

Original Article

The Effect of Individualized Drug Education on Medication Adherence among Patients Using Biologic Drugs

Serap Korkmaz, RN, MSc, PhD(c)

Gulhane Military Medical Academy, School of Nursing, Ankara, Turkey

Sevinc Tastan, RN, PhD

Associate Professor, Gulhane Military Medical Academy, School of Nursing, Ankara, Turkey

Salih Pay, MD, PhD

Professor, Gulhane Military Medical Academy, Rheumatology Department, Ankara, Turkey

Correspondence: Serap Korkmaz, PhD Student, Gulhane Military Medical Academy, School of Nursing, Ankara/Turkey, E-mail: serapsariman@hotmail.com

Abstract

Introduction: Biologic drugs are currently used extensively in a number of clinical areas for the initial treatment of rheumatic diseases. When these patients fail to follow their treatment plans, they may experience serious disease. Patient education is important for promoting adherence to treatment. This study aimed to investigate the effect of individualized drug education on medication adherence among patients using biologic drugs.

Methods: Included 60 patients using biologic drugs, including 30 patients receiving subcutaneous drugs and 30 patients receiving intravenous drugs. The data collection tools were the Introductory Information Form, the Modified Morisky Scale (MMS) and The World Health Organization-Five Well-Being Index (WHO-5). The patients were then given education related to their prescribed drugs.

Results: After education, significant increases in MMS knowledge level was observed among patients using intravenous biologic drugs and significant increases in MMS knowledge and motivation levels were observed among patients using subcutaneous biologic drugs.

Conclusion: Based on the study results, individualized drug education exerts positive effects on patient quality of life and drug adherence.

Keywords: Biologic drugs, individualized drug education, medication adherence.

Introduction

Biologic drugs are currently used extensively in a number of clinical areas for the initial treatment of rheumatic diseases. Biologic drugs that are used to treat rheumatic complaints may also prevent joint damage and reduce future illness severity (Larsson, Arvidsson, Bergman, & Arvidsson, 2010; Powell, 2005; Ryan, 2007). Non-steroidal anti-inflammatory drugs (NSAIDs), and corticosteroids that modify the disease can be used in combination with biologic drug treatments (Leff, 2006).

Patient education is important for promoting adherence to treatment. The main purpose of patient education is to change behavior caused by

a lack of information in a positive direction (Makelainen et al., 2009). Providing patients with education about their disease and treatment plan increases medication adherence. If a patient is prescribed a self-administered subcutaneous drug, that patient should be given education about the drug's storage, the route of administration, the disposal of used materials, and instructions for recording the date and the time of administration (Ryan, 2007). Today, some news stories about treatments are published in newspapers on television and on the internet and may create questions for patients. Nurses should provide patients with knowledge and educational material that provides accurate

answers about their treatment (Ryan, 2007; Furfaro, 2011)

Individuals who have rheumatic diseases undergo medical treatment for a long period of time. When these patients fail to follow their treatment plans, they may experience symptoms of disease. For this reason, education programs that aim to promote medication adherence among patients who use biologic drugs should take into account the patient's individual characteristics. In a qualitative study that investigated drug adherence among rheumatoid arthritis patients, Stamer et al. stated that drugs cause different adverse effects in different patients due to the patients' negative impressions of the drug. Those authors emphasized the necessity of providing education based on the patient's needs because individuals undergo treatment with different drugs and experience different obstacles. Moreover, those authors underlined the necessity of using clear language to increase drug adherence (Stamer, 2013)

Previous studies proposed that individualized education impacts adherence to drug treatment among patients with different illnesses (Hacihasanoglu, Yildirim, & Karakurt, 2010). However, no studies of the effectiveness of individualized patient education among patients who have rheumatologic diseases and are using subcutaneous and intravenous biologic drugs are currently available. The purpose of this study was to fill this knowledge gap and provide scientific data related to this subject.

Methodology

Study Method

This study employed a pre-test post-test design and aimed to evaluate the impact of individualized biologic drug education on medication adherence.

Research Survey and Sample

Patients using subcutaneous (e.g., adalimumab, etanercept, canakinumab, and golimumab) and intravenous (e.g., abatacept, tocilizumab, rituximab, and infliximab) biologic medications who were admitted to the Rheumatology Department of Training and Research Hospital between January and June 2014, met the inclusion criteria for this study and underwent treatment for at least 2 months constituted the study sample. To be eligible for the study, the

participants were required to meet the following criteria. The patients were required to use biologic drugs for at least 2 months, consent to be included in the study, have no health problems that prevented communication, and be 18 years of age or older.

Data Collection Tools

The data collection tools that were employed to obtain the study data consisted of two parts. In the first part, the participants provided some introductory characteristics by answering 18 questions (i.e., patients' age, gender, education level, marital status, allergy state, drugs used, people living in the same household, etc.) and answered 26 questions to determine their knowledge concerning their disease and their drug usage status (i.e., diagnosis, the level of knowledge about illness, adverse effects of drugs, the level of knowledge about storage conditions, the status of reading prescription information, etc.). The second part consisted of the Modified Morisky Scale (MMS) and the World Health Organization-Five Well-Being Index WHO-5.

While the study was being planned, training material for patients was prepared by researchers based on the pharmaceutical literature and drug information guides. The training material included the patient's diagnosis, the patient's current medications, the purpose of medication therapy, the type of drug usage (i.e., dosing frequencies and drug schedule), whether the drug administration was subcutaneous, explanations of the routes of administration and instructions for use with pictures, the drug's interactions with other drugs, the adverse effects of the drugs, and the storage conditions of the drugs. Great care was taken to ensure that the information provided in the training material was easy to read and understandable.

Modified Morisky Scale

Morisky and colleagues developed a questionnaire to assess adherence to antihypertensive treatment (Morisky et al., 1983). This scale has also been used for other diseases, such as diabetes mellitus, HIV, etc. The Modified Morisky four-item scale has been used to assess patient adherence, and two new items were added by the Case Management Society of America ('Case Management Society of America,'2004; Powell, 2005).

This questionnaire determines whether low adherence is related to knowledge or motivation. All questions on the scale are answered in a "yes" or "no" format. During assessment, "yes" is a score of 1, "no" is a score of 0 for questions 2 and 5; for the remaining questions, "yes" is a score of 0 and "no" is a score of 1. If a patient's total score is 0 to 1 for questions 1, 2 and 6, the motivation domain is scored as low-level. If the score is >1 for questions 1, 2 and 6, the motivation domain is scored as high-level. If a patient's total score is 0 to 1 for questions 3, 4 and 5, the knowledge domain is scored as low-level. If the score is >1 for questions 3, 4 and 5, the knowledge domain is scored as high-level (Powell, 2005; Nyugen et al., 2013) In this study, Cronbach's alpha value was 0.76.

WHO-5 Well-Being Index

The WHO-5 was described in 1998 by the WHO Regional Office in Europe. The Turkish Index of WHO-5, which was validated by Eser, consists of five questions ('World Health Organization,' 1998). The raw score is calculated by totaling the scores of the five questions. The raw score ranges from 0 to 25. A score of 0 indicates the worst possible quality of life, and a score of 25 indicates the best possible quality of life.

To acquire a percentage score ranging from 0 to 100, the raw score is multiplied by four. While 0% indicates the worst possible quality of life, 100% indicates the best possible quality of life ('World Health Organization,' 1998; Eser, 1998). In this study, the Cronbach's alpha value was defined as 0.72. Pre-execution was applied for five patients to evaluate the comprehensibility of the data collection forms. Feedback was obtained from patients about the comprehensibility of the questions on the data collection forms and scales.

Application of Research

Interviews were conducted in private rooms in the rheumatology clinic and the polyclinic between January 2014 and June 2014. Data were collected during face-to-face interviews. The first interview was conducted in the morning. The patients were introduced and informed about the study. For the study's pre-test application, the patients were asked to complete the first and second parts of the data collection process, which lasted approximately 20 minutes. The second interview was conducted in the afternoon on the same day as the first meeting. Previously

prepared educational material was provided to the patients. In addition, the patients were given individualized verbal education about subcutaneous biologic drugs. Patients using subcutaneous biologic drugs were shown practical self-administration injection techniques and informed about potential complications. The third meeting occurred three months after the second meeting. The post test was administered to patients during the last meeting. The post test includes the questions included in the second part of the data collection process. The interview was then ended, and the patients were thanked for their participation.

Data Analysis

The SPSS (SPSS Inc., Chicago, IL, USA) software program version 15.00 was used to statistically analyze the data. Frequencies, standard deviations and mean values were calculated. Furthermore, for each individual question, the difference between the pre-test and post-test findings was calculated using McNemars non-parametric test. However, the Student's t-test was used for parametric data. A P value < 0.05 was considered statistically significant.

Ethical Considerations

This study was approved by the medical ethics committee of the university hospital in which the research was performed.

Results

Patient Demographic Characteristics, Illnesses, and Drug Usage

As shown in Table 1, the majority of patients who use intravenous biologic drugs are female 60% (n=25), are primary and high school graduates 73.4% (n =22), and are married 90% (n =25). In addition, 71% (n=21) of patients have rheumatoid arthritis, 86.7% (n =26) of patients underwent treatment for one year or longer, and 63.3% (n=19) of patients mentioned having knowledge about their illness.

Among patients who used subcutaneous drugs, the average age was 38.43±9.61 years, 36.7% (n=11) were graduates of high school or higher level institutions, and 76.7% (n=23) were married.

According to Table 2, the majority of patients who used intravenous biologic drugs (63.3% (n

=19) had no knowledge about the drug. Among patients who used subcutaneous biologic drugs, 86.6% (n=26) underwent self-administered subcutaneous therapy, 63.3% (n =19) did not care about the drug expiration date, and 10% (n=3) stopped taking the drug due to a negative opinion about biologic drugs.

Drug Adherence and Quality of Life

The MMS scores of patients using intravenous and subcutaneous biologic drugs before and after education are shown in Table 3. Among patients using intravenous biologic drugs, MMS scores revealed that the patients had a higher knowledge level after education than before education; these differences were statistically significant

(p<0.001). In this study, most of patients had a high motivation level, motivation level of before and after education were similar (p>0.125).

With respect to the use of subcutaneous biologic drugs, more patients had high knowledge and motivation levels after education (p<0.001 for both).

Table 4 presents the average WHO-5 scores of patients using intravenous and subcutaneous drugs. These data demonstrated that the mean quality of life scores of patients using intravenous and subcutaneous drugs were higher after education. These differences were statistically significant (p<0.029 and P<0.001).

Figure 1. Flowchart of survey stages.

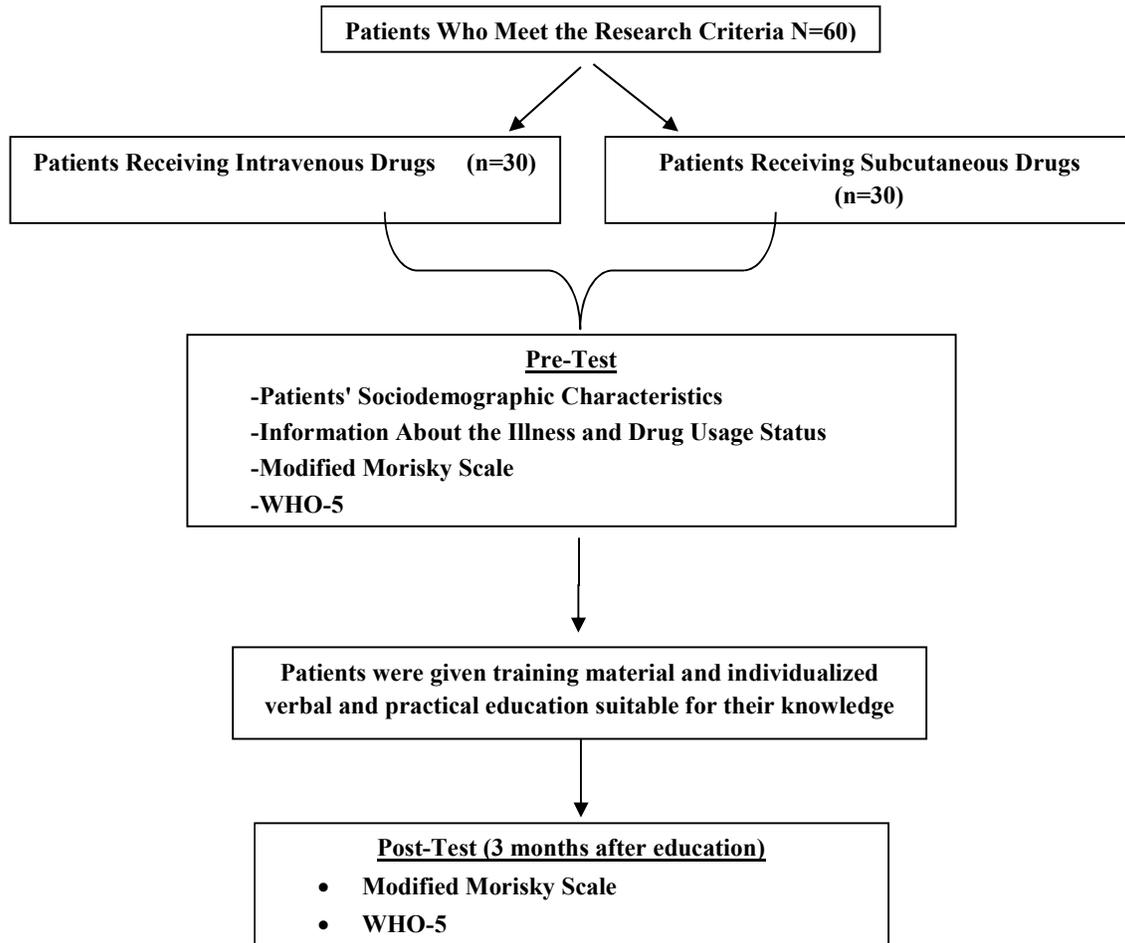


Table 1. Distribution of Sociodemographic Characteristics and Illness Findings (N:60)

	Patients Using Intravenous Biologic Medication		Patients Using Subcutaneous Biologic Medication	
	N	%	n	%
Age (M±SD)	46.93±12.45		38.43±9.61	
Gender				
Female	18	60	15	50
Male	12	40	15	50
Education				
Elementary school	11	36.7	10	33.3
High school	11	36.7	9	30
Graduate level or higher	8	26.6	11	36.7
Marital status				
Married	27	90	23	76.7
Single	3	10	7	23.3
Clinical diagnosis				
Rheumatoid Arthritis	21	71	10	33.3
Ankylosing Spondylitis	6	20	12	40
Adult Still's Disease	-	-	1	3.3
Dermatomyositis	1	3.3	-	-
Psoriatic Arthritis	2	6.7	4	13.3
Familial Mediterranean Fever (FMF) and Ankylosing Spondylitis	-	-	1	3.3
FMF and Psoriatic Arthritis	-	-	1	3.3
Pyoderma Gangrenosum	-	-	1	3.3
Duration of therapy				
Less than one year	4	13.3	10	33.3
One year or more	26	86.7	20	66.7
Comorbidities				
Yes	12	40	4	13.3
Knowledge about illness				
Yes	19	63.3	16	53.3
No	11	36.7	14	46.7

Table 2. Information about the Illness and Drug Usage Status (N:60)

	Intravenous Drug Users		Subcutaneous Drug Users	
	n	%	n	%
Rituximab	8	26.4	-	-
Abatacept	4	15.2	-	-
Tocilizumab	6	19.8	-	-
Infliximab	12	61.4	-	-
Canakinumab	-	-	1	3.3
Etanercept	-	-	14	46.6
Adalimumab	-	-	10	33.3
Golimumab	-	-	5	16.6
Two or more drugs used for treatment of different diseases	25	83.3	22	76.6
Source of Information about the Drug				
Nurse	3	10	3	10
Doctor	6	20	2	6.6
Pharmaceutical Companies Workers	-	-	15	50
Internet	1	3.3	4	13.3
Prospectus	1	3.3	4	13.3
No knowledge	19	63.3	2	6.7
If drug is subcutaneous, who injects the drug?				
Self-Administration	-	-	26	86.6
Partner	-	-	2	6.7
Hospital	-	-	2	6.7
Has Read the Drug Prospectus	11	36.7	16	53.3
Do Not Care about the Drug Expiration Date				
Yes	11	36.7	15	50
Availability of Information about Storage Conditions				
Yes	23	76.7	27	90
Knowledge about Side Effects of the Medication				
Yes	23	76.7	19	63.3
Reason for Discontinuing the Medication				
Adverse Effects	1	3.3	1	3.3
Negative Opinion about the Drug	1	3.3	3	10

Table 3. MMS scores of patients' receiving intravenous and subcutaneous biologic drugs before and after education

Modified Morisky Scale	Intravenous					Subcutaneous				
	Pre-education		Post-education		P*	Pre-education		Post-education		P*
	n	%	n	%		n	%	n	%	
<u>Knowledge Level</u>										
Low	12	40	2	6.7	0.001	15	50	1	3.3	<0.001
High	18	60	28	93.3		15	50	29	96.7	
<u>Motivation Level</u>										
Low	8	26.6	3	10	0.125	13	43.3	2	6.7	0.001
High	22	73.4	27	90		17	56.7	28	93.3	

*McNemar test

Table 4. The average WHO-5 scores of patients receiving intravenous and subcutaneous drugs

	Intravenous (M±SD)	Subcutaneous (M±SD)
Before Education	46.13±17.31	44.66±16.27
After Education	50.93±10.81	53.46±14.19
P	P=0.029 t=2.3	P=0.001 t=3.85

*Student t-test

Discussion

The effectiveness of therapy for rheumatic diseases often depends on patient adherence (Ryan, 2007). In this study, the effect of individualized drug education on the medication adherence of individuals who were receiving biologic drugs was investigated.

Drug medication adherence is defined as taking the drug at the frequency, dose and time recommended by health workers (Cramer et al., 2008). A patient's use of more than one drug and differences in drug administration may cause non-adherence in patients ("Case Management Society of America," 2015). Koneru et al. remarked that using more than one drug negatively affects adherence (Koneru et al., 2008).

In this study, we observed that approximately 1/3 of individuals who were receiving intravenous biologic drugs and 1/2 of individuals who were receiving subcutaneous drugs lacked knowledge concerning their disease. In addition, we determined that most intravenous biologic drug users lack knowledge about the drug, do not read the drug prescribing information and do not care about the drug's expiration date. In a qualitative study concerning rheumatoid patients' expectations of nurses, individuals reported a lack of knowledge about their diseases. The patients also expressed a desire for the nurses to provide them with information about their diseases (van Eijk-Hustings et al., 2013). Talas et al. (Talas & Pinarci, 2010) stated in their study that 39.1% of individuals receiving steroid drugs lack knowledge about the drug. In a study

performed by Tokem et al. (Tokem, Taşçı, & Yılmaz, 2013) half of patients with a hypertension diagnosis did not read the drug prescribing information. Patient non-adherence to drug treatment may cause increased disease activity, a loss of function, a decline in the quality of life, recurrent hospitalization and financial losses (Rapoff, & Barlet, 2006; Kalogianni, 2011; Zwikker, H., et al., 2012)

Our observation that patients lack knowledge about their disease and their drugs prior to education is consistent with the literature. Previous studies reported that patient education increases adherence to medication and drug usage and emphasized that patient-focused education is important (Kelo, Martikainen, & Eriksson, 2013; Kaya, 2009; Sato, Ishida, & Ohuchi, 2014). The obtained results reveal the need for extensive and structured education that is planned according the needs of patients who have chronic diseases, especially diseases with remission and relapse periods.

In our study, we found that the adherence knowledge and motivation levels of individuals using subcutaneous drugs increased after education about the drug's application, adverse effects, storage conditions, control time, and expiration date. Previous studies of rheumatology patients reported that as the patients' autonomy, motivation and knowledge level increased after receiving education concerning the drug's application, storage and adverse effects, adherence to treatment improved (Makelainen, Vehvilainen-Julkunen, & Pietila, 2009); Fall, Chakroun, Dalle, & Izaute, 2013; Larsson et al., 2010; Berry, Bradlow, & Courtenay, 2008).

A previous study stated that providing written and verbal education to patients with asthma increased the patients' knowledge level, leading to disease and medication adherence (Demiralay, 2004). A study performed by Meesters and et al. (Meesters, de Boer, van den Berg, Fiocco, & Vliet Vlieland, 2011) emphasized the importance of providing education to rheumatoid arthritis patients in health care centers according to the patients' needs, particularly with respect to the patient's age and education level. In another study that investigated older individuals, the authors determined that individualized drug usage education significantly increased average knowledge scores concerning individual drug

adherence and usage (Arslan, & Eşer, 2005). The results of this study are consistent with the literature. In this study, after determining the individuals' knowledge needs, the participants were given individualized written and verbal information that was presented using comprehensible and clear statements. The observed increase in individuals' drug knowledge and motivation levels can be explained by the planning of the educational materials according to the patients' needs, the inclusion of the patients in planning and regular patient follow-up by clinic doctors and nurses.

In this study, after individualized education was given to patients using intravenous drugs, the adherence knowledge level increased but the adherence motivation level failed to increase.

In a qualitative study of adherence among hypertension patients, Alhalaiqa and et al. (Alhalaiqa, Deane, & Gray, 2013). reported that patients' motivation is low. In a study that investigated motivation among rheumatoid arthritis patients, Pascual et al. (Pascual-Ramos, 2013) reported that most patients' motivation was low. Those authors found that patients' motivation is affected negatively by a number of factors, including financial problems, health system deficiencies, challenges in the pharmacy and not following the drug's dosage schedule. Patients using intravenous drugs cannot self-administer their medication like subcutaneous drug users. Patients using intravenous drugs are required to maintain their medication by coming to the hospital at specific intervals. We believe that this type of treatment negatively affects patients' work life, daily functions and family life.

In our study, providing patients with individualized drug education increases the quality of life of patients using intravenous and subcutaneous drugs. Moreover, during individualized education, the patients' disease and adherence problems related to the drugs used during the treatment period were assessed with the patient one-on-one. Previous studies reported that giving education to rheumatoid arthritis patients increases quality of life and medication adherence (Corbacho, 2010; Stockl, 2010). In a study performed by Cottrell et al. (Cottrell, 2012), rheumatoid arthritis patients stated that nurses give more time to patients than other health workers. Nurses stated that eliminating

patients' lack of knowledge about their diseases, subcutaneous drug administration, drug storage conditions, their disease's psychosocial effects, their drug's adverse effects, and situations that may affect their lifestyle through education and that collecting feedback from patients after education increase the patients' quality of life. The results obtained from this study are consistent with the literature.

The efficiency of patient education is important for increasing medication adherence. If rheumatic diseases are not controlled, the patients may experience complications in their lives. Patients may encounter negative situations, such as not being able to work, complete responsibilities at home, or fulfill their needs. These situations negatively affect the patient's quality of life. When patient education is maintained effectively, symptoms of disease may decrease and an increased patient quality of life may be observed.

Conclusion

To reduce the symptoms of rheumatic diseases, adherence to drug treatment is important. The results of this study indicate that individualized drug education has positive effects on patient quality of life quality and drug adherence. In this study, we observed that while the knowledge and motivation levels of individuals using subcutaneous drugs are increasing, only the knowledge levels of patients using intravenous drugs are increasing. For this reason, those designing patient education programs should take into account the fact that the drug administration route affects patient medication adherence.

Future studies should evaluate individualized education via telephone counselling. Individualized drug education can be applied with a higher frequency in large and diverse sample groups. In addition, the families of patients using intravenous drugs should be provided with education. The families of patients support follow their self-care regimen more regularly and this is vital to maintaining their health. We believe that qualitative studies are needed to increase motivation.

References

Berry, D., Bradlow, A., & Courtenay, M. (2008). Patients' attitudes towards, and information needs in relation to, nurse prescribing in rheumatology. *Journal of clinical nursing*, 17(2), 266-273.

- Corbacho, M. I., & Dapuelto, J. J. (2010). Assessing the functional status and quality of life of patients with rheumatoid arthritis. *Revista brasileira de reumatologia*, 50(1), 31-43.
- Cottrell, J. E., Jonas, M., Bergsten, U., Blaas, E., Torre Aboki, J., Howse, C., . . . Lupton, T. (2012). The Nurse's Role in Addressing Unmet Treatment and Management Needs of Patients With Rheumatoid Arthritis: Delphi-Based Recommendations. *International journal of nursing knowledge*.
- Case Management Society of America (2015). Retrieved from: <http://www.nxtbook.com/naylor/CMSQ/CMSQ14/index.php#6>.
- Case Management Society of America (2004). Case management adherence guidelines. Retrieved from: www.cmsa.org/portals/0/pdf/CMAG.
- Cramer, J. A., Roy, A., Burrell, A., Fairchild, C. J., Fuldeore, M. J., Ollendorf, D. A., & Wong, P. K. (2008). Medication compliance and persistence: terminology and definitions. *Value in health*, 11(1), 44-47.
- Demiralay, R. (2004). The effects of asthma education on knowledge, behavior and morbidity in asthmatic patients. *Turkish Journal of Medical Sciences*, 34(5), 319-326.
- Eser E. (1998). WHO (Beş) İyilik Durumu İndeksi, Psychiatric Research Unit WHO Collaborating Centre in Mental Health.
- Fall, E., Chakroun, N., Dalle, N., & Izaute, M. (2013). Is patient education helpful in providing care for patients with rheumatoid arthritis? A qualitative study involving French nurses. *Nursing & health sciences*, 15(3), 346-352.
- Furfaro, N. (2011). New therapeutic options in rheumatoid arthritis: a focus on interleukin-6 blockade. *Journal of infusion nursing*, 34(2), 107-115.
- Hacihanoglu, R., Yildirim, A., & Karakurt, P. (2010). The Impact of Medication Education on Medication Management of Elderly People 65 Years and Older. *Turk J Geriatr*, 13(2), 99-104.
- Kalogianni, A. (2011). Factors affect in patient adherence to medication regimen. *Health Science Journal*, 5(3), 157-58.
- Kaya H. (2009) Patient Education and Responsibilities of the Nurse in Health Services Turkish Clinics, *J Nurs Sci* 2009, 1(1), 19-23.
- Kelo, M., Martikainen, M., & Eriksson, E. (2013). Patient education of children and their families: nurses' experiences. *Pediatric nursing*, 39(2), 71.
- Koneru, S., Kocharla, L., Higgins, G. C., Ware, A., Passo, M. H., Farhey, Y. D., Brunner, H. I. (2008). Adherence to medications in systemic lupus erythematosus. *JCR: Journal of Clinical Rheumatology*, 14(4), 195-201.
- Larsson, I., Arvidsson, S., Bergman, S., & Arvidsson, B. (2010). Patients' perceptions of drug information given by a rheumatology nurse: a

- phenomenographic study. *Musculoskeletal Care*, 8(1), 36-45.
- Leff, L. (2006). Emerging new therapies in rheumatoid arthritis: what's next for the patient? *Journal of infusion nursing*, 29(6), 326-337.
- Makelainen, P., Vehvilainen-Julkunen, K., & Pietila, A. M. (2009). Rheumatoid arthritis patients' knowledge of the disease and its treatments: A descriptive study. *Musculoskeletal Care*, 7(1), 31-44.
- Morisky, D. E., Levine, D. M., Green, L. W., Shapiro, S., Russell, R. P., & Smith, C. R. (1983). Five-year blood pressure control and mortality following health education for hypertensive patients. *American Journal of Public Health*, 73(2), 153-162.
- Nguyen, L. M., Rhondali, W., De la Cruz, M., Hui, D., Palmer, L., Kang, D.H., Bruera, E. (2013). Frequency and predictors of patient deviation from prescribed opioids and barriers to opioid pain management in patients with advanced cancer. *Journal of Pain and Symptom Management*, 45(3), 506-516.
- Pascual-Ramos, V., & Contreras-Yanez, I. (2013). Motivations for inadequate persistence with disease modifying anti-rheumatic drugs in early rheumatoid arthritis: the patient's perspective. *BMC Musculoskeletal Disorders*, 14(1), 1.
- Powell, S. K. (2005). The case management adherence guidelines. *Professional Case Management*, 10(1), 1-2.
- Rapoff, M., & Barlet, S. (2006). Adherence in children and adults. Edited by: Barlett SJ. *Clinical care in the rheumatic diseases*. Atlanta: American College of Rheumatology, 279-284.
- Ryan, S. (2007). *Drug therapy in rheumatology nursing* (Vol. 14): John Wiley & Sons.
- Sato, F., Ishida, T., & Ohuchi, N. (2014). The perioperative educational program for improving upper arm dysfunction in patients with breast cancer: a controlled trial. *The Tohoku Journal of Experimental Medicine*, 232(2), 115-122.
- Stamer, M., N. Schmacke, et al. (2013). Noncompliance: A Never-Ending Story. Understanding the Perspective of Patients with Rheumatoid Arthritis. *Forum Qualitative Sozialforschung/Forum: Qualitative Social Research*, 14(3),1-26.
- Stockl, K. M., Shin, J. S., Lew, H. C., Zakharyan, A., Harada, A. S., Solow, B. K., & Curtis, B. S. (2010). Outcomes of a rheumatoid arthritis disease therapy management program focusing on medication adherence. *Journal of Managed Care Pharmacy*, 16(8), 593-604.
- Talas, M. S., & Pinarci, E. (2010). Evaluation of compliance to steroid use in inpatients of a university hospital. *Dicle Medical Journal*, 37(4), 385-393
- Tokem, Y., Taşçı, E., & Yilmaz, M. (2013). Investigation of Disease Management of Individuals with Hypertension at Home , *Turk Soc Cardiol Turkish Journal of Cardiovascular Nursing* 4(5), 30-40.
- van Eijk-Hustings, Y., Ammerlaan, J., Voorneveld-Nieuwenhuis, H., Maat, B., Veldhuizen, C., & Repping-Wuts, H. (2013). Patients' needs and expectations with regard to rheumatology nursing care: results of multicentre focus group interviews. *Annals of the Rheumatic Diseases*, 72(6), 831-835.
- Zwicker, H., van den Bemt, B., van den Ende, C., van Lankveld, W., den Broeder, A., van den Hoogen, F., & van Dulmen, S. (2012). Development and content of a group-based intervention to improve medication adherence in non-adherent patients with rheumatoid arthritis. *Patient Education and Counseling*, 89(1), 143-151.