountered by the health care professionals. During the last twenty years, the incidence of DM raised vigorously throughout the world. Patient education and training are aiming to increase knowledge, skills, and self-confidence that enabling them to increase control on their conditions and immerse self-management into ordinary daily lives. Thus, the present study aimed to examine the effect of protocol of care for patients with none-insulin dependent diabetes mellitus related to self-care management behaviors (NIDDM).

The current study shows that, about two-thirds of the studied patients have no family history of (NIDDM); nearly half of them have a confirmed diagnosis of NIDDM since 6-10 years, while two-fifths diagnosed since 1-5 years. Meanwhile, half of the studied patients are free from complications associated with the disease and the other half has minor complications as neuropathy, retinopathy, and foot complications. From the researchers' point of view, these results may relate to low level of vitamin B12, which is routinely associated with DM and lead to likewise complications.

These results are supported in some points and contradicted with others in a study named the effect of diabetes self-efficacy on diabetes self-care behaviors, by [1]. Who found that, the majority of participants had family history of DM, nearly half of them had a confirmed diagnosis of DM since 6 years. In relation to diabetic complications, half of the participants do not have complications related to diabetes mellitus.

The current study shows significant increase in patients' level of knowledge and practice after implementation of the protocol of care with $P < 0.001$. Level of patients' knowledge increases in the post implementation phase and slightly decreased at the follow-up phase. The level of patients' practice significantly increased at the post program phase and follow-up phase. Nevertheless, there is no significant change in patients' attitude through all phases of the program. These results could relate to importance of diabetes education, which considered an essential part of diabetic patient comprehensive care.

These results are consistent with [3] whom studied the effect of education program on improving self-care management behaviors in diabetic patients, found that, levels of KAP and self-care behaviors at the intervention group have been improved after implementation of the program. Also, [17] who study the effect of a Comprehensive Program on Patients with Type 2 Diabetes Mellitus at China reported that there was a significant increase in the patients' level of knowledge, attitude, practice, and self-care behaviors after implementation of the program.

The current study shows statistical significant difference in the self-care behaviors among the studied patients at all phases of the study with $P < 0.001$ except in the part concerned with smoking $P < 0.05$. The increased level of improvement occurred at the post implementation phase with mean and *SD* for all items of self-care management behaviors. From the researchers' point of view, these results could be related to effect of the patient education on their life style, as when the patient know the magnitude of the disease and its effect on life, try to take care of

themselves to prevent incidence of complications, which can enhance and improve patients' self-care management behaviors.

These results are consistent with a study by [18], who tested the effect of education in type 2 diabetes based on family-centered model. This study reported that before education, there was no significant difference between self-care management behaviors scores in both the intervention and control group ($p < 0.05$). Nevertheless, after education self-care management behaviors total scores and all the domains were increased and statistically were significant in the intervention group with ($p < 0.05$), while there was no significant increase in the control group.

The current study shows significant correlation between the level of patients' knowledge, attitudes, and practice with the different items of self-care behaviors, as diet, foot care, and blood testing are significantly associated with level of patients' knowledge by ($r=0.217$ & $p=0.019$), ($r=0.265$ & $p=0.004$), and ($r=0.269$ & $p=0.003$) respectively. Smoking significantly correlated with KAP of the patients with $p < 0.001$. Improvement in level of patients' practice significantly correlated with diet, blood testing, and foot care with $p < 0.001$. These findings may relate to that one of the most beneficial aspects of diabetic education is powering the patients to be able to care themselves.

These findings are agreed with [3] whom revealed the presence of a significant correlation between the participant's levels of KAP and the self-care behaviors. Also [19] who studied the Effect of KAP on Self-Management in Diabetic Patients on Dialysis reported the presence of a significant correlation between knowledge and practice of the studied patients and their self-care behaviors.

In most of chronic diseases, the major part of the treatment carried out by the patients themselves in collaboration with their health caregiver. The importance of patient education focuses on maintaining wellness, prevention of complications, and health promotion, in addition to develop a trusting and long-lasting relationship with patients.

Patient education plays a crucial role as a tertiary preventive measure and improving societal health behaviors. Continuous education is important for the patients, as well as the health care provider to take the time to answer the patients' questions and even encourage questions. All patients need effective diabetes self-management protocols of care with emphasis on motivating self-care behaviors. Furthermore, these protocols of care should implement in periodic reinforcement to achieve long-term changes in behavior. If the nurses know how and when efficiently educating the patients, they will improve their clinical practice and the patients' health outcome.

5. Conclusion and Recommendations:

The findings of the current study concluded that there is a significant positive correlation between the study' variables as the protocol of care appraised the self-care behaviors among the patients participated in the protocol of care. The current study will help the participants to

manage themselves, and reduce complications of the disease that can happen with inefficient care. The study recommended the need for implementing a structured training program at the hospitals on wide range, as diabetic education has become the need of the hour to decrease diabetes' complications. In addition, the health-care personnel should have a continuous education to be able to teach patients.

Acknowledgments

The researchers would like to produce thanks to all personnel helps this work to be in this form and facilitate data collection and analysis. In addition, we thank and gratitude to all participants at this study and working personnel at the chosen workplace.

Author Contributions

Ahmed, S.A and Nabih, M.H. developed the Study conception and design. Ahmed, S.A and Nabih, M.H collected data of the study. Ahmed, S.A performed data analysis and interpretation. Ahmed, S.A and Nabih, M.H formulated drafting of the article. Ahmed, S.A and Nabih, M.H completed the critical revision of the article.

References

- [1] Albikawi, Z. F., Petro-Nustas, W., & Abuadas, M. (2015). The effect of diabetes self-efficacy enhancing intervention on diabetes self-care management behaviors among Jordanian type two diabetes patients. *American International Journal of Contemporary Scientific Research*, 2(4), 34-48.
- [2] American Diabetes Association, A. D. (2017). 2. Classification and Diagnosis of Diabetes. *Diabetes Care*, 40(Suppl 1), S11-S24.
- [3] Barasheh, N., Shakerinejad, G., Noughjah, S., & Haghighizadeh, M. H. (2017). The effect of educational program based on the precede-proceed model on improving self-care behaviors in a semi-urban population with type 2 diabetes referred to health centers of Bavi, Iran. *Diabetes and Metabolic Syndrome: Clinical Research and Reviews*, 11, S759-S765.
- [4] Davari, L., Eslami, A. A., Hassanzadeh, A., Alavijeh, M. M., & Mahmoodi, G. R. (2014). Self-care Behavior Promotion among Type 2 Diabetic Patients: A Randomized Controlled Trial. *Journal of Biology and Today's World*, 3(11), 242-246.
- [5] Okonta, H. I., Ikombela, J. B., & Ogunbanjo, G. A. (2014). Knowledge, attitude and practice regarding lifestyle modification in type 2 diabetic patients. *The African Journal of Primary Health & Family Medicine*, 6(1), 2-7.
- [6] Miller, S. T., Cunningham-erves, J., & Akohoue, S. A. (2016). Diabetes Education, Specialty Care, and Self-Care Advice among Obese African American Women with Type 2 Diabetes. *Ethnicity and Disease Journal*, 26(2), 229-234.
- [7] Wichit, N., Mnatzaganian, G., Courtney, M., Schulz, P., & Johnson, M. (2017). Randomized controlled trial of a family-oriented self-management program to improve self-efficacy, glycemic control and quality of life among Thai individuals with Type 2 diabetes. *Diabetes Research and Clinical Practice Journal*, 123(1), 37-48.
- [8] Nejaddadgar, N., Solhi, M., Jegarghosheh, S., Abolfathi, M., & Ashtarian, H. (2017). Self-Care and Related Factors in Patients with Type 2 Diabetes. *Asian Journal of Biomedical and Pharmaceutical Sciences*, 7(61), 6-10.
- [9] Padma, K., Bele, S., & Bodhare, T. (2012). Evaluation Of Knowledge And Self Care Practices In Diabetic Patients And Their Role In Disease Management. *National Journal of Community Medicine*, 3(1), 3-6.
- [10] Rathod, G. B., & Parmar, P. (2012). Comparison Regarding Knowledge, Attitude And Practice Of Blood Donation Between Health Professionals And General Population. *International Journal of Contemporary Research and Review (Ijcr)*, 04(21), 114-120.
- [11] Toobert, D. J., Hampson, S. E., & Glasgow, R. E. (2000). The summary of diabetes self-care activities measure: Results from 7 studies and a revised scale. *Diabetes Care*, 23(7), 943-950.
- [12] Hamilton Family Health Team Registered dietitians. (2008). *Injecting insulin checklist*. Retrieved from <http://picsolution.ir/wp-content/uploads/2013/04/Injecting-Insulin-Checklist.pdf>.
- [13] F. A. Davis Company. (2007). Checking Fingertick (Capillary) Blood Glucose Levels. In Wilkinson & VanLeuven (Eds.), *Procedure Checklists for Fundamentals of Nursing* (pp. 18-19).
- [14] Payne, G. H., Leeman, J., & Farris, R. P. (2011). News from CDC (summer 2011)-translating knowledge to program action for nutrition, physical activity, and obesity interventions. *Translational Behavioral Medicine*, 1(3), 367-368.
- [15] West, J. F. (2014). Public health program planning logic model for community engaged Type 2 diabetes management and prevention. *Evaluation and Program Planning Journal*, 42, 43-49.
- [16] Guideline, J. C. (2017). Joslin Diabetes Center & Joslin Clinic.
- [17] Qi, L., Feng, L., Tang, W., Ma, X., Ding, X., Mao, D., & Li, J. (2014). A Community-Based Comprehensive Intervention Program for 7200 Patients with Type 2 Diabetes Mellitus in Chongqing (China). *International Journal of Environmental Research and Public Health*, 11, 11450-11463.
- [18] Ghotbi, narghes, Maddah, sadat S. B., Dalvandi, asghar, Arsalani, narghes, & Farzi, marjan. (2014). The effect of education of self care behaviors based on family-centered empowerment model in type II diabetes. *Advances in Nursing & Midwifery*, 23(83), 35-42.
- [19] Ghannadi, S., Amouzegar, A., Amiri, P., Karbalaefar, R., Tahmasebinejad, Z., & Kazempour-Ardebili, S. (2016). Evaluating the Effect of Knowledge, Attitude, and Practice on Self-Management in Type 2 Diabetic Patients on Dialysis. *Journal of Diabetes Research*, 2016, 1-7.

