

# An Interactive Multimedia Training on Anxiety, Uncertainty, and Hope among Patients Undergoing Percutaneous Coronary Intervention: An Interventional Study

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## ABSTRACT

**Background:** One of the most common treatments for cardiovascular diseases is coronary angioplasty. Due to the short period of hospitalization, less attention has been given to patients' education. This study was carried out to investigate the effects of Interactive Multimedia (IM) training on anxiety, uncertainty, and hope among Percutaneous Coronary Intervention (PCI).

**Methods:** In this interventional study, 90 eligible patients were enrolled one day before angioplasty in September-December 2019. Using the block random sampling method, the patients were assigned to IM training (n=45) or an educational pamphlet (n=45). Anxiety, uncertainty, and hope were evaluated at three periods (before, one day, and two weeks after PCI) using the Depression Anxiety and Stress Scales (DASS-21), Mishel Uncertainty of Illness Scale (MUIS), and Snider Hope scale. The Chi-square test, independent t-test, and repeated measurements using SPSS18 were used for statistical analysis.

**Results:** One week and two weeks after the intervention, the hope score was significantly improved; uncertainty and anxiety levels were reduced considerably more in the multimedia group than in the educational pamphlet ( $P < 0.001$ ); and repeated measurement analysis confirmed the effectiveness of IM ( $P < 0.001$ ).

**Conclusion:** IM training reduced anxiety and uncertainty and improved hope among patients. Since most patients were illiterate, IM training was easier and more accessible.

**Keywords:** Percutaneous coronary intervention, Angioplasty, Interactive multimedia training, Uncertainty, Anxiety, Hope

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## Introduction

Coronary artery disease is one of the leading causes of mortality, illness, hospitalization, and reduced quality of life worldwide (1). In addition to the profound physical problems, the diagnosis of the disease causes a significant disorder in the mental status of patients. Anxiety, depression, and uncertainty about the future can be mentioned among these disorders (2, 3). Percutaneous Coronary Intervention (PCI) is one of the most common treatments for cardiovascular diseases (4, 5). However, PCI is a conventional and relatively low-risk method; most patients who experience anxiety are estimated to be about 24-72% (6).

The other stressor at the time of illness and hospitalization is uncertainty. Longitudinal studies have shown that uncertainty is at the highest possible level during diagnosis, with a positive relationship with anxiety and depression (7). Uncertainty and fear in patients waiting for coronary artery reconstruction are more harmful than chest pain. Studies have shown that patients recovering from PCI lack confidence and certainty regarding their illness and prognosis. Patients who undergo PCI show more uncertainty and mental discomfort, even three months after the procedure, compared to those who experience Coronary Artery Bypass Graft (8).

Hope is another factor that needs to be emphasized during recovery and prognosis of procedures and cardiovascular diseases (9). Hope is an essential and active power in life and causes mirthfulness. Hopelessness as well as decreased expectations and goals in life cause the quality of life to be diminished (10). Studies have shown that hope plays a vital role in the recovery of individuals. Optimists have a better overall look at the results of their surgery. Looking at the better part causes less stress and reduces heart attacks and other chronic diseases. In this regard, educating patients before cardiac procedures can reduce anxiety and uncertainty while increasing hope (11).

Patient education is one of the essential principles of nursing care, and if properly

implemented, it reduces many complications. This issue is more important in patients undergoing PCI treatment due to the short duration of hospitalization (12). Therefore, pre-angiography education becomes critical (13). Hence, providing patients' educational needs for self-care and ensuring the continuity of care from hospital to home are necessary (14). Education can be provided in various ways, one of which is multimedia education. Multimedia education has many benefits, such as transferring concepts and making text, audio, and video more attractive. In some studies, multimedia education was shown to be superior to other types of training. Research has shown that the use of educational multimedia before the onset of therapeutic interventions can significantly reduce fear and anxiety during treatment and increase the ability of patients to adapt to treatment methods (15). The studies that used multimedia to inform patients under cardiac catheterization obtained positive results, especially in getting familiar with the environment and the procedure (16). Other studies applied similar methods in different scenarios, showing that visual resources for guiding patients' results in increased satisfaction and better enforcement of a process (17). Considering the advantages of using multimedia training and the lack of documented empirical studies on the effects of these methods in PCI, this study aimed to investigate the impact of IM training on anxiety, uncertainty, and hope of patients undergoing PCI.

## Methods

### *Study Design*

There was an intervention group (interactive multimedia training) and a control group (educational pamphlet). This pretest-posttest interventional study was done on both groups.

### *Participants*

The patients who were chosen for the study had to be willing to take part in the research, not have mental illness or mental

retardation, and not have other long-term illnesses (according to the doctor's diagnosis). The exclusion criteria consisted of any history of participating in similar educational programs and being reluctant to continue their cooperation. Patients who underwent angiography but did not undergo angioplasty were also excluded from the study.

### *Setting*

Ninety PCI candidates in the angioplasty readiness room, post-CCU, and CCU were enrolled at Kosar Hospital, Shiraz, Iran, during September- December 2019.

### *Teaching Interventions in Intervention and Control Groups*

After obtaining permission from the Vice-Chancellor of Research and Technology and the Ethics Committee of Shiraz University of Medical Sciences, the researchers started to develop appropriate content related to PCI, using library browsing, books, and relevant papers. The educational material covered the following topics: the purpose of angioplasty, the cath lab environment, nursing care, patient preparation before and after the procedure, the sensation felt during the procedure, potential risks, post-discharge care, return-to-work time, and follow-up. Then, ten professors from the cardiology and nursing departments reviewed the educational content, and necessary corrections were made. Then, educational content was designed for IM and pamphlet methods. The topics in the pamphlet and IM were identical.

*IM:* Mayer multimedia education principles and standards were used to create the multimedia content. Textual, graphical, and spoken content pieces were made following educational content (15). Finally, after completing the education and learning path, a rapid authoring tool developed multimedia. The final version of the software was approved by two experts and made available to the research subjects following technical and content evaluation.

*Educational pamphlet:* Educational materials, which included both written and

visual information, were color printed on 22 A5-size sheets, with as many reprints as subjects in the control group. All the educational multimedia material was demonstrated stage-by-stage through written text and color photos in the pamphlet.

### *Data Collection Tool*

Before training, one day after, and two weeks after PCI, the anxiety, uncertainty, and hope levels of both groups were evaluated as follows:

1. Depression, Anxiety, and Stress Scales (DASS-21): Lovibond created a 21-item DASS-21 in 1995. The scoring method is based on the Likert scale, with four options: low, medium, and high. In the current study, only seven questions were used to measure anxiety. Therefore, the total score ranged from 0 to 21, and the higher score indicated higher anxiety. The validity and reliability of the Persian version of DASS-21 were assessed and approved by Sahebi et al., 2005. In their study, Cronbach's alpha for anxiety was equal to 0.92 (17).

2. Mishel Uncertainty of Illness Scale (MUIS): This questionnaire was developed in 1983 by Mishel and contains 33-items based on a five-point Likert scale from totally agree (5 points) to disagree (1 point), and the maximum score is 165 (18). Considering that the questionnaire has not been used in Iranian society so far, the translation and psychometric steps of the questionnaire were investigated in this study.

To determine the psychometricity of this tool, the Mishel uncertainty scale was first translated from English to Persian. Then, to carry out the content validity, the scale was delivered to 11 faculty members of Nursing and Midwifery Department at the Shiraz University of Medical Sciences. The professors used the Waltz and Bausell content validity index, where three aspects of relevance, clarity, and simplicity were examined, and their suggestions and opinions were applied. Ten nurses working in CCU and nursing staff examined face validity, and their views were also applied. To verify the reliability of the Michel uncertainty scale,

Cronbach's alpha method was used. The variance of four sub-tests: the unknown nature of the disease (13 points), complexity or multiple symptoms of treatment and complex health system (7 points), inconsistency in information (5 points) and prediction (6 points) were obtained, and Cronbach's alpha of 0.87 was obtained.

3. Snider Hope scale: This questionnaire was made by Schneider et al., 1991, consisting of 12 items. In this test, the scoring is done according to an 8-point Likert scale ranging from 1, "totally disagree" to 8, "totally agree." The range of scores can be placed between 8 and 64. Many studies support the reliability and validity of this questionnaire. Alaedini et al. reported internal consistency of 0.74–0.84 and test-retest reliability of 0.80 (19).

#### *Sample Size*

When we looked at the descriptive statistics for anxiety, uncertainty, and hope after doing the pilot study, we discovered that the hope variable requires a larger sample size than the other variables. Therefore, based on the following information for hope in the pilot study, the minimum required sample size was estimated at 41 in each group: type one error=0.05, type two errors=0.10, the difference in means=4.0, and the pooled standard deviation of means=5.5. Considering the 10% dropout probability, 45 patients were allocated to each group. Accordingly, the researcher referred to Kosar Heart Hospital daily and selected an angioplasty patient who met the inclusion criteria. Then the patients were randomly allocated either to the intervention group or the control group, using a block randomization technique. Instead of patients, weeks were randomly assigned to the control or intervention group. This was done to prevent the contamination of information and bias. The process, as mentioned earlier, continued until saturation.

#### *Statistical Methods*

The Chi-square test, independent t-test, and repeated measurements analysis were used to analyze the collected data. All the

statistical analyses were performed in SPSS 18.0, and a  $P < 0.05$  was statistically significant.

#### *Ethical Considerations*

This study was conducted with the ethics code (93-7067). It was approved by the local Ethics Committee of Shiraz University of Medical Sciences. The researcher first explained the study objectives, the process, and the anonymity of the participants, and then the informed consent was obtained from all the participants.

#### **Results**

Most of the participants in the current study were male (63.3%), married (94.5%), and over 50 years old (76.6%). The Chi-square test showed no significant difference between the two groups regarding demographic variables (Table 1).

The independent t-test showed that the mean score of hope, uncertainty, and anxiety between groups was insignificant before the intervention (Table 2).

The independent t-test showed that the mean score of hope, uncertainty, and anxiety between groups was insignificant before the intervention. However, in both the post-test and follow-up test (after two weeks), the mean of hope between groups was statistically significant ( $P < 0.001$ ), and repeated measurement analysis confirmed the effect ( $P < 0.001$ ). This finding meant that IM could lead to a considerable increase in the mean score for hope. This increase is shown in Figure 1. Also, there was a significant interaction between time and group ( $P = 0.002$ ), indicating different mean scores of hope profiles for other patient groups. Independent t-test suggested that the mean scores of uncertainty after and follow-up tests were significantly lower in the intervention group than in the control group ( $P < 0.001$ ).

As shown in Figure 1, obtained results indicate that IM effectively reduced the level of uncertainty among the intervention group, and testing for the simple factor effect of the group yielded a significant impact between groups in terms of uncertainty scores ( $P < 0.001$ ).

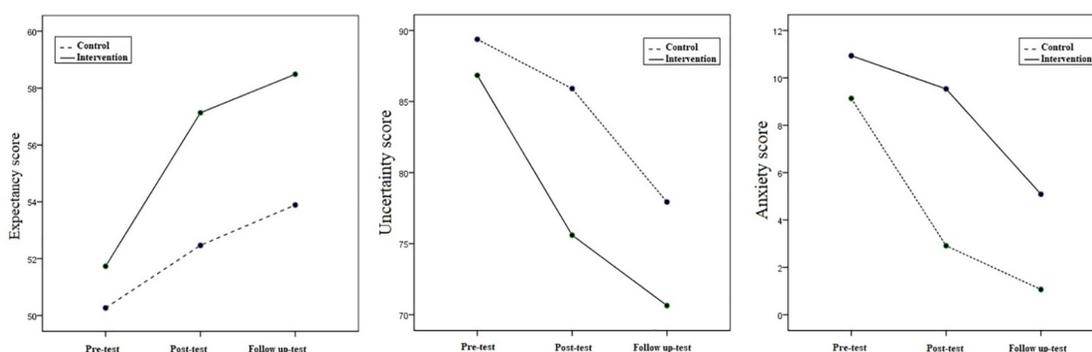
**Table 1:** Comparison of demographic characteristics between control and intervention groups

Variable	Subgroup	Intervention	Control	Total	P value
Gender	Male	28 (62.3%)	29 (64.4%)	57 (63.3%)	0.87
	Female	17 (37.7%)	16 (35.6%)	33 (36.7%)	
Age	< 40 years	2 (4.4%)	0 (0.0%)	2 (2.2%)	0.33
	40-50 years	10 (22.22%)	9 (20.0%)	19 (21.1%)	
	>50 years	33 (73.3%)	36 (80.0%)	69 (76.65%)	
Marital status	Married	42 (94.4%)	43 (96.6%)	85 (94.5%)	0.39
	Single	3 (6.6%)	2 (4.4%)	5 (5.5%)	
Education level	Illiterate	12 (26.6%)	13 (28.8%)	25 (27.7%)	0.83
	Primary	8 (17.7%)	10 (22.22%)	18 (19.8%)	
	High school	7 (15.5%)	6 (13.33%)	13 (14.4%)	
	Diploma	10 (22.22%)	10 (22.22%)	20 (22.22%)	
	University	8 (17.7%)	6 (13.2%)	14 (15.5%)	

**Table 2:** Descriptive statistics and results of repeated measures analysis for hope, uncertainty, and anxiety

Variable	Group	Time			P value		
		Pre-test	Post-test	After two weeks of test	Time	Group	Time Group
		Mean(SD)*	Mean(SD)	Mean(SD)			
Hope	Intervention	51.7 (4.4)	57.1 (5.3)	58.5 (4.5)	<0.001	<0.001	0.002
	Control	50.3 (5.7)	52.5 (6.2)	53.9 (5.4)			
T-test P value		0.18	<0.001	<0.001			
Uncertainty	Intervention	86.8 (14.2)	75.6 (11.9)	70.6 (8.5)	<0.001	<0.001	0.03
	Control	89.4 (8.4)	85.9 (10.7)	77.9 (8.2)			
T-test P value		0.31	<0.001	<0.001			
Anxiety	Intervention	9.1 (7.1)	2.9 (3.0)	1.1 (1.7)	<0.001	<0.001	<0.001
	Control	10.9 (5.7)	9.5 (5.3)	5.1 (3.7)			
T-test P value		0.19	<0.001	<0.001			

\*Standard Deviation

**Figure 1:** Trends of mean hope, uncertainty, and anxiety of patients in the intervention and control group

The repeated measures analysis for the trend of anxiety score revealed profoundly different anxiety profiles for other groups ( $P < 0.001$ ). As it is shown in Figure 1, the profiles mentioned earlier were not parallel across times, indicating the interaction effect

( $P < 0.001$ ), and they were at different mean levels, showing the main result of the group ( $P < 0.001$ ) (Table 2). Therefore, IM leads to a significant decrease in the anxiety score of patients. Also, the results showed that there was no significant relationship between

demographic data (age, gender, marital status, and education level) and the level of hope, uncertainty, and anxiety.

## Discussion

The present study was conducted to investigate the effect of IM on anxiety, uncertainty, and hope amongst patients under PCI. This study showed that IM reduced uncertainty and anxiety levels and increased hope in the intervention group. This finding is in line with the study results published by Tsai et al. (2012), which evaluated the effect of multimedia education on the level of disease-related anxiety and uncertainty among patients with Myocardial Infarction (MI) after angioplasty. Their results showed that multimedia education could reduce anxiety among angioplasty patients (20). Also, the results of a study by Jlala et al. (2010) showed the effect of IM on the anxiety level of patients under local anesthesia, causing a reduction in anxiety among pre-surgery patients (21).

The findings of Trotter et al. (22) who aimed to investigate anxiety in patients undergoing angioplasty, showed that anxiety before angioplasty was at its highest and gradually decreased after angioplasty and after discharge. This downward trend in anxiety indicates that anxiety before the procedure should be investigated and managed. Nurses' intervention is essential in reducing anxiety. The reduced anxiety of patients might be due to the multimedia's interactive features. In this way, content-rich sounds, music, and videos can attract people's attention and concentration, thereby reducing anxiety caused by lack of information and the unknown.

Also, the present study results showed that training through IM could impact the patients' level of uncertainty in the intervention group. Uncertainty in the intervention group was significantly reduced compared to the control group. This result is consistent with the results of other studies. Chiou et al. (23) conducted a study intending to survey the effect of multimedia education on knowledge, uncertainty, and decision-making processes

among patients in the final stage of renal disease and concluded that multimedia education could reduce patients' uncertainty. Although their study was carried out on renal patients and used the pre- and post-education method, they used the same group as control and the same group as the intervention. However, the present study was carried out on patients with heart disease. They were allocated into two groups: control and interference. These findings support the results of our research. There was a significant time to manage uncertainty regarding the pre-angiography and angioplasty periods. Therefore, multimedia education can be beneficial in reducing uncertainty in this regard.

Evidence shows that gaining hope is an essential measure of effectiveness for medical interventions (24). Likewise, our study showed that IM training effectively promotes a sense of hope. This means that the level of hope has significantly increased after the intervention. This increase could probably be because diagnosing coronary artery disease leads to reduced hope among patients (25). However, over time and with gaining more confidence, the level of hope will increase. By surveying the previous studies, none of them evaluated the level of hope among angioplasty patients.

The current study found that most patients were married, illiterate, and over 50 years old, just like in the previous studies (26, 27). These results suggest that multimedia might be effective despite demographic characteristics such as age, gender, and even education level. The reason might be that multimedia features, such as pictures, sounds, music, and interactivity of the electronic content, might affect learners' attention and concentration, leading to improved performance. This finding might be since it is easier to understand multimedia than educational pamphlets. Another reason might be that most patients were illiterate and were not able to read, write, and use the leaflets.

## Limitations and Suggestions

In terms of study limitations, it is advised

that future research compare the IM training and educational pamphlets over a more extended period and with a bigger sample size to provide a more accurate assessment of the level of hope, anxiety, and uncertainty experienced by the participants.

### Conclusion

Based on the findings, it can be concluded that IM training can be helpful in preparing patients by increasing their hope and reducing their anxiety and uncertainty. Therefore, due to the effectiveness of this method, IM training suggested educating patients under percutaneous coronary intervention.

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### Authors' Contributions

SG and NZ devised the study concept, designed the study, supervised the intervention, data collection, and analysis, participated in the coordination of the research, and critically revised the manuscript. HM collected the data, ran the study intervention, participated in the study concept, performed the analyses, and revised the manuscript. HRS contributed to the design and reporting of the study data and drafted the manuscript. All authors reviewed the manuscript and approved the final version. They take full responsibility for the content and writing of this article.

### Conflict of interests

There is no conflict of interests to be declared in this study.

### Ethical Considerations

The Research Ethics Committee of Shiraz University of Medical Sciences approved the conduct of this study (Issue: IR.SUMS.REC.1393.7067).

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