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DO INSTRUCTIONAL MESSAGE DESIGN PRINCIPLES WORK FOR PHYSIOTHERAPY AND REHABILITATION PATIENT LEAFLETS?

Abstract

This research investigates the patient leaflets used in terms of instructional message design principles. Non-experimental comparative design has been used in this study. The study sample consists of 6 different types of patient leaflets that are distributed in Physiotherapy and Rehabilitation Department of Erzurum Atatürk University Research Hospital for the first research question, and 36 patients for the second research question. Patients have successfully applied the exercises in printed materials appropriate to these principles. According to the results obtained, these principles must be followed during the preparation of these leaflets. The success level of leaflets to educate Physiotherapy and rehabilitation patients is increasing when the message design principles are taken care of. The leaflets that comply with instructional message design principles have serious implications for patients' success level for exercises.

Keywords: Patient education, Instructional message design, Patient leaflets

HASTALARA DAĞITILAN BROŞÜRLERİN ÖĞRETİMSSEL MESAJ TASARIMI İLKELERİNE GÖRE DEĞERLENDİRİLMESİ

Özet

Bu çalışmanın ilk amacı fizik tedavi hastalarına dağıtılan broşürlerin öğretimsel mesaj tasarımı ilkelerine uyumunu incelemektir. Bu çalışmanın ikinci amacı bro-

şürlerin öğretimsel mesaj tasarımına uyumunun hastaların başarı düzeylerine ve davranış örüntülerine etkisini araştırmaktır. Araştırmada deneysel olmayan karşılaştırma deseni kullanılmıştır. Araştırmanın örneklemini 6 broşür ve 36 hasta oluşturmaktadır. Araştırmada veriler gözlem formları ile toplanıp nicel (betimsel tablolar) ve nitel (içerik analizi) yöntemler kullanılarak analiz edilmiştir. Hastalara dağıtılan broşürlerin bir kısmının öğretimsel mesaj tasarımı ilkelerine uyduğu, bir kısmının ise uymadığı sonucuna ulaşılmıştır. Elde edilen sonuçlara göre broşürlerin hazırlanması sırasında öğretimsel mesaj tasarımı ilkelerine uyulmalıdır. Hastaların başarı düzeyleri incelendiğinde ilkelere uyan broşürlerin daha başarılı olduğu görülmektedir.

Anahtar kelimeler: Hasta eğitimi, Öğretimsel Mesaj Tasarımı, Hasta broşürleri

1. INTRODUCTION

With the exponential growth of information, the effective design of the message and transfer of instructional messages, becomes one of the major problems of our age. In a simply term, the instructional message can be defined as a signal pattern (verbal, visual, symbols etc.), produced and prepared to change learner's cognitive, affective and psychomotor behaviors (Fleming, 1993). The message design includes perception, attitude and attention principles, that manage the properties of the physical form of communication, between the sender and receiver (Seels, 1996).

The medicine is one of the main areas where effective transfer of message is important. Because in the field of medicine, messages should be transferred in a short time and correctly. However, the number of patients per doctor is quite high. Especially in the underdeveloped and developing countries, doctors have difficulty in giving time to patients to examine and treat. In areas such as physiotherapy and rehabilitation; the transfer process of psychomotor activities takes a lot of time. This process effect the patient's healing (Graafland, Schraagen & Schijven, 2012). Psychomotor activities involve a complex information processing cycle. In 1980, Romizowski proposed a 4-step model for gaining psychomotor skills. According to this model, the learner stimulated with the message, responds by displaying performance in accordance with the plan that perceives the information and remember what they have already (see Figure 1).

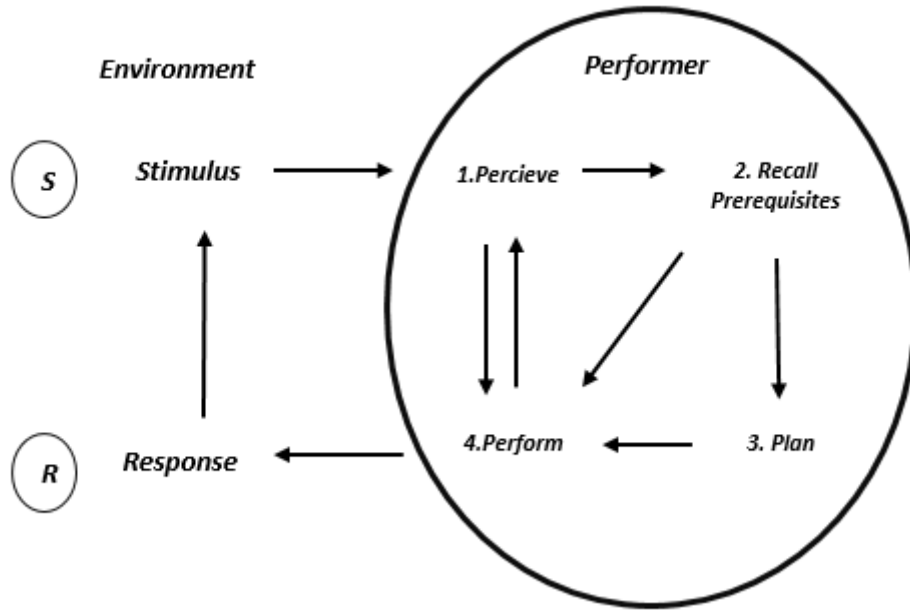


Fig. 1. Four stages of Romizowski's S-R model (Fleming, 1993)

In physiotherapy and rehabilitation which this research focused on, printed educational resources such as leaflets, are the most common way to transfer the message to patients. Physiotherapy and rehabilitation doctors are waiting for the necessary exercises to be done by giving leaflets for the treatment of the illness. But when the messages in the leaflets are not designed appropriately, the exercises are not being fully understood and critical points are being missed (Eker et al., 2013). Therefore, these leaflets should be designed correctly. If they are not designed correctly, patients cannot get the message properly. In this case, the patients cannot be cured, the worst one they can be affected adversely.

There are principles governing various properties for the correct design of printed resources. These principles provide suggestions for effective use of the items in the leaflets (Rees, Ford, Sheard2003). They are important for the effective use of the printed sources in a correct and efficient manner. However, these principles are not considered during the preparation of many leaflets presently used as printed medical resources. The correct use of the items such as language, texts, visuals, highlighters etc. in the leaflets; is important for correct transmission of the message. In many studies examining the suitability of printed health resources, it has been found that the suitability levels of these sources are low or moderate (Eames et al., 2003; Hoffman & McKenna, 2006).

Language is an important element in printed medical materials. The language to be used in these materials should be simple, clear, understandable. Doak and Doak (1996) highlight the importance of the simplicity of language used in printed educational health resources. Davis et al. (1998) have concluded that the instructional directives should be easy to read in order to help learners more. In this regard, Doak, Doak, & Root (1996) stated that the level of readability of printed health materials prepared for patients should be at 6th grade level. However, Vallance

et al. (2008) stated that very little printed educational material provides this standard. It has shown that these resources are prepared at a high level of readability (grade levels 11-17) (Cardinal & Sachs, 1992; Cardinal & Seidler, 1992). On the other hand, due to the high number of patients and the high workload of doctors, it has been seen that doctors cannot provide detailed information about the contents of the leaflets (Stapleton, Kirkham & Thomas, 2002).

The text need to be used appropriately in printed medical resources. Font size, type, placement plan, etc. should be set correctly. Texts are suitable for manipulations. These manipulations include writing in large or small font sizes, oblique writing, italic writing, underlined writing, writing in different colors, and so on. Text manipulations can be used effectively in printed medical materials. For example, wherever attention is required, the text can be used in larger fonts or in different colors (Clerehan & Buchbinder, 2006). Also texts are very important for explaining the visuals and describing the effect of visuals in leaflets.

Visuals are often used effectively in health and medicine education. Dowse and Ehlers (2001), Hosey et al. (1990) have reached findings that people prefer visuals in instructional health messages. For example, teaching the steps of injection or showing the where the liver is in body by using visuals much easier and more effective than just words. According to Moller (1986) and Readence & Moore (1981) simple visuals have more impact on facilitating the comprehension and learning. The advantage of these visuals according to other complex visuals is that their minimization of unnecessary details. According to Filippato & Pumfrey (1996) learners have low levels of literacy are more attached to unnecessary details in visuals more than high-level learners. Outs et al., (2006) highlight the importance of the visuals' characteristics such as color, complexity and uncertainty.

In their review of the literature, Houts, Doak, Doak and Loscalzo have concluded, the role and the correct use of visuals are important for attracting attention to message, comprehending, recalling the message and reflecting the message as changes in behavior (Houts et al., 2006). Filippatou & Pumfrey (1996) and Carney & Levin (2002) have confirmed that visuals help to the learners' comprehension. They have said the visuals are more effective in more complex texts and for students with low level prior knowledge. They also have emphasized the importance of proximity between texts and visuals. According to them, although visuals are almost always useful, however in some cases, especially for learners have low visual literacy they intervene to the comprehension. The visual which cannot describe the information is meaningless for readers. In these cases, the readers estimate the required information. They usually estimate wrong about what they should understand from the messages. This is an intervention to comprehension. In some cases, the visuals distract and draw all attention to itself from the text unnecessarily. In their literature review study, Levie & Lentz (1982) examined 155 experimental articles. They have found that visuals related to the text, affect the learners' comprehension positively. Visuals not related to the text do not have a significant benefit on learners' comprehension. They have reached the conclusion that visuals provide a context for organizing the information in the text and this situation helps to comprehension significantly. The texts accompanying to visuals guide to this interpretation, however learners have low level

literacy can try to interpret the visuals without reading the texts. This situation can be observed even on high level learners in case of using a high abstract language in instructional printed brochures, leaflets, and booklets. For this situation captions, arrows and labels which involve the desired context can be the solution (Houts et al., 2006). As a result; simple visuals which are integrated to the information correctly, free from unnecessary details, easy to read, understandable and do not distract; facilitate the comprehension especially in learners have low reading level abilities.

It is necessary to use the auxiliary items correctly from printed health resources. This item can be replaced by an arrow, a color contrast, an auxiliary question according to needs. Morrow et al., (1998) have cited to benefits of highlighters such as arrows, circles, color contrasts and brightness. They have concluded that these highlighters show to the readers where they have to look in printed medical sources which have complex contents. Also they have indicated that captions may be effective in some situations where information was transferred by leaflets. Instructions that show to the learners where they should look in printed educational sources can improve the comprehension (Levie & Lentz ,1982).

Elements in leaflets such as writing, painting, graphic, highlighter in printed medical materials should be correctly blended and placed in a document in harmony. Distance between visuals and texts, location of graphics etc. should be set appropriately (Dowse, Ramela & Browne, 2011). Learning is better if the texts and visuals associated with each other are close to each other on the leaflets. In situations outside of this, the rate of comprehension of teaching will decrease (Twomey, 2009). It is better to learn in environments where texts and visuals that are related to each other are presented at the same time. For example, if a visual is displayed after 5 minutes after teaching, the learning rate of that subject will be less.

1.1. Problem Statement

It is important to transfer the message to the learners with right methods especially in the critical fields such as medicine. One of the most time-consuming areas of medicine is the transfer of psychomotor skills. It does not seem possible in terms of time for doctors to transfer psychomotor skills to patients one by one. Despite all these obstacles, psychomotor skills in medicine is important for patients to be transferred correctly (Kovacs, 1997). In order to overcome these time constraints, a variety of printed and visual media are utilized to transfer psychomotor skills. One of the main tools in this regard are printed educational materials such as patient leaflets. The most common sources of information were Patient Information Leaflets (PILs) (74%), doctors (68%) and pharmacists (60%). Next came television (40%), newspapers and magazines (40%), drug advertisements (32%), nurses (28%), drug information leaflets (27%), relatives and friends (24%), medicine guides and books (22%) and the Internet (20%) [20].

It is important to examine the availability of physiotherapy and rehabilitation patient leaflets according to generally accepted instructional message design principles, at what level is successfully applied by patients of these leaflets and determinate the patient's behavior patterns in the implementation process.

1.2. Research Questions

1. What is the level of the suitability of physiotherapy and rehabilitation patient leaflets with instructional message design principles?
2. What is the success levels of patients during the exercise process and how are the behavior patterns of patients during the exercise process?

2. METHODS

Non-experimental comparative design has been used in this study. In the comparative method, it is investigated whether there are differences between two or more groups or cases (Christensen, Johnson & Turner, 2011). Accordingly, in this study, leaflets have been scored according to message design principles. Then, the success rates of the patients who followed the leaflets were compared.

2.1. Sample

The study sample consists of 6 different types of patient leaflets that are distributed in Department of Physiotherapy and Rehabilitation of a Research Hospital in Eastern Anatolia Region of Turkey for the first research question, and 36 patients for the second research question.

2.2. Data collection instruments

It has been used a form consists of 23 principles which were suggested by Fleming and Levies (1993) to examine the suitability of physiotherapy and rehabilitation patient leaflets. First of all, the principles in the book were translated by the researchers and their peer group. This peer group consists of 4 academics. These translations evaluated and made adjustments with weekly meetings, revised by an English and a Turkish language expert and finalized. Then first, 45 principles selected by the researchers thought to be relevant with aim. At last parallel 7 principles under separate headings have been eliminated and this number has been reduced to 23. These principles are presented in Appendix C.

Six leaflets (Table 1) predetermined by researchers have been evaluated with a 3-point scale by researchers and three doctoral students according to this form. If a leaflet shows full suitability with the principle was scored as "2", shows partly suitability was scored as "1" and shows no suitability was scored as "0". The highest score each leaflet can get is 46. Then, these leaflets are used as stimulus according to the Romiszowski Model for patients. An observation form (Appendix A) is prepared by researchers aimed to determine the level of patients' success during the implementation process. According to this observation form, the perception, recall prerequisites, plan and performance process of the patients were observed. In this form, the patient's gender, age, educational level and experience of making exercises were variable. The patient is experienced if he / she has exercised the exercises related to the discomfort in advance (with brochure and expert demonstration), otherwise he / she is considered inexperienced. It has been given advance information about this study to the patients and taken the permissions of them. The patients have performed the exercises in physiotherapy and rehabilitation leaflets in front of a physiotherapy and rehabilitation expert. In this process the researchers have ob-

served all the steps and stages. The patients have no realized researchers' observation. When the physiotherapy and rehabilitation expert has said patient "Well done true, try next" the researchers understood that the exercise has been done correctly. When the physiotherapy and rehabilitation expert has said patient "You should pay attention to the following points" the researchers understood that the exercise has been done partly correct. When the physiotherapy and rehabilitation expert has said patient "You should do the following" the researchers understood that the exercise has been done wrong.

Table 1. Leaflet types

Leaflet	Number
Hip Exercises Leaflet	L1
Neck Exercises Leaflet	L2
Shoulder Exercises Leaflet	L3
Back Exercises Leaflet	L4
Knee Exercises Leaflet	L5
Waist Exercises Leaflet	L6

2.3. Data Analysis

The obtained data have been evaluated using content analysis and descriptive analysis techniques.

3. RESULTS

3.1. Suitability of the physiotherapy and rehabilitation patient leaflets with the principles of instructional message design

According to message design principles, L1 has taken the highest score (Total Score-TS:31, Suitability Rate-SR: % 68). L2 has the second highest score (TS:24, SR: 53%). L6 has taken the lowest score (TS:9, SR: % 19). Scores has been received by other leaflets are close and parallel. Researchers' evaluation for each leaflet are presented in Table 2.

Table 2. Leaflet scores according to message design principles

	L1	L2	L3	L4	L5	L6
Principle 1	1	1	1	0	0	0
Principle 2	0	0	0	0	0	0
Principle 3	2	0	0	0	0	1
Principle 4	2	2	2	2	2	0
Principle 5	2	2	1	1	1	0

Principle 6	0	1	1	0	0	0
Principle 7	0	2	1	0	0	0
Principle 8	0	2	1	0	0	0
Principle 9	2	1	0	0	0	0
Principle 10	1	0	0	0	0	0
Principle 11	2	0	0	1	0	0
Principle 12	2	2	2	2	2	2
Principle 13	1	0	0	0	0	0
Principle 14	2	0	0	0	0	0
Principle 15	2	1	0	0	0	0
Principle 16	2	1	1	1	1	0
Principle 17	1	0	0	1	1	0
Principle 18	2	2	2	2	2	1
Principle 19	2	2	2	2	2	2
Principle 20	2	1	1	1	1	2
Principle 21	1	1	1	1	1	0
Principle 22	1	2	0	0	1	1
Principle 23	1	1	0	0	0	0
Total Score (TS)	31	24	16	14	14	9
Suitability Rate	%68	%53	%35	%30	%30	%19

3.2. Success levels and behavior patterns of patients during the exercise process;

3.2.1. Hip Exercises Leaflet(L1)

In L1, 4 female and 2 male patients aged between 21 and 65 years have been observed. L1 is the most successful leaflet (SR: % 68) with reference to message design principles. Success level of patients in L1 is presented in Table 3. 1st, 4th and 6th patients are the most successful patients who have successfully performed all of the exercises. Apart from these patients, it has been seen that other patients have achieved high success rates, too.

Table 3. Hip exercises leaflet success levels

Patient Number:	Prior experience	Age	Gender	Education Level	Number of exercises	Success rate	Mean
1	+	32	Female	Primary School	8	%100	
2	-	53	Male	Undergraduate	8	%90	
3	-	65	Male	Secondary School	8	%80	%90,83
4	+	44	Female	Undergraduate	8	%100	
5	+	54	Female	Primary School	8	%75	
6	-	21	Female	Primary School	8	%100	

This leaflet, which has the highest suitability rate via message design principles (SR: %68), includes 8 exercises. Three of the patients who performed hip leaflet were experienced before, while the other half was inexperienced. Two of the patients who have successfully performed all exercises are already experienced, while one is inexperienced. Two of these patients are primary school graduates and the other is undergraduate student. Although all three of these patients are female, the most unsuccessful patient is female too. This patient is primary school graduate. All these descriptive results show that it is difficult to capture a pattern in terms of experience, gender and level of education. However, it is noteworthy that this leaflet, which is the most successful in terms of the message design principles, has the highest success rate mean (M: %90,83).

In *perception* process, all patients except 5th has read the text and examined the visuals carefully. All of the patients have performed their exercises in turn. Patients have not specified that they did not understand any exercise, and in the process, they have not asked the expert any questions about exercises. In *recall prerequisites* process, it has been seen 5th patient has focused on only to visuals because she had been showed by an expert before. This patient has found voice comments in the style of "Yes I remember this movement." It has been observed that this situation causes some exercises to be misrecognized. Other patients have tried to perform the exercises mentioned above focusing on the leaflet only. In *plan process* all patients except 5th has read the text loudly and examined the visuals carefully a few times. They have thought aloud about if they need any help. Then they have gone through a final mental gathering and practiced the exercises. In *perform process*, it has drawn attention that nearly all patients have focused on exercises with high motivation and performed all exercises. In the process, it has been observed that the majority of patients could easily perform the exercises.

3.2.2. Neck Exercises Leaflet(L2)

In L2, 4 male and 2 female patients aged between 24 and 60 years have been observed. This leaflet (SR: %53), ranked 2nd in six leaflets when it has been evaluated in terms of message design principles. Success level of patients in neck exercises leaflet is presented in Table 4. Accordingly, the 1st, 3rd and 6th patients are the most successful patients. 4th patient has the lowest success rate.

Table 4. Neck exercises leaflet success levels

Patient Number:	Prior experience	Age	Gender	Education Level	Number of exercises	Success rate	Mean
1	-	35	Male	Undergraduate	9	%100	
2	+	56	Male	Secondary School	9	%50	
3	+	30	Male	Undergraduate	9	%100	%73
4	-	60	Male	Secondary School	9	%33	
5	+	24	Female	Undergraduate	9	%55	
6	+	58	Female	Secondary School	9	%100	

This leaflet includes 9 exercises for patients. Half of the patients are undergraduates while the other half of the patients are secondary school graduates. Four of the patients who underwent hip leaflet were experienced before, while the other two was inexperienced. Two of the three patients who successfully complete the exercises are already experienced and one is already inexperienced.

Two of these three patients are male, the other is female. When we look at the educational status, it is seen that both of them are secondary school graduates and the other student is undergraduate students. The patient with the lowest level of success is a secondary school graduate male. It is seen that the success rate of the 5th patient with BS degree is 55%. All these descriptive results show that it is difficult to capture a pattern in terms of experience, gender and level of education. However, it is noteworthy that the success rate (73%) of the patients who implement this leaflet, which complies with the message design principles as second among the six leaflets.

In *perception* process, most patients (1,3,6 patients) carefully read the text and examine the visuals in many exercises. However, some exercises have done wrong by some patients (2nd, 4th and 5th patients) because many patients focused on solely to the visuals. The reason of this case can be visuals in leaflet give feelings to patients that the exercises are very easy. Patients did not ask the expert anything in the process. In *recall prerequisites* process, it has been seen that 2nd, 4th and 5th patients have focused on only to visual because they had been taught by an expert before. It has been observed that the 2nd patient thought "Hmm, the exercise that this therapist

showed", and the fifth patient thought "I know this exercise " aloud. This situation has led to a false recall of the exercises. In *plan and perform processes*, it has been observed 1st, 3th and 6th patients read the text loud, and compared the visuals with the text. It has been noted that 2nd, 4th and 5th patients read the text carelessly and focused on to images. It has drawn attention that nearly all patients have focused on process with high motivation and performed the many of the exercises.

3.2.3. Shoulder Exercises Leaflet(L3)

In L3, 3 male and 3 female patients aged between 20 and 70 years were observed. This leaflet (Suitability Rate =% 35), ranked 3rd in 6 leaflets when it has been evaluated in terms of message design principles. Patients' levels of success in shoulder exercises leaflet is presented in Table 5. Accordingly, 3rd (%80) patient is the most successful. The 6th patient had a low performance of 10% and the 2nd patient had a low performance of 13%.

Table 5. *Shoulder exercises leaflet success level*

Patient Number:	Prior experience	Age	Gender	Education Level	Number of exercises	Success rate	Mean
1	+	45	Female	Secondary School	16	%47	
2	-	23	Male	Undergraduate	16	%13	
3	+	35	Male	Secondary School	16	%80	%46,16
4	+	20	Male	Undergraduate	16	%65	
5	-	68	Female	Secondary School	16	%62	
6	-	70	Female	Primary School	16	%10	

This leaflet is the leaflet that contains the most exercise with 16 exercises. Half of the patients who apply this leaflet are secondary school graduates. Two of the other patients are undergraduates and the last patient is primary school graduate. When the success rates of the patients are examined, it is seen that the most successful patient is a middle school graduate who has previous experience. The two most unsuccessful patients are a first-year graduate male (2nd patient) and a primary school graduate (1st). A woman with a high school graduate with no prior experience (5th) and a male undergraduate with prior experience (4th) seem to have achieved success rates close to each other. All this shows that it is difficult to catch a pattern in terms of gender and educational level variables on findings. Nevertheless, previously experienced patients seem to be more successful. However, in this brochure, it is noteworthy that the compliance with the message design principles and the success rates of the patients decrease together.

In *perception* process, in the 6th exercise all of the patients have perceived the wall wrong and concluded the exercise wrong by taking the wrong position. In the exercises between the

number 10 and 16 it has been observed by the researchers that patients had difficulties in perception of these exercises because of visuals and text are not given together. This caused the patients confusion about the exercises. Most of the patients were observed to have discourses to expert in the style of "I do not understand what this exercise means." In recall prerequisites process, patients who see the exercises beforehand have a higher success rate than other patients. These patients performed some exercises as they remembered before. In this way they were relatively more successful than other patients. In plan and perform processes, it has been seen that 3rd, 4th and 5th patients read text and correlated the text via visuals. Then they focused on visuals. However, the other patients have looked to visuals and tried to interpret without reading the texts or they have skimmed and scanned fast. It has been seen that patients who have higher education levels have read and examined the leaflets carefully but patients who have lower education level have focused on only to visuals in leaflet. It has been observed that some exercises were too hard for all patients such as 6th exercise. In this exercise all of the patients have perceived the wall wrong and concluded the exercise wrong by taking the wrong position. This means the mistake in perception has a negative effect on perform.

3.2.4. Back Exercises Leaflet(L4)

This leaflet is ranked 4th among 6 leaflets along with 5th leaflet when evaluated in terms of message design principles. Patients' levels of success in back exercises leaflet is presented in Table 6. Accordingly, 1st patient is the most successful patient. The 2nd and 4th patients failed to make any exercise.

Table 6. Back exercises leaflet success levels

Patient Number:	Prior experience	Age	Gender	Education Level	Number of exercises	Success rate	Mean
1	+	52	Female	Primary School	3	%100	
2	+	58	Female	Secondary School	3	%0	
3	-	47	Male	Secondary School	3	%15	%40
4	-	53	Male	Secondary School	3	%0	
5	-	26	Female	Undergraduate	3	%75	
6	+	33	Male	Primary School	3	%50	

This leaflet is the leaflet with the minimum number of exercises with three exercises. In this leaflet, 3 of the participants are primary school graduates, 2 are secondary school graduates and 1 is undergraduate students. Only one patient was able to do all the exercises, and two patients could not perform any exercises. The most successful patient is a primary school graduate female with previous experience. However, two of the most unsuccessful patients are female and one is primary school and the other is a secondary school graduate. One of the most

unsuccessful patients is already experienced. When all these findings are considered together; it difficult to capture a pattern in terms of variables: gender, prior experience and level of education. However, it is noteworthy that the success rates of patients who implement this leaflet, which is in the last place in terms of compliance with message design principles, are low.

In *perception* process, it has been observed that all patients except 1st looked to only pictures without reading the text. The focus of the patients on just the images caused them to misinterpret their exercises and misapply them. Most of the patients were observed to have difficulty examining the leaflets. Patients often ask the expert questions such as "I do not understand, what does this mean or will it be?" In *recall prerequisites* process, it has been seen that 2nd, 4th and 5th patients have focused on only to visual because they had been taught by an expert. This caused patients to misinterpret many exercises and do them wrong. In *plan and perform processes*, it has been observed 1st patient read the text loud, and compared the visuals with the text. Patients 2 and 4 checked the leaflets a disorganized manner and performed all of the exercises wrong. These patients have continuously set up phrases such as "what this means, I do not understand, can you show, I wish you would show" in the performance process. It has been noted that other patients except first read the text carelessly and focused on to images. It has been seen that patients have not paid attention to process when they performed the exercises.

3.2.5. Knee Exercises Leaflet(L5)

This leaflet is ranked 4th among 6 leaflets along with 4th leaflet when evaluated in terms of message design principles. Accordingly, the 2nd patient is the most successful patient. Nevertheless, no patient has successfully applied all of the exercises.

Table 7. Knee exercises leaflet success levels

Patient Number:	Prior experience	Age	Gender	Education Level	Number of exercises	Success rate	Mean
1	+	60	Male	Secondary School	8	%38	
2	+	56	Female	Primary School	8	%75	
3	+	52	Female	Primary School	8	%32	%51,66
4	+	48	Male	Undergraduate	8	%32	
5	-	28	Male	Undergraduate	8	%65	
6	-	65	Male	Primary School	8	%68	

In this leaflet, 8 exercises were given to patients. 3 of the participants in this brochure are primary school, 2 are undergraduate students and 1 is secondary school graduate. Four of the patients are already experienced. None of the patients showed 100% success. The most successful patient is a primary school graduate female with previous experience. However, when looking at the two most unsuccessful patients, it is seen that these patients have prior experience.

One of these patients is an undergraduate student female and the other is a primary school graduate male. Given all these findings, it seems difficult to capture a pattern in terms of gender, prior experience and level of education. However, it is noteworthy that the success rates of patients who implement this leaflet, which is the final line in terms of compliance with message design principles, are low.

In *perception* process, 2nd patient has read the text and examined the visuals carefully. Other patients have been found in the incorrect perception in some exercises by focusing on visuals directly. 4th and 5th patients have asked some questions to expert in the form of "I do not understand what this means or does. In *recall prerequisites* process, it has been seen that 1st, 3th and 4th patients have focused on only to visual because they had been taught by an expert. This caused patients to misinterpret many exercises and do them wrong. In *plan and perform processes*, 2nd patient has read the text and examined the visuals carefully. It has been seen that 1st, 3th and 4th patients have focused on only to visuals. This case effected these patients negatively.

3.2.6. Waist Exercises Leaflet(L6)

This leaflet is the least successful brochure when evaluated in terms of message design principles. Patients' levels of success in hip exercises leaflet is presented in Table 8. Accordingly, the 1st patient is the most successful patient. It is seen that three of the patients could not apply any exercises. Even the most successful patient was able to catch only 40%. The average success rate is only 14%.

Table 8. Waist exercises leaflet success levels

Patient Number:	Prior experience	Age	Gender	Education Level	Number of exercises	Success rate	Mean
1	+	50	Male	Secondary School	10	%40	
2	-	51	Male	Primary School	10	%0	
3	-	66	Male	Primary School	10	%20	%14
4	+	59	Female	Secondary School	10	%0	
5	+	65	Male	Primary School	10	%25	
6	-	43	Female	Undergraduate	10	%0	

In this leaflet, which has minimum suitability with the message design principles, it is presented 10 exercises to patients. In this leaflet, 3 of the participants are primary school, 2 are secondary school graduates and 1 is undergraduate students. Half of the patients are already experienced and the other half is inexperienced. None of the patients showed 100% success. Half of the patients could not apply any exercise. The most successful patient is a secondary school graduate male with previous experience. However, when looking at the three most un-

successful patients, it appears that one of them is a woman with a pre-experienced secondary school graduate, one is a male with a previous inexperienced elementary school graduate, and the other is a female with an inexperienced undergraduate student. Given all these data, it seems difficult to capture a pattern in terms of gender, prior experience and level of education. However, it is noteworthy that the success rate of patients who apply this leaflet, which is at the last place in terms of suitability with message design principles, is at the lowest level.

It has been observed that all patients had difficulties during all processes. All patients have stated that the font of the texts on leaflet are too small and have directly looked at to the visuals. 1st, 3th and 6th patients have stated that they could not choose to texts because of the dark background. It has been seen that 1st, 4th and 5th patients have focused on only to visual because they had been taught by an expert. This caused patients to misinterpret many exercises and do them wrong. All patients have not read the text. They have tried to interpret the visuals. They have not followed a ranking during exercises. It has been seen all patients have not paid attention to leaflet.

When the findings for the first two research questions are examined together, the success rates of the patients performed the exercises in the leaflets designed according to the message design are higher than the others (Table 9).

Tablo 9. *The suitability scores of the leaflets and the success rates of the patients applying these leaflets*

Leaflet	Number	Suitability Score	Suitability of Leaflets with Principles	Achievement Averages of Patients
Hip Exercises Leaflet	L1	31	% 68	% 90
Neck Exercises Leaflet	L2	24	% 53	% 73
Shoulder Exercises Leaflet	L3	16	% 35	% 46
Back Exercises Leaflet	L4	14	% 30	% 40
Knee Exercises Leaflet	L5	14	% 30	% 50
Waist Exercises Leaflet	L6	9	% 19	%14

4. DISSCUSSION AND CONCLUSION

The main result of this study is that the patients' leaflets have considerable differences in their suitability to instructional message design principles. According to Eames et al. (2003) and Hoffman & McKenna (2006), the suitability levels of the leaflets have been examined and similar levels of suitability have been observed. This may be due to the fact that the leaflets are prepared by pharmaceutical companies without instructional concerns. On the other hand, the fact that instructional designers and field specialists are not involved in the leaflet development

process may have caused this variance. For this reason, while designing leaflets which an important factor in the healing process of patients, a systematic procedures based on scientific instructional design principles are needed. Instructional designers and field experts should involve to this process and this should be supported by pilot practices. In this direction, such mechanisms can be used in preparation process to be gained specific quality and standards for the leaflets.

Another main finding of this study is that when the leaflets are designed in compliance with instructional message design principles, the level of patient success increased. Suitability to the principles may have positively affected behavioral patterns of patients in the process of performing exercises. Some studies have referred to the positive effects of the leaflets designed in accordance with the principles in their studies on behaviors such as understanding and remembering of patients (Carney & Levin, 2002; Filippatou & Pumfrey, 1996; Houts et al., 2006; Levie & Lentz, 1982). It can be reached to this finding as a result of observations that give us such findings; the patients who apply the high level compliance leaflets did not have many difficulties but the patients who apply the low level compliance had much problems and difficulties in performing process. For leaflets suitable via instructional message design, it has been observed that patients have high perception. They carefully examined and focused on their leaflets. They have read the texts carefully, looked and focused on visuals. They have performed the exercises in leaflets successfully. According to this, patients' perceptions are higher, planning is more organized and performances are more successful when implementing leaflets that comply with message design principles. Many principles, such as clear and readable text and the use of effective and understandable visuals, have helped the patient to use the leaflets in a pleasing manner. It has been observed that patients experience difficulties and problems in performing process when these principles are not used effectively enough. There may be many reasons for this result. Some of these may be that; well-designed leaflets help better understand what patients are reading, better visual feedback, better focus. In this study, no meaningful pattern could be reached when considering variables such as gender, age, education level, previous experience. This may be due to the small number of patients. For this reason, this result does not indicate that the leaflets prepared in accordance with the message design principles have a direct effect of the patient's success in performing the exercise. Herewith, future studies can empirically examine this effect. In this context, the leaflets prepared according to the instructional message design principles can be compared with the existing leaflets used. Along with that, more specifically, studies may be conducted that look at the effects of specific principles (font size, visual position, etc.).

Exercises are important in the therapy processes of physiotherapy and rehabilitation patients. Especially in hospitals where patients are concentrated, patients are being trained with written and visual leaflets because of the insufficient time and personnel (Stapleton, Kirkham & Thomas, 2002). Therefore, it can be said effective design of the leaflets and proper perform of the exercises affect the treatment process of the patients positively.

In this study, the success rates of the patients were evaluated by an expert. The sample is limited to 6 leaflets and 36 patients. The number of patients is limited to 6 for each different type of exercise. In future studies, using more patients, variables such as gender, age, education level and experience status can be examined in the context of experimental patterns. The direct effect of these variables can be seen.

The comparison of the leaflets to be prepared according to instructional message design principles with the support of instructors and instructional designers in specific discomforts (knee, shoulder, etc.) and the current leaflets may be another research topic. Accordingly, the performance of the patients' exercises is comparable to that of the practice and behavior patterns can be observed during the practice of the exercises. It may be another issue of studying and comparing different media such as video and written materials in transferring process of psychomotor skills to patients (Twomey, 2009).

In this study, observation-based data can be made more objective with tools such as eye-tracking technologies (glasses type). Especially places where we think that participants have difficulties can be supported by looking at the places such as focusing, returning and jumping.

Experimental studies can be constructed according to the parameters included in principles 9 and 11 (which exist in successful leaflets and do not exist in unsuccessful leaflets). Many studies in literature [8,9,10,11,30,31] have reached that the features of these principles such as size, simplicity of text, simplicity, background color and the presence of auxiliary elements, have influenced the comprehension of patients (Davis et al., 1998; Doak, Doak & Koot, 1996; Dowse, Ramela & Browne, 2011; Hosey et al., 1990; Houts et al., 2006; Twomey, 2009) .

Leaflets given to patients have shown high variation among each other in terms of suitability of instructional message design principles. Leaflets with a high level of suitability score may have helped to increase the success rate of patients while doing exercises. It may also have a positive effect on the behavioral patterns of the patients. However, there is a need for more experimental studies involving more patients to investigate whether suitability with the principles is a directly influential factor. For this reason, this study is the basis for such experimental work.

In leaflets distributed in hospitals, it is seen that there are no certain standards. The use of leaflets in the education process of the patients is very important because it affects the healing positively or negatively. Patients may see the expected benefits of performing exercises correctly. However, the wrong performing of exercises may prevent patients from healing, or even they may get worse. Eker et al. (2013) also noted that brochures not prepared in accordance with some standards in a similar way cause patients to miss critical points in the eye. Accordingly, a standard should be prepared by preparing the necessary criteria for the leaflets. Instructional design experts and related field experts should take role in defining and standardizing these criteria. Reece, Ford & Sheard (2003) mentions the necessity and importance of this standardization in his study.

One of the major limitations of the use of leaflets in patient education is the lack of feedback from experts. Doctors are not able to provide detailed information from the intensity (Stapleton, Kirkham & Thomas, 2002). Patients usually perform the exercises at home and cannot receive evaluative feedback that whether they perform correct or not correct. For this reason, technologies such as gesture-based technologies, augmented reality, gaming can be used to provide feedback. In addition, it will be the most appropriate method to develop individual health environments that can adaptively respond to individual parameters such as age, weight and education level of patients.

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Appendix A.

PATIENT OBSERVATION FORM			
Age:	Education Level:	Gender:	
Observation Date:	Leaflet Type:	Prior Information Status:	
Number of Exercise:	Success Percentage:		
Number of Exercise:	Positive	Partly Positive	Negative
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			

Specific Errors

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General impressions

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Appendix B. Some Sections from Evaluated Leaflets

KALÇA EGZERSİZLERİ



4

Her iki elinizle dizlerinizin arkasından iki bacağınızı da tutun ve bacaklarınızı karnınıza doğru mümkün olduğunca çekin. Rahat nefes alıp verin. Bu pozisyonda iki üç saniye bekleyin.



5

Bacaklarınızı bir miktar gevşetin ve hareketi tekrarlayın.



6

Vücudunuzda başka hiçbir yer hareket etmeyecek şekilde ve ayak topuğunuz yerden kalkmadan sağ bacağınızı düz olarak yana doğru mümkün olduğunca açın. Rahat nefes alıp verin. Bu pozisyonda iki üç saniye bekleyin. Sonra eski pozisyonunuza geri dönün. Hareketi tekrarlayın.

Aynı hareketi diğer bacağınız için de uygulayın.



7

Kalçalarınızı dışa döndürerek ayak uçlarını her iki yanda yere değdirmeye çalışın. Rahat nefes alıp verin. Bu pozisyonda iki üç saniye bekleyin. Hareketi tekrarlayın.



8

Bu kez kalçalarınızı içe döndürerek ayak uçlarını birbirine değdirmeye çalışın. Rahat nefes alıp verin. Bu pozisyonda iki üç saniye bekleyin. Hareketi tekrarlayın.



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BOYUN ve SIRT EGZERSİZLERİ

I. İZOMETRİK EGZERSİZLER



Başlangıç Pozisyonu:
Baş ve boyun düz, yüz tam karşıya bakmalıdır.



Başınız öne doğru itmeyi sağlayarak, eliniz başınızın ön bölgesine koyarak karşı direğe gözetin.



Başınız arkaya doğru itmeyi sağlayarak eliniz başınızın arkasına koyarak karşı direğe gözetin.

Her egzersizde tut-gevşet yöntemi kullanılır. 5 sn. kasılı tutulup, 5-10 sn. gevşenir. Her bir egzersiz 10 kez tekrarlanır ve günde 2-4 kez gerçekleştirilir.

II. İZOTONİK EGZERSİZLER



Ayağa veya otururken, her iki omuzunuzu kürek kemiğine doğru kaldırın. 5 saniye tutun ve gevşeyin.



Ayağa veya otururken, her iki omuzunuzu yukarıya, arkaya ve aşağıya doğru dairesel şekilde hareket ettirin.



Ayağa veya otururken, her iki dirseğinizi göğüs hizasına getirin. Dirseklerinizi geriye doğru hareket ettirin. 5 saniye tutun ve gevşeyin.



Ayağa veya otururken, bir dirseğinizi karşı omuzunuza doğru itin. 5 saniye kadar tutup bırakın. Aynı hareketi diğer tarafta uygulayın.



Ellerinizi, kolunuzu yere paralel olacak şekilde, göğüs hizasında birleştirin ve birbirine basdırın. 10'a kadar sayarak pozisyonunuzu koruyun. Bu egzersizi en az 5 kez tekrarlayın.



Başınızı yavaşça sağa döndürünüz ve 3 saniye böyle bekleyin. Aynı hareketi aynı yöne yapıp, egzersizi 5 defa tekrarlayın.

DİZ EGZERSİZLERİ 1

- 1**



Bacaklar düz, sırtüstü yatar pozisyondayken topuğunuzu kaldırmadan kaydırarak bacağınızı bükün.
Günde kez tekrarlı yapın ve hareketler arasında saniye dinlenin.
- 2**



Aynı pozisyondayken ağırlı dizinizi aynı taraftaki elinizle topuğunuzu kaydırarak bükün.
Günde kez tekrarlı yapın ve hareketler arasında saniye dinlenin.
- 3**



Sırtüstü şekildeki gibi yatarken kalçanızı bükerek ayağınızı duvara dayayın. Topuğunuzu duvardan kaldırmadan yukarı doğru kaydırın.
Günde kez tekrarlı yapın ve hareketler arasında saniye dinlenin.
- 4**



Sırtüstü şekildeki gibi yatarken sağlam taraftaki ayağınızı ağırlı taraftaki ayağınızın altına geçirerek topuğunuzu duvardan kaldırmadan sağlam tarafın desteğiyle yukarı doğru kaydırın.
Günde kez tekrarlı yapın ve hareketler arasında saniye dinlenin.

Appendix C. Message design principles used in leaflet evaluation process.

Number	Principle
1	Use headings, italics, boldface, larger font, bullets, arrows, icons, underlining, margin notes, repetition, and/or whitespace to highlight the relevant information.
2	Use adjunct questions to emphasize relevant information.
3	Use statements of instructional objectives to emphasize relevant information.
4	Distinguishing between figure and ground is one of the most basic perceptual processes. Early perceptual processes are active in figure-ground organization. Message designers should make figure-ground distinctions as clear as possible.
5	When the sequence in which message elements are to be processed is not controlled by the order in which they are presented, sequence can still be influenced by the relative attention-drawing capability of individual items, and by devices such as lines, arrows, and the message's composition.
6	Students often need specific instructions as to how to look at a picture.
7	Interpretative pictures should be simplified and labelled so that only those aspects having to do directly with what is being interpreted are immediately accessible to perception.
8	Captions can effectively direct attention where the designer wishes it to be directed.
9	The relative size of elements is perceived as communicating their relative power or importance. The larger the element, the more important it is thought to be.
10	In text, attention is drawn to words or passages that stand in contrast to the rest of the body of the text.
11	The ease with which text is read is affected in complex ways by such factors as type size, line length, the amount of space between lines, type and background color, and level of illumination.
12	Simple tasks with limited background knowledge may be demonstrated and explained simultaneously as an illustrated narrative.
13	Sources perceived by the receiver as attractive are more influential.
14	Use a reasonably open text display rather than a constrained display in order to maintain learner attention
15	Texts must not be written so closed to each other.
16	Use appropriate color, graphics, and high-quality typesetting and printing for print products to gain and maintain learner attention.
17	Use interesting pictures to gain and maintain learner attention in instructional

- text.
- 18 Include pictures that include people to gain and maintain learner attention.
 - 19 Colored pictures tend to be more interesting to most readers than those without color.
 - 20 Related pictures and words would be more effective and lasting learning if given together instead of giving them consecutively.
 - 21 Located in a visual tool items should be distributed in a balanced way. By own weight of the items it must take place evenly on both sides of the horizontal and vertical axes.
 - 22 Text set in lower case letters is easier to read than text set in all capitals.
 - 23 Generally, for illustrations to facilitate the comprehension of text, they need to be closely related to text's content.
-