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Effects of Home Visits on Medication Adherence of Elderly Individuals with Diabetes and Hypertension

Ozlem Sinan[1*], Aygul Akyuz[2]

[1]Department of Nursing, Faculty of Health Sciences, Ankara Yıldırım Beyazıt University, Ankara, Turkey
[2]School of Nursing, Koç University, Istanbul, Turkey

ABSTRACT

This research was a pre-final measured quasi-experimental study evaluating the effects of home visits aimed at increasing the medication adherence of elderly individuals with diabetes and hypertension. The research was carried out in the private homes of elderly individuals, who were then followed up by staff of the Geriatrics Polyclinic. The study subjects were elderly individuals with diabetes and hypertension who met the research criteria (n = 45). The data were collected with the data collection form prepared in accordance with the literature, a form to determine drug use status in the elderly, and the Medication Adherence Self-Efficacy Scale-Short Form. Two home visits were conducted for each patient. During these home visits, the individuals were educated regarding their medications, and their medication adherence levels were evaluated both before and after the education. The study results demonstrated that the medication adherence levels of the subjects increased after the first home visit. The subjects also became more aware of the important points regarding the medicines they were using, as demonstrated by a statistically significant difference in the average HbA1c values after the home visits ($p<0.05$). This study revealed that the provision of patient education via home visits is quite effective in creating awareness about medications and increasing the adherence level of elderly individuals' medication adherence. The results suggest that home visits should be planned for patients in a given period, and that nurses should take an active role in these home visits.

Key Words: Elderly individual, home visit, medication adherence, nursing

Introduction

In elderly individuals, the number of chronic diseases gradually increases, and the chronic diseases gradually increase in severity so that they become a significant cause of morbidity and mortality (1). Multiple chronic diseases are very common in elderly individuals, and require the use of numerous medications. Diabetes and hypertension are important chronic diseases, and their prevalence increases with patient age. In addition, these two illnesses tend to occur together, especially in elderly individuals. It has been shown that, due to chronic diseases, elderly individuals use the most medications among all age groups, and that most elderly individuals use three or more medications simultaneously (2).

Medication adherence among elderly individuals is a very important matter due to their decreasing cognitive functional capacity and multiple medication usage. Medication adherence is defined as the level of patient obedience with respect to the advice of the doctor regarding prescribed medications. Medication non-adherence is defined as incorrect usage or misusage or less or more usage of medications (3,4). Medication non-adherence of elderly individuals is considered responsible for failure of treatment, development of complications, increase in patients' health expenses, and premature death (5,6,7). Therefore, the facilitation of medication adherence in elderly individuals is important for preventing disease progression and possible complications.

Elderly individuals who have chronic diseases are at greater risk for possible medication usage problems while they continue their medication treatment in their own homes. Educating elderly individuals on medication adherence only at hospitals is not sufficient. Continuation of the education via home visits and follow-up is also required (8,9,10). Nurses provide patient care services to elderly individuals via their consultancy, guidance and tutor roles (11,12). Therefore, nurses working with elderly individuals should evaluate their patients' medication usage environment constantly to assess the factors that

*Corresponding Author: Ozlem Sınan, Department of Nursing, Faculty of Health Sciences, Ankara Yıldırım Beyazıt University, Ankara, Turkey
E-mail: ozlemozdemir310@gmail.com, Phone: +90 (532) 207 83 53, Fax: +90 (312) 321 87 46
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Table 1. Sociodemographic and treatment qualifications of elderly individuals (n=45)

	N	%
Age ($\overline{X}$ ±SS=74.6±6.31)		
65–74	21	46.7
75–88	24	53.3
Gender		
Male	16	35.6
Female	29	64.4
Marital status		
Married	31	67.9
Single (Widowed)	14	31.1
Educational status		
Literate	3	6.7
Primary school graduate	19	42.2
Secondary/High school graduate	14	31.1
College/University and more	9	20.0
People subject lives with		
With only wife/husband	29	64.4
Alone	8	17.8
With family	8	17.7
Existence of person who follows up treatment		
Yes	20	44.4
No	25	55.6
Existence of other chronic disease		
Yes	24	53.3
No	21	46.7
Being careful about diet suitable to illness		
Yes	26	57.8
No	19	42.2
Number (type) of medicines used for hypertension treatment		
One	22	60.0
Two	15	33.3
Three	3	6.7
Number (type) of medicines used for diabetes treatment		
One	22	48.9
Two	17	37.8
Three	6	13.3
Number (type) of medicines used in total		
4-7	36	80.0
8-11	9	20.0
Condition of exercising at least 10–15 min in a day		
Never	29	64.4
1–2 times in a week	11	24.4
Almost every day	5	11.1

Table 2. Comparison between Medication Adherence Self-Efficacy Scale Short-Form score, Medication usage adherence score, Hypertension medication usage adherence score and Diabetes medication usage adherence score averages with respect to elderly individuals' home visits (n=45)

	First Home Visit		Second Home Visit			
	$\overline{X}$	SS	$\overline{X}$	SS	z*	p
MASES-SF score	44.4	7.98	51.1	3.27	4.768	<0.001
Medication usage adherence score	2.78	0.33	3.00	0.00	4.376	<0.001
Hypertension medication usage adherence score	2.85	0.46	3.00	0.00	2.032	0.042
Diabetes medication usage adherence score	2.85	0.40	3.00	0.00	2.207	0.027

affect adherence to treatment (13). For this reason, the continuation of elderly individuals' education and follow-up home visits are important. The main objective of this pre-final measured quasi-experimental study was to evaluate the effects of home visits conducted to increase the medication adherence of elderly individuals.

Material and Methods

Study participants: This study was carried out in the private homes of elderly individuals of age ≥ 65 years who lived in the Ankara city center, with follow-up by staff from the Geriatrics Polyclinic. The study included patients who received follow-up by Geriatrics Polyclinic staff from September 2012 through March 2013. The patients were using multiple medications due to having both diabetes and chronic hypertension. The staff of the Geriatrics Polyclinic includes 4 physicians, 5 nurses, 2 social workers, and 10 other health personnel who provide services related to diagnosis, treatment, and follow-up for 20 patients per day who are approximately of age ≥ 65 years. The unit serves as an outpatient clinic. During the Polyclinic service given to elderly patients, all drugs used by the individuals are evaluated and the patients are given pertinent information relating to their medications. Information is obtained on the contact information, diagnosis and treatment of the patients who are served in the geriatrics outpatient clinic, and the geriatric evaluation results are recorded in the patients' files.

In this study, sample selection was not performed; instead of sample selection, all the patients who met the research criteria were followed up by the Polyclinic. The study was conducted in patients who had hypertension (systolic blood pressure ≥ 140 mmHg; diastolic blood pressure ≥ 90 mmHg) and diabetes. The criteria for presence of diabetes included, in addition to diabetes-specific symptoms (polyuria, polydipsia, unexplained weight loss etc.), plasma glucose level at any time of day ≥ 200 mg/dL, or fasting plasma glucose ≥126 mg/dL, or 2-hour plasma glucose (obtained during oral glucose tolerance test) ≥ 200 mg/dL, or HbA1c ≥ 6.5%. Other criteria for patient inclusion were use of least 4 medications for at least 6 months, ability to read and write in Turkish, ability to follow up his/her treatment himself/herself, acceptance of both home visits and participation in this research project, and scoring ≥ 24 points on the Standardized Mini-Mental State Examination (SMMSE). Exclusion criteria were refusal to participate in this research project, diagnosis of dementia or Alzheimer's disease, and being both blind and deaf. Among 63 study candidates, 15 patients refused to participate in the study, and 3 patients were unable to complete it. Therefore, this study was conducted in 45 elderly individuals who met the research criteria. Approval was obtained from the Gulhane Military Medical Academy Ethics Committee (2012–08). The participants were informed of the purpose of the research and confidentiality was assured.

Measurements: Sociodemographic Attributes and Treatment Characteristics Form for Elderly Individuals

This form consists of questions related to sociodemographic attributes and treatment characteristics of individual subjects.

Medication Adherence Self-Efficacy Scale Short-Form (MASES-SF)

The MASES-SF is an assessment tool used to determine medication adherence using a self-efficacy scale in hypertensive individuals (14). The MASES was developed by Ogedegbe et al. (15) as a 26-item scale based on a sample of hypertensive Americans in 2003. In the present study, the Turkish version of the MASES-SF was used as prepared and revised by Hacıhasanoglu et al. (16). The range of scores of the MASES-SF is 13–52. A high score indicates a hypertensive individual's high level of adherence to antihypertensive treatment. A Cronbach alpha value of 0.94 indicates a scale's validity and reliability (16); in the present study, the Cronbach value was calculated as 0.99.

Table 3. Comparison between medicine knowledge score and medication forgetfulness score averages respect to elderly individuals' home visits (n=45)

	First Home Visit		Second Home Visit			
Score type	$\overline{X}$	SS	$\overline{X}$	SS	z*	p
Recognizing name of the medicine	89.1	23.07	98.51	9.94	2.366	0.018
Indicating pillbox	96.31	14.02	100.0	0.00	1.826	0.068
Using medicines for last two weeks without forgetting	96.85	15.41	100.0	0.00	1.604	0.109
Being aware of important points to consider about medicines	51.1	35.27	100.0	0.00	5.171	<0.001

Medication-Use Identification Form for Elderly Individuals

This form was developed through research by the investigators of the present study, and has been used to transform elderly individuals' medication usage evaluation results into objective data. The form is completed through patient observation and interviews. The form has 8 parameters for each medicine used by a patient: recognizing the name of the medicine, recognizing/indicating the medicine container, knowing the daily dosage of the medicine, knowing the medication usage frequency per day, knowing the medication time/hour, not forgetting to take the medication during the past 2 weeks, awareness of the most important points to consider about a medication (such as possible side effects, best time of day to take the medicine, whether to take the medicine with food, etc.), if any, and knowing the right way to store the medicine.

HbA1c value

The hemoglobin A1c (HbA1c) value is one of the vital indicators of the effectiveness of diabetes treatment. To analyze the relationship between medication adherence and metabolic control (17), HbA1c values before the first home visit and after the second visit were recorded. The time period between the two measurements was approximately 3 months.

Data collection: This study was performed in four steps. Four weeks after interviewing the study subjects in the Geriatrics Polyclinic, the first home visit was conducted. Then, four weeks after the first home visit, the second home visit was conducted.

Step 1: Geriatrics Polyclinic. Medical records were reviewed to determine possible candidates for the study. Data were collected on demographic information, diagnosis, medications, SMMSE, address, and patient contact information. Detailed information on medication treatment was collected on the patients who agreed to participate in the study. The investigator met with the physician of each study patient to prepare the educational plan for the home visits.

Step 2: First Home Visit. The first observation and interview were conducted, and the MASAS-SF was administered. The Medication-Use Identification Form for Elderly Individuals was also administered, which asked the subjects to indicate all the medicines they were using.

Step 3: Second Home Visit. The MASAS-SF and the Medication-Use Identification Form for Elderly Individuals were administered a second time to determine if any change had occurred in the subjects' medication adherence after they received the education at the first home visit.

Step 4: Geriatrics Polyclinic. The HbA1c values of the study subjects were obtained from the Polyclinic's routine blood measurement results from the patient files.

Statistical analyses: SPSS version 15.0 (SPSS Inc., Chicago, IL, USA) was used to analyze the data. Values of $p < 0.05$ were accepted as significant. The χ^2 test was used for statistical comparison of discrete variants, and the Wilcoxon signed-rank test and the paired sample t-test were used for before-after comparisons. Correlation analysis and the Spearman rank correlation were used to determine the direction and intensity of relationships between variables.

Results

Table 1 provides the study subjects' sociodemographic information and data relating to the study inclusion criteria. The subjects' average age was 74.6±6.31 years, with 53.3% of the subjects in the 75-88 age group. Women comprised 64.4% of the study participants, and 64.4% of the subjects lived with their spouse. It was found that 80% of the subjects used 4–7 medicines per day and 20% of the subjects used 8-

Table 4. Comparison between pre-first home visit HbA1c average values and post-second home visit HbA1c average values (n=21)**

	$\overline{X}$	SS	t*	p
Pre-first home visit HbA1c value	7.52	1.45	2.654	0.015
Post-second home visit HbA1c value	7.09	1.39		

11 medicines per day. Among the participants, 66.7% of the subjects did not use insulin, 24.4% had chronic heart failure, 17.8% had hyperlipidemia, 13.3% had osteoporosis, 6.7% had prostate disease, and 4.4% had goiter (data not shown).

Table 2 shows that the average MASES-SF score was 44.4±7.98 out of 52 possible points at the first home visit. The mean adherence scores for medication usage, hypertension medication usage, and diabetes medication usage at the first home visit were 2.78± 0.33, 2.85± 0.46 and 2.85± 0.40, respectively, all out of 3 possible points. At the second home visit, the mean MASES-SF score and the mean adherence scores for medication usage, hypertension medication usage, and diabetes medication usage were 51.1±3.27 (out of 52 possible points), 3.00±0.00, 3.00±0.00 and 3.00±0.00, respectively (each out of 3 possible points). All of these scores were higher at the second home visit than at the first home visit. The differences in the mean score values between the first and second home visits was statistically significant ($p<0.05$). The difference between the mean value of the MASES-SF adherence score at the first and second home visit was greatly statistically significant ($z=4.768$, $p<0.001$). There was also great statistical significance in the difference between total medication usage between the first and second home visits ($z=4.376$, $p<0.001$) (Table 2).

No statistically significant differences could be detected between medication adherence scores and other factors such as the MASES-SF score at the first home visit, and age, sex, marital status, number of medicines used, existence of person who followed up on treatment other than the patient himself/herself, or suitable diet with respect to the disease. In comparing the MASES-SF scores between the first and second home visits, there was found to be only a negative correlation ($r=-0.314$, $p=0.036$) between the MASES-SF scores and the number (type) of medicines the subjects were using ($p<0.05$). Hence, the subjects' medication usage scores reached their top limits at the second home visit; statistical evaluation on this aspect could not be performed.

(Insert Table 3 about here)

As can be seen in Table 3, all score averages (recognizing name of the medicine, knowing the location of the medicine container, not forgetting to take medicines in the past two weeks, and awareness of the most important points to consider (if any) at the second home visit were higher than the average scores at the first home visit. The difference between "recognizing name of the medicine" score averages between the two home visits was found to be statistically significant ($p=0.018$), and a statistically significant difference was also found in "being aware of most important points to consider" score averages ($z=5.171$, $p<0.001$) between the two home visits.

[Insert Table 4 about here]There was a statistically significant difference between the pre-first home visit HbA1c average values and the final HbA1c average values ($t = 2.654$, $p=0.015$).

Discussion

In this study, two home visits were conducted to increase elderly individuals' medication adherence and also to educate elderly individuals about their medicine treatment plans and about important points for which they needed to be careful regarding their medicines. The average MASES-SF score of the study subjects was 44.4±7.98 out of 52 possible points at the first home visit and 51.1±3.27 at the second home visit (Table 2). The MASAS-SF scores at the first home visit, which were measured before the patients received their education, were low, but not very low. The reason that the subjects' initial MASAS-SF scores could be considered as relatively high was that patients are provided with information about their medications as a matter of routine during visits to the Geriatrics Polyclinic, and the study subjects had already had appointments at the Geriatrics Polyclinic before the first home visit.

According to data collected from the second home visits, the subjects' scores increased for medication adherence, medication usage, hypertension medication usage, and diabetes medication usage (Table 2). These results show that providing education and raising awareness about medications via home visits are effective in

increasing elderly individuals' medication adherence. The literature also supports this result (11,18). Lowe et al. (19) conducted 3 home visits to elderly individuals who used at least 3 medicines to determine the effects of an education program on medication adherence. One group was educated about medicine treatments during home visits, whereas a second group was not educated. Two months after the education, the medication adherence level of the control group was 79.5%, whereas the rate increased to 91.3% in the educated group. This result showed that educating elderly individuals is quite effective in increasing their medication adherence level. The higher the number (type) of medicines used by elderly individuals, the lower their MASES-SF scores become. This finding leads to the conclusion that elderly individuals do learn more about the medicines they use via education given at a first home visit, but as the number of medicines increases, the learning process becomes harder. A randomized control study showed that elderly individuals who were trained and followed for 6 months had a significant increase in treatment compliance and a significant decrease in blood pressure (20).

In the present study, the average scores of recognizing name of the medicine, indicating the location of the medicine container, not forgetting to take the medication during the past 2 weeks, and being aware of the most important points to consider were higher after the second home visit than before the first home visit (Table 3). This result indicates that with education, the knowledge of elderly individuals about their medication increases. It is conjectured that the main reason that the scores were lower for recognizing the names of the medicines was the foreign names of the medicines, making the names harder to remember. In a study by Tokem and Karadakoven (21), which was conducted in elderly individuals with at least one chronic disease, elderly individuals were educated about name of the medicine, dosage, purpose of usage, side effects, storage conditions, and important points related to usage; at 3 weeks after the education, the knowledge level of elderly individuals related to their medicines increased. Another study that examined the effect of elderly individuals' education on medication management demonstrated that elderly individuals' scores for recognizing medicine names, awareness of important side effects, and knowledge of important points of the medications were significantly higher than their pre-education scores (22).

In the present study, the subjects' HbA1c mean values over an interval of 3 months were evaluated, beginning at prior to the first home visit and then again after 3 months. A difference was found in the subjects' HbA1c average values between the time just prior to the first home visit ($\overline{X}$ ±SS=7.52±1.45) and after the second home visit ($\overline{X}$ ±SS=7.09±1.39). The subjects' HbA1c values decreased after the first home visit ($p<0.05$). This finding indicates that home visits increase the medication adherence of elderly individuals; therefore, home visits have a positive effect on the treatment process. Studies indicate that good glycemic control decreases the complications of diabetes. It has been shown that a 1% decrease in the HbA1c level produces a 21% decrease in all complications related to diabetes, a 27% decrease in all deaths related to diabetes, a 14% decrease in myocardial infarction, and a 37% decrease in microvascular complications that result from diabetes (23,24). These dramatic decreases in the complications of diabetes produced by good glycemic control demonstrate that every effort to increase the medication adherence of elderly individuals is important.

In the present study, the medication adherence of elderly individuals and their knowledge regarding the names of their medications and what needs be considered related to their medications increased, and the HbA1c values decreased after one home visit. Therefore, education provided at a home visit was found to be effective in increasing the medication adherence of elderly patients and produced positive effects on their treatment process and glycemic control.

Application area of the research has been limited by elderly individuals who live in Ankara city center due to reasons such as transportation, financial matters and shortness of prospective follow-up period. This research did not take into consider medicines which were prescribed by different doctors and was not indicated mentioned records. Because of this reason only medicines, which were prescribed and recorded by Geriatrics Polyclinic doctor, were taken into consideration during the process of evaluating elderly individuals' medication adherence.

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