OPEN

The Effect of Nursing Counseling on Treatment Compliance: Acute Coronary Syndrome and Diabetes Mellitus

Selda CELIK[1]* • Feride TASKIN YILMAZ[2] • Seval GUNDOGDU[3] • Meryem TURKOGLU[4]

ABSTRACT

Background: The comorbidity of acute coronary syndrome and diabetes affects patient prognoses. Therefore, it is important to manage these diseases simultaneously.

Purpose: In this study, the effect of nursing counseling on treatment compliance was investigated in patients who had received surgical treatment for acute coronary syndrome and had been recently diagnosed with diabetes.

Methods: A quasi-experimental design with pretest–posttest control group was used. The study sample consisted of 60 patients (intervention group = 30, control group = 30). The data were collected using a patient information form, the Patient Learning Needs Scale, and the Scale for Patient Compliance with Type 2 Diabetes Mellitus Treatment. This study was conducted in compliance with the Transparent Reporting of Evaluations with Nonrandomized Designs checklist.

Results: The intervention group earned significantly higher posttest scores on the Patient Learning Needs total scale and subscales than the control group. Moreover, intervention group compliance with treatment was higher than that of the control group. Furthermore, although significant improvements were found in the average posttest body mass index, fasting blood glucose, HbA1c, total cholesterol, triglyceride, and low-density lipoprotein cholesterol values of the control group, the between-group differences in these values were not significant.

Conclusions/Implications for Practice: It is important for nurses to provide counseling services that align with the learning needs of their patients. Also, nursing counseling units should be created and staffed by both specialist nurses and nurse trainers working in healthcare institutions.

KEY WORDS:
acute coronary syndrome, diabetes, nurse, counseling, treatment compliance.

Introduction

Acute coronary syndrome (ACS), characterized by a sudden reduction in blood supply to the heart, includes ST-segment elevation myocardial infarction, non-ST-segment elevation myocardial infarction, and unstable angina (Bhatt et al., 2022). Despite improvements achieved in diagnosis and treatment in recent years, ACS is still the most significant cause of morbidity and mortality worldwide, including Turkey (Simsek & Alpar, 2020).

Diabetes, hypertension, metabolic syndrome, hyperlipidemia, smoking, alcohol consumption, obesity, physical inactivity, and dietary habits are modifiable risk factors of ACS, whereas gender, age, and family history are nonmodifiable risk factors (Usta et al., 2015). Diabetes, a particularly significant independent risk factor for ACS (Einarson et al., 2018), affects an estimated one in 10 adults worldwide (IDF Diabetes Atlas, 2023). Because of the minor symptoms associated with the onset and gradual development of hypoglycemia, patients with can take years to be properly diagnosed for many years, which increases the risk of microvascular and macrovascular complications (The Society of Endocrinology and Metabolism of Turkey, 2022). Approximately one third of patients with ACS are also affected by diabetes (mostly Type 2 diabetes; Tang et al., 2020). Chronic hyperglycemia can lead to cardiomyocyte systolic dysfunction and ultimately to cell death (Mortuza & Chakrabarti, 2014). ACS and diabetes represent a double chronic disease epidemic (Wu et al., 2017). In a study on patients with ACS and Type 2 diabetes, it was reported that the hospital stay duration of these patients was long, that their 30-day readmission rates were high, and that an effective self-management program should be developed to improve their health behaviors to shorten hospital stay durations and reduce the number of hospitalizations (Tang et al., 2020).

ACS and diabetes are irreversible diseases that require lifelong self-care and rehabilitation (Baraz et al., 2017). Patients newly diagnosed with ACS and diabetes are encouraged to make appropriate adjustments to their diet, physical activity,

[1]PhD, RN, Professor, Hamidiye Faculty of Nursing, University of Health Sciences Turkey, Istanbul, Turkey • [2]PhD, RN, Associate Professor, Faculty of Health Sciences, Sakarya University of Applied Sciences, Sakarya, Turkey • [3]MSc, RN, Diabetes Specialist Nurse, Mehmet Akif Ersoy Thoracic and Cardiovascular Surgery Training and Research Hospital, University of Health Sciences, Istanbul, Turkey • [4]MSc, RN, Health Care Services Manager, Mehmet Akif Ersoy Thoracic and Cardiovascular Surgery Training and Research Hospital, University of Health Sciences, Istanbul, Turkey.

drug use, and blood glucose measurement (Qasim et al., 2019; The Society of Endocrinology and Metabolism of Turkey, 2022), as medical treatment alone is not adequate for effective disease management (Simsek & Alpar, 2020). Patients who comply with lifestyle and treatment protocols are able to continue their daily life more easily; overcome the individual, familial, and social problems brought about by the disease; and develop a more optimistic and positive attitude toward life (Bien et al., 2016).

Today, counseling is an important role of nursing that protects patients from diseases and improves health. Nurses help increase patient and patient family member awareness of diseases and provide counseling on issues such learning about the course of their disease, inform patients about sources that will help them cope with the problems created by their disease, encourage them to access available support resources, and share evidence-based scientific knowledge (Gedük, 2018). Counseling provided by nurses as a supportive service is a practical and cost-effective method that may be used to improve quality of care, expedite the recovery process, and prevent complications (Mons et al., 2013). The findings of prior studies indicate that nursing counseling can enhance patient self-care behaviors and satisfaction (Azami et al., 2018; Debussche et al., 2012; Martos-Cabrera et al., 2021). In addition, nurse counseling for diabetes can help in the control of hypertension, hyperlipidemia, obesity, and other risk factors via improved diet, exercise, weight control, and treatment compliance.

ACS comorbid with diabetes affects patient prognoses (Einarson et al., 2018) in terms of complicating the patient's life due to symptom burden and related psychosocial problems. Thus, it is important to manage these two diseases simultaneously. In a meta-analysis study designed to help suggest effective educational interventions for patients with ACS and Type 2 diabetes, it was emphasized that, although a significant body of evidence exists regarding the effectiveness, content, and application of healthcare training in patients with ACS and Type 2 diabetes, all available systematic analyses and meta-analyses focus on only one of these two diseases (Liu et al., 2017).

This study was developed to determine the effect of nursing counseling on treatment compliance in patients who had received surgical treatment for ACS and were newly diagnosed with Type 2 diabetes.

Methods

Study Design

A quasi-experimental design with pretest–posttest control group was used. The research hypothesis is as follows: Nursing counseling promotes treatment compliance in patients who had received surgical treatment for ACS and were newly diagnosed with diabetes.

Population and Sample

This study was conducted using an intervention group and a control group. The study population consisted of patients who had received surgical treatment for ACS (with either cardiac catheterization or coronary artery bypass surgery), were

newly diagnosed with diabetes, and were scheduled for discharge from the Cardiovascular Surgery Clinic of Chest and Cardiovascular Surgery Training and Research Hospital in Istanbul between May 1 and October 31, 2022. The sample size was calculated using G*Power using data from a prior diabetes treatment compliance study (Eşer et al., 2018). The sample size was calculated as 28 in each group (56 in total) based on an impact size of 1.18, an α value of .05, and a power of 0.80. To account for potential withdrawals from the sample, 32 patients were recruited and assigned to each group (Figure 1). Patients who met the inclusion criteria and confirmed as participants were first assigned to the control group and, once filled, then assigned to the intervention group to ensure that patients in the two groups were not recruited simultaneously and thus less likely to interact and affect each other. The inclusion criteria were as follows: having received surgery for ACS, having a recent diagnosis of diabetes, having at least a primary school education, being able to communicate verbally, being able to make phone calls, and voluntarily agreeing to participate. Patients with ACS only or who were unconscious were excluded.

Data Collection Tools

The data for this study were collected using a patient information form, the Patient Learning Needs Scale, and the Scale for Patient Compliance with Type 2 Diabetes Mellitus Treatment. The Transparent Reporting of Evaluations with Nonrandomized Designs checklist was followed in writing the article (Des Jarlais et al., 2004).

Patient information form

This form, developed by the researchers, consisted of 23 questions on sociodemographic characteristics (age, gender, marital status, educational status, and profession), disease information (e.g., name of the disease, duration of the disease, drug use, presence of complications), and metabolic parameters (e.g., fasting blood glucose [FBG] level, body mass index [BMI], HbA1c, blood pressure).

The Patient Learning Needs Scale

This scale was developed by Bubela et al. (1990), and the related Turkish validity and reliability study was conducted by Catal and Dicle (2008). This scale consists of 50 items under seven subscales (medications, activities of daily living, community and follow-up, feelings related to condition, treatment and complications, enhancing quality of life, and skin care), with items scored on a 5-point Likert-type scale to generate total scale and subscale scores. In terms of subscale score ranges, the medications subscale is 8–40 points, activities of daily living is 9–45 points, community and follow-up is 6–30 points, feelings related to condition is 5–25 points, treatment and complications is 9–45 points, enhancing quality of life is 8–40 points, and skin care is 5–25 points. The total scale score ranges between 50 and 250, with higher scores indicating higher learning needs (Catal & Dicle, 2008). The Cronbach's alpha coefficient of this scale was .91 in this study.

Figure 1
Study Flow Diagram
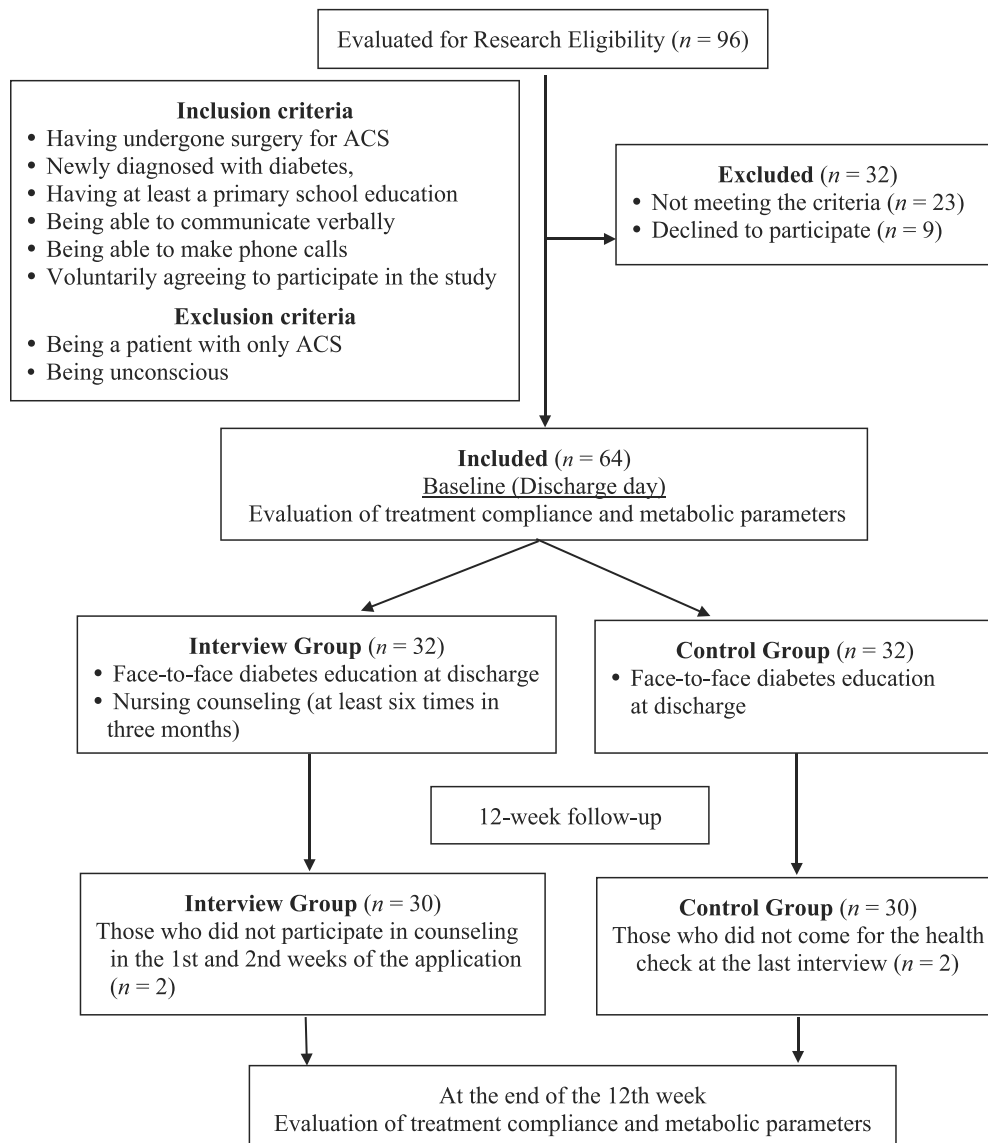
The Scale for Patient Compliance with Type 2 Diabetes Mellitus Treatment

This scale, developed by Demirtas and Akbayrak (2017) to evaluate treatment compliance in patients with Type 2 diabetes mellitus, is scored using a 5-point Likert-type system, with the sum of item scores giving the total scale score. Thirteen items on this scale address positive attitudes, and 17 items address negative attitudes. The total scale score ranges between 30 and 150, with lower scores indicating better compliance with Type 2 diabetes mellitus treatment. The Cronbach's alpha coefficient of the original scale is .77 (Demirtas & Akbayrak, 2017) and was .91 in this study.

The Intervention

The data in this study were obtained in two evaluations (baseline and posttest), with baseline data obtained on the day of patient discharge and posttest data obtained 12 weeks after discharge. All of the participants were followed up in the intensive care unit following surgical treatment for ACS, and their treatment was continued in the cardiovascular surgery clinic. In this process, consultation was requested for each patient from the internal diseases clinic, and discharge treatment plans related to diabetes were created. Face-to-face training was provided by the diabetes nurse on the research team who had 18 years of experience in this field, held a diabetes care certificate, and had been working in the study institution for 13 years. This training, provided individually to each patient 1 day before discharge, covered general diabetes knowledge, including the definition of the disease, hypoglycemia, hyperglycemia, nutrition at home, blood glucose measurement at home, oral antidiabetic drug and/or insulin use at home, time to apply for health control, and the importance of regular

checkups. For these patients, consultation was requested from a dietician, and they were provided with training on nutrition in diabetes by the dietician. During the postdischarge period, nursing counseling was provided to the intervention group only. On the day of their discharge, the Patient Learning Needs Scale was given to intervention group participants to identify their training needs and determine the content of subsequent nursing counseling. In line with each participant's learning and information needs, a 12-week face-to-face nursing counseling program was provided on an initial weekly and then monthly basis. Counseling by telephone was also provided when patients needed counseling during working hours (08:00 a.m. to 17:00 p.m.). Counseling content also included evaluations of blood glucose measurement results and drug use, the importance of nutrition and exercise, and recommended strategies for coping with stress and preventing acute and chronic complications. Intervention group participants were provided with counseling services at least six times over the 12-week period with a mean duration of 68.53 (SD = 13.21) minutes. Only two interviews were held with the control group participants (at baseline and posttest). The mean interview duration for the control group was 23.37 (SD = 9.58) minutes. The data on metabolic parameters for all of the participants were retrieved from the digital system used at the institution on the day of discharge and 12 weeks after discharge.

Evaluation of Data

IBM SPSS Statistics 23.0 (IBM Inc., Armonk, NY, USA) was used to analyze study data, which were summarized as mean and standard deviation. Data distribution was tested using the Shapiro–Wilk test, with the data found to be normally distributed. The difference between independent groups was analyzed using an independent sample t test. A paired sample t test was used for intragroup pretest-and-posttest comparison. Chi-square and Fisher's exact chi-square tests were used to compare qualitative data. In addition, Cohen's d was calculated to determine the effect size, with Cohen's d of ≤ .20, ≤ .50, and ≤ .80 used, respectively, to determine small, medium, and large effect sizes (Cohen, 1988). Level of significance was set as $p < .05$.

Ethical Approval

Prior to conducting this study, written ethical approval was obtained (decision date: 04/03/2022; decision number: 18). Participation in this study was voluntary, and before starting the study, all of the participants were informed about the purpose and benefits of the study and signed the informed consent form. The participants were also informed that their identity information and privacy would be respected and kept confidential. In addition, based on the finding that nurse counseling enhanced treatment compliance in the intervention group, a similar intervention was applied to the control group after the study was completed.

Results

Age, gender, educational status, marital status, working status, smoking status, ability to perform activities of daily living, presence of individuals with heart disease or diabetes in first-degree relatives, regular exercise habits, and general health were similar between the two groups ($p > .05$). However, the number of individuals with chronic diseases other than diabetes was higher in the intervention group (Table 1).

The average Patient Learning Needs Scale overall score at discharge (224.43 ± 25.29) indicated a high degree of learning needs in the intervention group. However, the learning needs in this group decreased significantly after the nurse counseling intervention ($p < .01$; Table 2).

A statistically significant difference was determined between the intervention group and the control group in terms of treatment compliance at posttest, with the intervention group showing greater treatment compliance. In addition, in comparing discharge and posttest results, significant improvements were identified in the intervention group in terms of BMI, FBG, HbA1c, total cholesterol, triglyceride, and low-density lipoprotein cholesterol levels. However, although the control group showed improvements in BMI and FBG levels at posttest, mean diastolic blood pressure level was found to have increased. In the intergroup comparison, metabolic parameters did not display any differences between the initial and final interviews ($p > .05$). In addition, a high between-group effect size was observed with regard to the difference between the Scale for Patient Compliance with Type 2 Diabetes Mellitus Treatment scores (Cohen's d = .70). This high effect size supports the effectiveness of the nurse counseling intervention. However, the effect size was low in terms of metabolic parameters between the groups at posttest (Cohen's $d < .20$), indicating the effect of nurse counseling on metabolic parameters to be low (Table 3).

Discussion

ACS and diabetes comorbidity are common diseases that increase mortality risk if not effectively managed after first diagnosis. In this study, the effect of nursing counseling on treatment compliance in patients with ACS who were newly diagnosed with diabetes was investigated.

In the initial evaluation, it was indicated that participant learning needs were high. In previous studies conducted on patients hospitalized in internal disease clinics, high learning needs were also found at discharge, particularly in terms of information related to drugs, treatment, complications, and quality of life (Doğan et al., 2019; Taskin Yilmaz et al., 2019). A similar finding was obtained in a study on patients with coronary artery bypass grafting (Saritaş et al., 2018). Providing targeted training and counseling to patients newly diagnosed with a disease is a core responsibility of nurses. In this study, the learning needs of intervention group participants decreased considerably after completion of the nursing counseling intervention. Provision of training and counseling, particularly on issues for which they feel deficient and in need of education, may have contributed to meeting their learning needs.

Table 1

Comparison of Participant Characteristics, by Group at Baseline

Characteristic	Intervention Group (n = 30)		Control Group (n = 30)		t/χ²	p
	n	%	n	%		
Age (years; M and SD)	57.83	9.53	59.43	6.87	t = −0.75	.45
Gender					0.09	.76
Female	7	23.3	8	26.7		
Male	23	76.7	22	73.3		
Educational status					7.02	.07
Illiterate	4	13.3	7	23.3		
Primary school graduate	18	60.1	22	73.3		
Secondary school graduate	4	13.3	1	3.3		
High school graduate	4	13.3	–	–		
Marital status					0.71	.36
Married	25	83.3	27	90.0		
Single	5	16.7	3	10.0		
Working status					1.27	.26
Yes	11	36.7	7	23.3		
No	19	63.3	23	76.7		
Smoking status					2.59	.27
Yes	12	40.0	18	60.0		
Quit smoking	9	30.0	5	16.7		
Never smoked	9	30.0	7	23.3		
Ability to perform activities of daily living					1.22	.54
Can do it alone	27	90.0	25	83.3		
Can do with help	3	10.0	4	13.3		
Can't do	–	–	1	3.3		
Presence of individuals with heart disease in their first-degree relatives					2.58	.11
Yes	72	73.3	16	53.4		
No	8	26.7	14	46.7		
Presence of individuals with diabetes in their first-degree relatives					2.41	.12
Yes	19	63.3	13	43.3		
No	11	36.7	17	56.7		
Presence of other chronic diseases other than diabetes					4.34	.04*
Yes	17	56.7	9	30.0		
No	13	45.3	21	70.0		
Regular exercise status					0.07	.79
Yes	16	53.3	15	50.0		
No	14	46.7	15	50.0		
Overall health assessment					9.17	.23
Good	25	83.3	16	53.3		
Moderate	5	16.7	10	33.3		
Bad	–	–	4	13.3		

Note. t = Student t test; χ^2 = chi-square test.
*$p < .05$.

The Impact of Nursing Counseling on Treatment Compliance

As with all chronic diseases, ensuring patient compliance is important to diabetes treatment in terms of the success of the treatment and prevention of complications (Eşer et al., 2018).

In studies using descriptive designs, it was found that treatment compliance level in diabetic patients was poor but could be improved through nursing training and counseling (Eşer et al., 2018; García-Pérez et al., 2013). In this study, nurse counseling was shown to support diabetes treatment compliance, which confirms the hypothesis. In a prior randomized controlled trial,

Table 2

Comparison of the Patient Learning Needs Scale Mean Scores of the İntervention Group, at Baseline and Posttest

Patient Learning Needs Scale	Baseline		Posttest		t	p [a]
	M	SD	M	SD		
Medications	34.26	4.14	9.63	1.71	28.23	< .01
Activities of daily living	38.90	4.58	10.43	1.94	29.77	< .01
Community and follow-up	25.83	3.05	8.76	2.78	19.25	< .01
Feelings related to condition	21.30	2.64	5.50	1.54	26.44	< .01
Treatment and complications	38.80	4.54	11.76	3.31	23.75	< .01
Enhancing quality of life	34.30	4.11	9.46	1.79	28.21	< .01
Skin care	21.40	2.58	5.13	0.57	33.60	< .01
General	224.43	25.29	60.70	11.81	29.87	< .01

[a] Paired sample *t* test.

it was also demonstrated that diabetes training provided via telephone calls and text messaging affected patients' diabetes management and treatment compliance positively (Kin & Tureyen, 2022). However, in another study that executed a training and support program on diabetes self-treatment for hospitalized patients under the leadership of a nurse, it was determined that, whereas disease knowledge improved, drug compliance levels remained unchanged (Macido, 2019). This finding shows the importance of nursing counseling in terms of ensuring treatment compliance, especially in patients who are newly diagnosed. Notably, the higher number of individuals with chronic diseases in the intervention group than control group in this study supports that nurse counseling can facilitate treatment compliance even in patients with multiple chronic diseases.

The Impact of Nursing Counseling on Metabolic Parameters

In this study, significant improvements were found in BMI, FBG, HbA1c, total cholesterol, triglyceride, and low-density lipoprotein cholesterol levels in the intervention group, whereas improvements in BMI and FBG levels only were observed in the control group. The improvement observed in the control group may be attributable to the participants starting medical treatment simultaneously after receiving diagnoses of ACS and diabetes. The improvement in the intervention group may be attributable to the training provided on nutrition, physical activity, and medical treatment and the close follow-up by telephone. In addition, although the metabolic parameters of the intervention group displayed greater improvement, the between-group differences were not significant. Studies on nursing counseling in the literature are limited, with most focused on nursing training. Various findings were observed in these studies. For example, in a randomized controlled trial conducted on patients with Type 2 diabetes using a phone-based

counseling intervention, average HbA1c values decreased significantly in both the intervention and control groups, and no posttest differences were identified between the groups (Mons et al., 2013). In a study in which individual lifestyle counseling was provided, counseling was found to have significantly improved the metabolic control and diet and exercise habits of the subjects (Debussche et al., 2012). In studies in which nursing training was provided, metabolic parameters were determined to have improved after the training (Gamboa Moreno et al., 2019; Martos-Cabrera et al., 2021; Tavakol Moghadam et al., 2018). In another study in which the effectiveness of a training program administered to patients newly diagnosed with Type 2 diabetes, structured on complementary medicine, and conducted under the guidance of a nurse was examined, it was reported that the intervention was effective in improving glycemic control and self-efficacy (Yu et al., 2022). Although nursing counseling was found to have no beneficial effect on metabolic parameters in this study, the findings show the intervention had certain beneficial effects, especially in terms of cardiovascular parameters. Long-term counseling and follow-up may be needed to maintain the improvements in metabolic parameters.

Limitations

This study was affected by several limitations. As the study was conducted over a certain time period and at a single state hospital, the results may not be generalized. Also, the collected information on diabetes treatment compliance was self-reported by participants, and changes in metabolic parameters during the 3-month period after discharge were not assessed. A further limitation is that chronic diseases other than diabetes were not considered. In addition, nursing counseling was made available only during working hours (8 a.m. to 5 p.m.) rather than 24 hours a day during the study period. Finally, a randomization method was not used in the study, and only the learning

Table 3

Intergroup Comparison of Metabolic Parameters and Treatment Compliance Levels

Variable	Intervention Group ($n = 30$)		Control Group ($n = 30$)		Test [a]	p	Cohen's d
	M	*SD*	*M*	*SD*			
The Scale for Patient Compliance With Type 2 Diabetes Mellitus Treatment							
Last interview	62.30	9.57	80.86	9.40	−7.58	< .01	.70
Body mass index (kg/m^2)							
Baseline	28.98	3.81	29.85	4.54	−0.81	0.42	
Last interview	28.11	3.94	29.18	4.58	−0.97	0.34	.12
t and *p*	2.93	.01**	2.93	.05*			
Fasting blood glucose (mg/dl)							
Baseline	163.30	68.10	144.93	75.96	0.99	0.33	
Last interview	113.80	23.47	117.26	38.08	−0.42	0.67	.05
t and *p*	4.75	< .01	2.62	.01*			
HbA1c (%)							
Baseline	7.54	1.63	7.04	1.24	1.34	0.19	
Last interview	6.50	0.85	6.77	0.82	−1.23	0.22	.16
t and *p*	4.95	< .01	1.45	.16			
Systolic blood pressure (mmHg)							
Baseline	121.10	15.83	121.33	16.34	−0.06	0.96	
Last interview	122.33	11.65	124.01	13.05	−0.52	0.60	.07
t and *p*	−0.49	.63	−0.78	.44			
Diastolic blood pressure (mmHg)							
Baseline	77.66	17.94	74.66	8.60	0.83	0.41	
Last interview	78.66	7.76	78.33	8.74	0.16	0.88	.02
t and *p*	−0.32	.75	−2.08	.05*			
Total cholesterol (mg/dl)							
Baseline	183.96	51.36	169.90	44.15	1.14	0.26	
Last interview	155.46	31.79	158.33	35.71	−0.33	0.74	.04
t and *p*	4.33	< .01	1.38	.18			
Triglyceride (mg/dl)							
Baseline	219.80	177.66	201.06	60.88	1.09	0.17	
Last interview	157.63	68.68	137.13	60.37	1.23	0.23	.16
t and *p*	2.72	.01*	0.86	.40			
LDL cholesterol (mg/dl)							
Baseline	109.76	38.25	98.26	35.89	1.20	0.24	
Last interview	85.33	18.98	87.13	28.79	−0.29	0.78	.04
t and *p*	4.26	< .01	1.77	.09			
HDL cholesterol (mg/dl)							
Baseline	36.86	10.22	41.50	11.58	−1.64	0.11	
Last interview	37.96	8.96	40.66	10.39	−1.08	0.28	.13
t and *p*	−0.95	.35	0.56	.58			

Note. LDL = low-density lipoprotein; HDL = high-density lipoprotein.
[a] Student *t* test. [b] Paired sample *t* test.
*$p < .05$. **$p < .01$.

needs of the intervention group were evaluated. Long-term randomized controlled trials can provide more information about the effect of nursing counseling on metabolic parameters.

Conclusion

Nursing counseling provided to patients who received surgical treatment for ACS and who were newly diagnosed with

diabetes that aligns with their learning needs can positively affect treatment compliance.

Relevance to Clinical Practice

Nurses should prioritize identifying the learning needs of newly diagnosed patients. It is highly important to make tailored plans for patients receiving surgery for ACS who are

newly diagnosed with diabetes that align with their needs during the discharge phase and then to provide training and counseling services and follow-up after discharge. In addition to nurse trainers working in health institutions, nursing counseling units should be established in which specialist nurses are employed to support a follow-up system for newly diagnosed patients and create a service network through which patients/patients' relatives may access desired information. In addition, randomized controlled studies should be conducted on the effect of nurse counseling on the process of repeated admission to health institutions and the cost of health services borne by newly diagnosed diabetic patients with ACS.

Author Contributions:

Study conception and design: SC, FTY
Data collection: SG, MT
Data analysis and interpretation: FTY, SC
Drafting of the article: FTY, SC, SG
Critical revision of the article: SC, FTY, MT

*Address correspondence to: Selda CELIK, PhD, RN, Hamidiye Faculty of Nursing, University of Health Sciences Turkey, Mekteb-i Tıbbiye-i Sahane (Hamidiye) Kulliyesi Selimiye Mah., Tıbbiye 3834668, Uskudar, Istanbul, Turkey. Tel: +90-5332253856; E-mail: selda.celik@sbu.edu.tr
The authors declare no conflicts of interest.

References

Azami, G., Soh, K. L., Sazlina, S. G., Salmiah, M. S., Aazami, S., Mozafari, M., & Taghinejad, H. (2018). Effect of a nurse-led diabetes self-management education program on glycosylated hemoglobin among adults with Type 2 diabetes. *Journal of Diabetes Research, 2018*, Article ID 4930157. https://doi.org/10.1155/2018/4930157

Baraz, S., Zarea, K., & Shahbazian, H. B. (2017). Impact of the self-care education program on quality of life in patients with type II diabetes. *Diabetes & Metabolic Syndrome: Clinical Research & Reviews, 11*(2, Suppl.), S1065–S1068. https://doi.org/10.1016/j.dsx.2017.07.043

Bhatt, D. L., Lopes, R. D., & Harrington, R. A. (2022). Diagnosis and treatment of acute coronary syndromes: A review. *JAMA, 327*(7), 662–675. https://doi.org/10.1001/jama.2022.0358

Bien, A., Rzonca, E., Kańczugowska, A., & Iwanowicz-Palus, G. (2016). Factors affecting the quality of life and the illness acceptance of pregnant women with diabetes. *International Journal of Environmental Research and Public Health, 13*(1), Article 68. https://doi.org/10.3390/ijerph13010068

Bubela, N., Galloway, S., McCay, E., McKibbon, A., Nagle, L., Pringle, D., Ross, E., & Shamian, J. (1990). The Patient Learning Needs Scale: Reliability and validity. *Journal of Advanced Nursing, 15*(10), 1181–1187. https://doi.org/10.1111/j.1365-2648.1990.tb01711.x

Catal, E., & Dicle, A. (2008). A validity and reliability study of the Patient Learning Needs Scale in Turkey. *Journal of Dokuz Eylül University School of Nursing, 1*(1), 19–32. (Original work published in Turkish)

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Lawrence Erlbaum Associates.

Debussche, X., Rollot, O., Le Pommelet, C., Fianu, A., Le Moullec, N., Régnier, C., Boyer, M. C., Cogne, M., Bakiri, F., Schwager, J. C., & Favier, F. (2012). Quarterly individual outpatients lifestyle counseling after initial inpatients education on Type 2 diabetes: The REDIA Prev-2 randomized controlled trial in Reunion Island. *Diabetes & Metabolism, 38*(1), 46–53. https://doi.org/10.1016/j.diabet.2011.07.002

Demirtas, A., & Akbayrak, N. (2017). Development of an assessment scale for treatment compliance in Type 2 diabetes mellitus in Turkish population: Psychometric evaluation. *International Journal of Nursing Sciences, 4*(3), 244–251. https://doi.org/10.1016/j.ijnss.2017.06.002

Des Jarlais, D. C., Lyles, C., Crepaz, N., & the TREND Group. (2004). Improving the reporting quality of nonrandomized evaluations of behavioral and public health interventions: The TREND statement. *American Journal of Public Health, 94*, 361–366. https://doi.org/10.2105/AJPH.94.3.361

Doğan, M. D., Çadırlı, Ş., Paçaçı, M., & Arslan, Y. (2019). Care satisfaction and training requirements in patient with chronic disease. *Journal of Health and Nursing Management, 6*(1), 22–28. https://doi.org/10.5222/SHYD.2019.39200

Einarson, T. R., Acs, A., Ludwig, C., & Panton, U. H. (2018). Prevalence of cardiovascular disease in type 2 diabetes: A systematic literature review of scientific evidence from across the world in 2007–2017. *Cardiovascular Diabetology, 17*, Article No. 83. https://doi.org/10.1186/s12933-018-0728-6

Eşer, A. K., Doğan, E. N., Kav, S., & Bulut, Y. (2018). Evaluation of the patient compliance in type 2 diabetes mellitus treatment. *Journal of Ege University Nursing Faculty, 34*(2), 64–76. (Original work published in Turkish)

Gamboa Moreno, E., Mateo-Abad, M., Ochoa de Retana García, L., Vrotsou, K., Del Campo Pena, E., Sánchez Perez, Á., Martínez Carazo, C., Arbonies Ortiz, J. C., Rúa Portu, M. Á., Piñera Elorriaga, K., Zenarutzabeitia Pikatza, A., Urquiza Bengoa, M. N., Méndez Sanpedro, T., Oses Portu, A., Aguirre Sorondo, M. B., Rotaeche Del Campo, R., & Osakidetza Active Patient Research Group. (2019). Efficacy of a self-management education programme on patients with type 2 diabetes in primary care: A randomised controlled trial. *Primary Care Diabetes, 13*(2), 122–133. https://doi.org/10.1016/j.pcd.2018.10.001

García-Pérez, L. E., Alvarez, M., Dilla, T., Gil-Guillén, V., & Orozco-Beltrán, D. (2013). Adherence to therapies in patients with type 2 diabetes. *Diabetes Therapy, 4*(2), 175–194. https://doi.org/10.1007/s13300-013-0034-y

Gedük, E. A. (2018). Developing roles of the nursing profession. *Archives of Health Science and Research, 5*(2), 253–258. https://doi.org/10.17681/hsp.358458

IDF Diabetes Atlas. (2023). *IDF diabetes atlas reports*. https://diabetesatlas.org/atlas-reports/

Kin, O. K., & Tureyen, A. (2022). The effect of diabetes education based on learning modality in individuals with diabetes incompatible with treatment on compliance and metabolic goals: A randomized controlled trial. *Primary Care Diabetes, 16*(1), 150–155. https://doi.org/10.1016/j.pcd.2021.12.006

Liu, X. L., Shi, Y., Willis, K., Wu, C. J., & Johnson, M. (2017). Health education for patients with acute coronary syndrome and type 2 diabetes mellitus: An umbrella review of systematic reviews and meta-analyses. *BMJ Open*, *7*(10), Article e016857. https://doi.org/10.1136/bmjopen-2017-016857

Macido, A. (2019). A nurse-led inpatient diabetes self-management education and support program to improve patient knowledge and treatment adherence. *Journal of Health Education Teaching*, *10*(1), 1–10.

Martos-Cabrera, M. B., Gómez-Urquiza, J. L., Cañadas-González, G., Romero-Bejar, J. L., Suleiman-Martos, N., Cañadas-De la Fuente, G. A., & Albendín-García, L. (2021). Nursing-intense health education intervention for persons with type 2 diabetes: A quasi-experimental study. *Healthcare*, *9*, Article 832. https://doi.org/10.3390/healthcare9070832

Mons, U., Raum, E., Krämer, H. U., Rüter, G., Rothenbacher, D., Rosemann, T., Szecsenyi, J., & Brenner, H. (2013). Effectiveness of a supportive telephone counseling intervention in type 2 diabetes patients: randomized controlled study. *PLOS ONE*, *8*(10), Article e77954. https://doi.org/10.1371/journal.pone.0077954

Mortuza, R., & Chakrabarti, S. (2014). Glucose-induced cell signaling in the pathogenesis of diabetic cardiomyopathy. *Heart Failure Reviews*, *19*(1), 75–86. https://doi.org/10.1007/s10741-013-9381-z

Qasim, R., Masih, S., Hussain, M., Ali, A., Khan, A., Shah, Y., Shah, H., & Yousafzai, M. T. (2019). Effect of diabetic counseling based on conversation map as compared to routine counseling on diabetes management self-efficacy and diabetic distress among patients with diabetes in Pakistan: A randomized controlled trial (study protocol). *BMC Public Health*, *19*, Article No. 907. https://doi.org/10.1186/s12889-019-7266-3

Saritaş, S., Erci, B., & Boyraz, A. (2018). Post-discharge learning needs of patients undergoing coronary artery bypass grafting. *Journal of Academic Research in Nursing*, *4*(3), 142–147.

Simsek, A. K., & Alpar, S. E. (2020). Determination of risk factors in patients with acute coronary syndrome. *Turkish Journal of Cardiovascular Nursing*, *11*(25), 82–89. (Original work published in Turkish)

Tang, L., Li, K., & Wu, C. J. (2020). Thirty-day readmission, length of stay and self-management behaviour among patients with acute coronary syndrome and type 2 diabetes mellitus: A scoping review. *Journal of Clinical Nursing*, *29*(3–4), 320–329. https://doi.org/10.1111/jocn.15087

Taskin Yilmaz, F., Aldemir, K., & Yildiz, E. (2019). The discharge related education needs of inpatients being treated in the internal diseases clinic and affecting factors. *International Journal of Caring Sciences*, *12*(3), 1658–1665.

Tavakol Moghadam, S., Najafi, S. S., & Yektatalab, S. (2018). The effect of self-care education on emotional intelligence and HbA1c level in patients with type 2 diabetes mellitus: A randomized controlled clinical trial. *International Journal of Community Based Nursing & Midwifery*, *6*(1), 39–46.

The Society of Endocrinology and Metabolism of Turkey. (2022). *Clinical practice guideline for diagnosis, treatment and follow-up of diabetes mellitus and its complications—2022, 15th edition, Ankara.* https://file.temd.org.tr/Uploads/publications/guides/documents/diabetes-mellitus_2022.pdf

Usta, M., Sakin, A., Sakin, A., Celik, K., Ozturk, S., Ayer, F. A., Gurkan, Y., Ulusoy, M., Yigit, N., & Feyizoğlu, H. (2015). Evaluation of risk factors and laboratory parameters in patients of acute coronary syndrome. *Smyrna Medical Journal*, *2015*(2), 5–11.

Wu, C. J., Atherton, J. J., MacIsaac, R. J., Courtney, M., Chang, A. M., Thompson, D. R., Kostner, K., MacIsaac, A. I., d'Emden, M., Graves, N., & McPhail, S. M. (2017). Effectiveness of the cardiac-diabetes transcare program: Protocol for a randomised controlled trial. *BMC Health Services Research*, *17*(1), Article No. 109. https://doi.org/10.1186/s12913-017-2043-4

Yu, X., Chau, J. P. C., Huo, L., Li, X., Wang, D., Wu, H., & Zhang, Y. (2022). The effects of a nurse-led integrative medicine-based structured education program on self-management behaviors among individuals with newly diagnosed type 2 diabetes: A randomized controlled trial. *BMC Nursing*, *21*(1), Article No. 217. https://doi.org/10.1186/s12912-022-00970-7