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Atefeh Behboudifar[1], Fatemeh Heshmati Nabavi[2*], Abdolghader Assarroudi [3]

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**Address:** Mashhad Nursing and Midwifery School, Ebn-e-Sina St., Mashhad, Iran
**P.O.Box:** 9137913199
**Tel.:** (098 51) 38591511-294
**Fax:** (098 51) 38539775
**Email:** EBCJ@mums.ac.ir

# Anxiety and Self-care Behavior in Patients Undergoing Head and Neck Radiotherapy: Effect of Print and Multimedia Health Materials

Atefeh Behboudifar[1], Fatemeh Heshmati Nabavi[2*], Abdolghader Assarroudi [3]

**Abstract**
**Background:** Patients undergoing radiotherapy require training through educational media due to the specific nature of this therapeutic modality.
**Aim:** The aim of this study was to compare the efficiency of multimedia and print educational tools in anxiety and self-care behaviors among patients undergoing radiotherapy.
**Method:** This randomized clinical trial was conducted on 60 patients referring to the radiotherapy centers of Mashhad, Iran, in 2016. Based on the treatment centers, the patients were randomly assigned into two groups of Group 1 and 2 provided by a 20-minute multimedia training session and three pamphlets, respectively. The patients' anxiety was assessed in two stages, namely before the intervention and prior to the initiation of the first radiotherapy session, using the State-Trait Anxiety Inventory. Neil's Self-care Inventory was completed at the end of the first, third, and fifth weeks of treatment for assessing self-care behaviors.
**Results:** The mean ages of the multimedia and pamphlet groups were 52.2±1.4 and 50.6±1.4, respectively. Paired t-test showed a significant decrease in the mean anxiety score of the pamphlet group (37.8±3.0) after the intervention, compared to that in the multimedia group (40.0±2.3) (P=0.009). Furthermore, the multimedia group had significantly higher self-care behavior scores, compared to the pamphlet group, in the first (P=0.003), third (P=0.01) and fifth weeks of treatment (P<0.001).
**Implications for Practice:** Educational multimedia tools can have a more effective contribution in maintaining self-care behaviors. Given the reduction of anxiety in the pamphlet group, it is important to consider the rate and flow of transferring information in radiotherapy training to reduce anxiety among patients.

**Keywords:** Anxiety, Multimedia tools, Pamphlet, Radiotherapy, Self-care behaviors

1. MSc in Nursing, Department of Medical-Surgical Nursing, School of Nursing and Midwifery, Mashhad University of Medical Sciences, Mashhad, Iran
2. Assistant Professor, Evidence-Based Care Research Center, Department of Nursing Management, School of Nursing and Midwifery, Mashhad University of Medical Sciences, Mashhad, Iran
3. Assistant Professor, Iranian Research Center on Healthy Aging, Department of Medical Surgical Nursing, School of Nursing And Midwifery, Sabzevar University Of Medical Sciences, Sabzevar, Iran

* Corresponding author, Email: heshmatinf@mums.ac.ir

**Introduction**
Cancer incidence has a growing trend in different societies to the extent that it is currently the second leading cause of mortality in the developed countries. Accordingly, more than 3,000 individuals annually pass away due to cancer. Preparation for radiotherapy as a common cancer treatment modality can be a stressful experience both for the patients and their families (1).

The patients candidate for radiotherapy are prone to increased stress and anxiety due to cancer diagnosis and new experiences and concerns regarding the radiotherapy process caused by such factors as the lack of knowledge on the devices used in the treatment room and their effects, unobservable treatment, long waiting time before treatment, and loneliness during the treatment. Therefore, the anxiety of radiotherapy has the greatest effect on the patient(2).

In a systematic review, Waller et al. (2014) reported that 40-62% of the patients experienced anxiety before the initiation of treatment (3). In many western countries, informing cancer patients about their condition is a common task. However, in Iran similar to a number of eastern countries, physicians avoid informing patients about their diagnosis, and they have no clarity in this regard. In addition, patients' families may also disagree with the medical team to disclose the diagnosis to the patient (4, 5). Moreover, some patients prefer to receive less information or want their family to be involved in their medical condition in order to decrease their anxiety (6, 7).

Previous studies have shown that patients experience radiotherapy complications, including fatigue, nausea, vomiting, reduced appetite, sleep disturbance, and dry mouth, more than other complications (8). The incidence rates of fatigue, sleep disturbance, and oral problems among the patients undergoing radiotherapy have been estimated as 95%, 31%, and 77-100%, respectively (2, 9).

Self-care behavior (SCB) is one of the useful strategies for patients to manage their symptoms and complications. According to the literature, the patients trained to deal with the complications of chemotherapy and radiotherapy begin self-care activities earlier, experience less anxiety levels, and can better manage side effects in comparison to their untrained counterpart (2, 9, 10).

In the legal regulations of some countries, patient training is regarded as a validation criterion for caring organizations, and also one of the determinants of the quality of hospital care. However, the integration of health training with patient care activities still faces dramatic challenges in Iran (11). Accordingly, the results of a study performed by Bahadori et al. (2010) demonstrated that among the services delivered in treatment centers, the patients reported the lowest satisfaction with the training dimension (12).

In the studies conducted in Iran, the main barriers to the proper training of patients included the lack of time due to the large number of patients, shortness of personnel, lack of psychological preparedness, improper physical conditions, and lack of educational equipment (13, 14).

Several factors have led to the inhibition of implementing training for the patients undergoing radiotherapy as a routine and organized activity. These factors include background problems, organizational culture barriers regarding the lack of support for patient training programs, and new establishment of patient training quality evaluation in hospital validation programs.

Furthermore, the provision of radiotherapy on an outpatient basis, short duration of the treatment, inappropriate psychological and physical conditions of the patient during the treatment, and lack of the required opportunity to interact with the patient and provide training have made the execution of training programs difficult and challenging (14, 15). Regarding this, the use of educational media can be a suitable approach for training these patients since in case of a proper selection, these tools, in addition to saving time, can enhance learners' motivation and deep learning (16).

Among the training tools, pamphlet is one of the most widely used, cheapest, and most accessible printed tools available for use in crowded medical centers that does not require any equipment. However, this tool is associated with some disadvantages, such as dependence on the reading abilities of the patients, also this device is not capable of showing the process (17-19).

There is evidence regarding the effectiveness of this tool in monitoring the perceived control of patients with cancer and psychological stress who are candidate for radiotherapy (20). However, in a study, the use of the script tools in oncology clinics was reported to be mostly ineffective in meeting the information requirements of the patients (14).

Multimedia tools are new educational methods that facilitate the transfer of concepts and materials in a simple, wide, and attractive manner through incorporating text, audio, image, and video. These tools, while providing frequent reviews, display processes and engage the visual and auditory senses.

Furthermore, they are less reliant on writing abilities and more useful among the low-literacy patients (19, 21).

The sociocultural specifications of each society are recommended to be taken into account in the selection and provision of patient education resources. The selection of a suitable educational method in accordance with the conditions and characteristics of the patients and treatment centers requires a comprehensive assessment of the methods, tools, and training strategies. Therefore, the content, outcome, and impact of each educational process must be considered in the comprehensive assessment of the patient education process (22).

Various studies have compared the effectiveness of the pamphlet and multimedia tools; however, they reported inconsistent findings. In some studies, it was reported that multimedia methods were not effective in patient anxiety despite resulting in the increased satisfaction of patients with education (21, 23). Nonetheless, some studies reported no significant difference between the efficiency of multimedia training and pamphlet in patients' anxiety (24). On the other hand, the results of some studies indicated a significant difference in the efficiency of multimedia and script tools in terms of anxiety, knowledge, and satisfaction (25, 26).

In addition, the results of a systematic review study indicated that these educational tools result in different outcomes. In the mentioned systematic review, it was recommended to emphasize on the behavioral outcomes and use the same educational content when comparing the two media (19).

To the best of our knowledge, the effectiveness of the print and multimedia tools has not been comprehensively examined yet. Regarding the questions on choosing appropriate educational media for patients and the controversies in this regard, the present study was conducted to determine the effectiveness of multimedia and print tools focusing on behavioral outcomes in Iran using a comprehensive approach.

**Methods**
The present randomized trial was conducted on 60 patients newly diagnosed with head and neck cancer and referring to the medical centers (three centers) of Mashhad University of Medical Sciences, Mashhad, Iran, within 2016-2017. All participants received radiotherapy as the first treatment of cancer.

The inclusion criteria were: 1) diagnosis of head and neck cancers, 2) age range of 18-65 years, 3) fluency in Persian language, 4) ability to understand the given information, 5) no history of chemotherapy within the last 3 months, 6) first experience of radiotherapy, 7) no history of major stressful events, except for the cancer diagnosis, in the last 6 months (e.g., death of loved ones, marital separation, and dismissal from work), 8) no history of diagnosed psychiatric disorder, and 9) no history of psychiatric medicine consumption.

On the other hand, the exclusion criteria included: 1) failure to read/view the educational content before the first session of the treatment, 2) death or physical condition that makes it impossible to continue cooperation, and 3) occurrence of stressful events during the study.

Mashhad as the second largest city of Iran and the only main referral center offering medical services in eastern Iran entails three radiation therapy centers. These centers are public governmental hospitals with the same physicians. The participants were allocated into two groups based on the number of patients admitted to treatment centers. To this end, the patients referring to Emam Reza Hospital and Reza Oncology Center were assigned into Group 1, and those referring to Omid Hospital were allocated into Group 2. This allocation was performed in order to prevent data transfer among the study groups. In the next step, the two groups were randomly assigned into the multi-media (Group 1) and pamphlet (Group 2) groups through drawing lots.

The data were collected using a demographic-health form, Self-Care Dairy, and State-Trait Anxiety Inventory. The demographic form included both demographic and health information. The demographic information covered in this from included gender, age, marital status, employment, economic situation, insurance status, and education level. Health information entailed the place of treatment (i.e., face, neck, or mouth), history of receiving chemotherapy, and underlying diseases.

The Self-Care Dairy is a descriptive and self-report measure designed by Nail et al. (1991). This instrument evaluates the occurrence and intensity of 12 side effects of cancer therapy, as well as the usage and effect of self-care behaviours for each side effects. It measures the number of the side effects experienced, severity of each side effects, number of self-care behaviours performed for a

given side effect, and effectiveness of each self-care behaviours.

In the current study, this tool was modified by reducing the number of studied side effects and using a telephone interview rather than a written survey. Accordingly, the researchers just included the frequently experienced side effects of radiotherapy, namely sleep disturbance, loss of appetite, mucositis, and fatigue, as well as the self-care behaviour for these side effects. Therefore, the score range of self-care behaviour ranged within 0-5.

The subjects were asked to report experiencing specific side effects and rate their severity on a five-point Likert scale (ranging within not severe=1 to extremely severe=5). The incidence and severity of the side effects were obtained by summing up the items and averaging the score. An average score for the number of self-care behaviours used for each side effects was obtained by summing up the number of adopted self-care behaviours divided by the number of experienced side effects.

Since there were variations in the number of self-care behaviours listed for different side effects in the proposed study, we examined self-care behaviours performed for each side effect, as well as the total number of self-care behaviours. The efficacy of self-care behaviours was individually examined in relation to each side effect (14).

Due to the lack of access to the Persian version of this instrument, the items used in this study were translated under the supervision of the head of English Department, and then back-translated to ensure the accuracy of the translated version. To confirm the content validity of the questionnaire, it was distributed among 10 faculty members of nursing in Mashhad University of Medical Sciences. In addition, the reliability of the questionnaire was confirmed by obtaining a Cronbach's alpha coefficient of 0.90.

The State-Trait Anxiety Inventory, developed by Spielberger (1983), is a 20-item questionnaire that has been extensively used for the assessment of anxiety in medical, surgical, psychosomatic, and psychiatric patients. The state anxiety scale measures transitory anxiety, whereas the trait anxiety scale evaluates how individuals feel in general. In this study, only the state section of this inventory was used.

This instrument is rated on a four-point Likert scale (ranging within very little=1 to too much=4). In this tool, individual's score is obtained by summing up the scores of 20 items. Regarding this, it has a score range of 20-80. In this instrument, the score ranges of 20-31, 32-53, 54-64, 65-72, and 73-80 are indicative of slight, moderate, rather severe, severe, and too severe anxiety, respectively.

The results of the test-retest and alpha coefficients demonstrated that this inventory is a reliable instrument that possesses internal consistency and stability. The assessment of validity through concurrent, convergent, divergent, and construct validity confirmed the validity of this instrument (27). In this study, the reliability of the questionnaire was assessed showing a Cronbach's alpha coefficient of 0.85.

A 20-min multimedia tool (i.e., DVD) was made by the researchers using the Camtasia software. This DVD contained information regarding the radiotherapy of the head and neck and included images, films, audio, music, and texts. The information was presented in four sections described as follows:.

Part 1: General information about disease and treatment modalities.

Part 2: What is radiotherapy? What are essential tips to know during the treatment seasons?

Part 3: What are the possible side effects of head and neck radiotherapy and self-care behaviors to manage them?

Part 4: A test including five questions about the subjects the answers of which were presented after a few minutes.

The written materials contained a set of three coloured pamphlets. The content of the pamphlets was the same as that of the multimedia tool. The first pamphlet entailed general information about the disease and treatment modalities. It also contained information about radiotherapy and the essential tips to know during the treatment seasons. The second and third pamphlets covered the probable side effects and the way to manage them. The content of both media was confirmed by an oncology specialist and professional nurses.

Prior to data collection, the study proposal was approved by the Regional Ethics Committee of Mashhad University of Medical Sciences. Informed consent was obtained from all participants before entering the study. Furthermore, they were ensured about the possibility of study withdrawal at any time without any influence on their treatment plan.

The researchers referred to the centers to identify the eligible cases after visiting the physician and receiving radiotherapy prescription. After providing the participants with basic information and assessing

their ability to receive and comprehend information, all subjects filled out the demographic and also anxiety instrument for the first time. Then, the patients in the multimedia group and their care givers were subjected to a 20-min face to face educational session during which they were briefly provided with information regarding the treatment process, as well as the general and systemic side effects.

Based on the intervention groups, the multimedia was delivered to Group 1, and the three pamphlets were submitted to Group 2. They were asked to use their media before starting radiotherapy. At the first session of radiotherapy (before the patient's arrival to the treatment room), the patients completed the state-anxiety questionnaire for the second time.

In order to fill out the Self-Care Dairy, all subjects were interviewed by the same interviewer for three times namely, at the end of the first, third, and fifth weeks of treatment, by telephone, during which the participants reported the self-care behaviors they adopted in the previous week.

### Statistical analysis

Data analysis was performed in SPSS (version 13). Descriptive statistics, such as frequency, percentage, mean, and standard deviation were used to describe the demographic data. The inter- and intra-group comparison of anxiety was accomplished using the independent and paired sample t-tests, respectively. Given the non-normality of the data related to self-care behaviors, the Mann-Whitney U and Friedman tests were run to compare this variable between and within the groups, respectively. Figure 1 illustrates the design of the study.
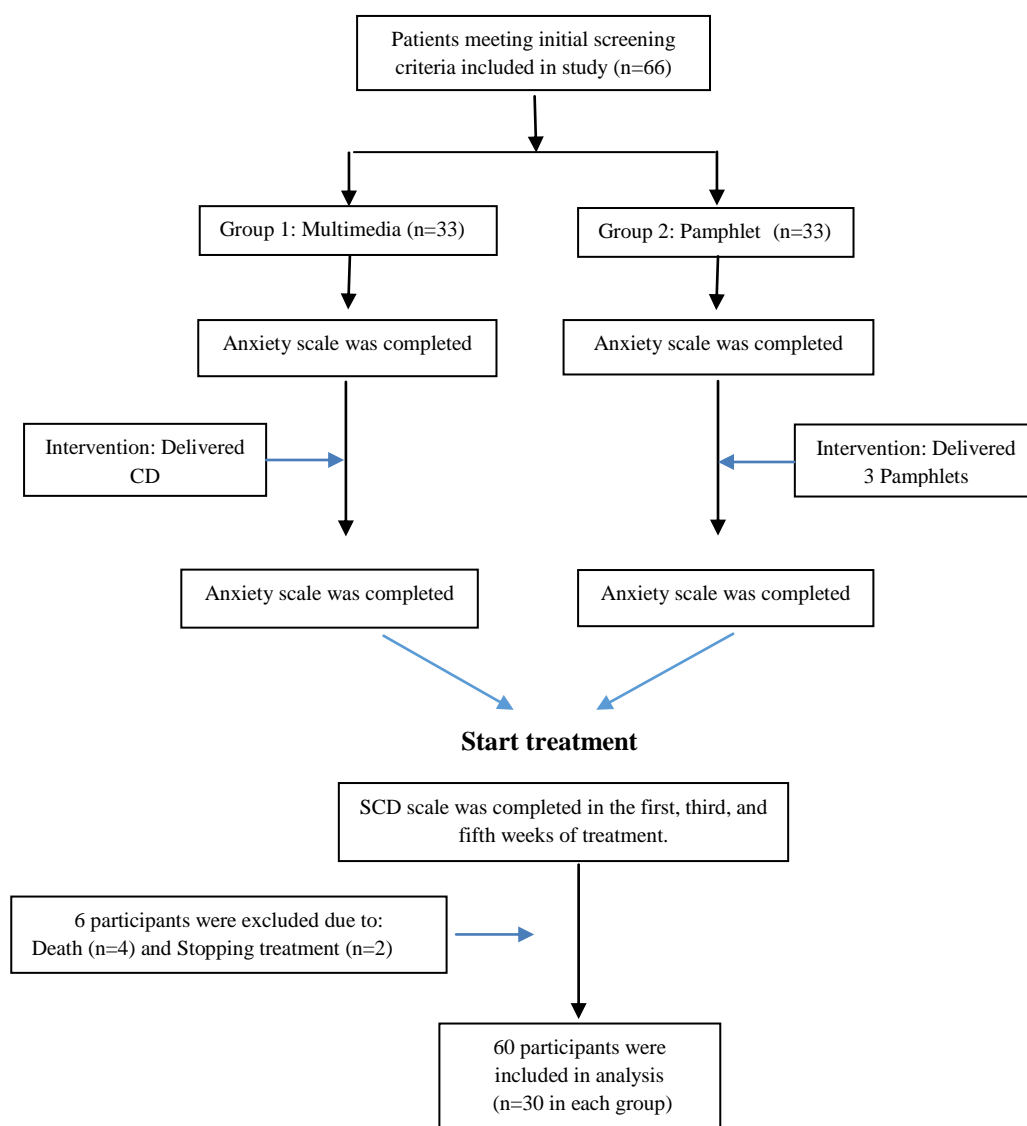


**Figure 1. Design of the study**

**Results**
According to the results, there was no significant difference between the two intervention groups (i.e., multimedia and pamphlet) in terms of the baseline demographic variables, expect for education level, economic status, and history of chemotherapy. The mean ages of the participants were 52.2±1.4 and 50.6±1.4 in the multimedia and pamphlet groups, respectively. Furthermore, most of the participants were male (n=11, 61.7%).

Regarding the education level, 11 (36.7%) patients in the multimedia group had senior high school education and 23 (76.7%) participants in the pamphlet group had primary education (five grade or lower). Furthermore, 17 (56.7%) patients in the pamphlet group had a history of chemotherapy in the last 3 months; however, only 1 (3.3%) patient in the multimedia group had such a history (Table 1).

The results of the independent sample t-test revealed no significant difference between the two groups in terms of the mean anxiety score before the intervention (P=0.08). The mean anxiety scores of the participants in the pamphlet and multimedia groups were 37.8±3.0 and 40.0±2.5 after the intervention, respectively. According to the results of the paired t-test, the mean anxiety scores were significantly different in both group at the post-intervention stage, compared to the pre-intervention stage (P<0.001). The results of the independent sample t-test showed a significant difference between the pamphlet and multimedia groups after the intervention regarding anxiety (P=0.009). In this regard, the pamphlet group showed a significantly lower level of anxiety than the multimedia group (Table 2).

The results of the Man-Whitney U test demonstrated a statistically significant difference between the pamphlet and multimedia groups in terms of self-care behavior scores in the first (P=0.003), third (P=0.015), and fifth weeks of the treatment (P<0.001). In this respect, the multimedia group had a higher score in all three stages. Additionally, the results of the Friedman test demonstrated a significant increase in the self-care behavior scores of both groups during the first to fifth week of the treatment (P<0.001) (Table 3).

**Table 1. Description of the sample**

| Variable | Multimedia group (n= 30) n ( %) | Pamphlet group (n= 30) n (%) | P-value |
|---|---|---|---|
| Age (years) (Mean±SD) | 52.2±1.4 | 50.6±1.4 | $P^*$=0.43 |
| Gender | | | |
| Male | 18 (60) | 19 (63.3) | $P^{**}$=0.79 |
| Female | 12 (40) | 11 (36.7) | |
| Education | | | |
| Primary school | 10 (33.3) | 23 (76.7) | |
| Junior high school | 1 (3.3) | 2 (6.7) | $P^{***}$=0.004 |
| Senior high school | 11 (36.7) | 4 (13.3) | |
| Academic education | 6 (20.0) | 1 (1.3) | |
| Marital status | | | |
| Single | 2 (6.7) | 2 (6.7) | |
| Married | 27 (90.0) | 26 (86.7) | $P^{***}$=1.00 |
| Widow | 1 (3.3) | 2 (6.7) | |
| Divorced | 0.0 | 0.0 | |
| Economic status | | | |
| Below normal | 9 (30.0) | 21 (70.0) | |
| Normal | 20 (66.7) | 9 (30.0) | $P^{***}$=0.004 |
| Above normal | 1 (3.3) | 0.0 | |
| Insurance | | | |
| Yes | 29 (96.7) | 28 (93.3) | $P^{****}$=0.55 |
| No | 1 (3.3) | 2 (6.7) | |
| History of chemotherapy | | | |
| Yes | 1 (3.3) | 17 (56.7) | $P^{**}$≤0.001 |
| No | 29 (96.7) | 13 (43.3) | |
| Place of treatment | | | |
| Neck | 17 (56.7) | 25 (83.3) | |
| Mouth | 12 (40.0) | 4 (13.3) | $P^{***}$=0.05 |
| Face | 1 (3.3) | 1 (3.3) | |

$P^*$ = Mann-Whitney U test   $P^{**}$ = Chi-Squared   $P^{***}$ = Exact Chi-Squared   $P^{****}$ = Fisher's exact test

**Table 2. Comparison of anxiety scores in two groups before and after intervention**

| Anxiety | Pamphlet (n=30) | Multi-media (n=30) | P-value |
|---|---|---|---|
| | Mean± SD | Mean± SD | |
| Before intervention | 45.3±3.1 | 46.6±2.5 | P[*]=0.08 |
| After intervention | 37.8±3.0 | 40.0±2.3 | P[*]=0.009 |
| Within group | P[**]<0.001 | P[**]<0.001 | |

P[*]: Independent sample t-test
P[**]: Paired t-test

**Table 3. Mean score of self-care behavior in multi-media and pamphlet groups**

| SCB | Pamphlet (n=30) | | Multimedia (n=30) | P-value |
|---|---|---|---|---|
| | Mean±SD | | Mean±SD | |
| 1st SCD | 2.90±0.7 | 19 | 3.80±0.9 | P[*]= 0.003 |
| 2nd SCD | 0.33±0.1 | 30 | 0.27±0.04 | P[*] =0.01 |
| 3rd SCD | 3.43±0.5 | 30 | 4.51±1.8 | P[*]= <0.001 |
| Within group | P[**]<0.001 | | P[**]<0.001 | |

SCB: self-care behavior
P[*]: Man-Whitney U test
P[**]: Freidman test

**Discussion**

As the findings indicated, the use of pamphlet as a training tool was more effective in reducing patients' anxiety before radiotherapy, compared to the employment of multimedia tools. However, there was no significant difference between the two groups (i.e., pamphlet and multimedia tool) regarding the incidence and severity of side effects of radiotherapy. Moreover, the findings indicated that multimedia tool had a greater impact on the self-care behaviors of patients, compared to the pamphlet.

The decrease in anxiety among both groups of patients after receiving training indicated the effectiveness of the preparation programs, provision of information, and patient's knowledge on the treatment method in reducing anxiety among the patients undergoing radiotherapy. These results are in agreement with those reported by Kaur et al. (2014) investigating the effect of training programs before radiotherapy on patients' anxiety rate (28).

In the mentioned study, written and visual tools, like PowerPoint, were used in the intervention group, and the control group was subjected to the routine care program. The anxiety rate was measured by a researcher-made questionnaire and indicated that the anxiety was decreased in both groups after training; however, this decrease was higher in the intervention group.

In another study, Harrison et al. (2000) examined the effect of educational films on the anxiety of the patients undergoing radiotherapy. The mentioned study was conducted on patients with head and neck, prostate, and bladder cancers, and training in the control and intervention groups was provided by leaflets and both leaflets and videos, respectively. They demonstrated that the leaflet group experienced less anxiety in the dimension of worrying about hair loss. Nonetheless, no statistically significant difference was reported between the two groups in terms of other dimensions of anxiety under study (29).

Despite the advantages of audio-visual tools, it seems that the achievement of general information has a greater effect on reducing patients' anxiety, compared to the fully-detailed visual presentation of the procedure before the onset of the treatment. Moreover, this result can be due to the method and time of information presentation. In the present study, the materials were presented in form of a pamphlet in three sections, provided separately (information on radiotherapy, side effects and management of these complications).

This finding is consistent with the results obtained by D'haese et al. (2000), showing that when the information is provided gradually and according to the treatment stage, it had a greater impact on the decrease of anxiety, compared to the time it is presented instantly (30).

However, some studies reported no significant difference in the anxiety rate of the patients exposed to written and video training methods. For example, in a study carried out by Dunn et al. (2003) on the effect of training videos on the anxiety of patients with breast and head and neck cancer undergoing

radiotherapy, despite observing anxiety reduction in both groups after training, there was no significant difference between the two groups in this regard (17). In the mentioned study, the intervention group received an educational video before the initiation of the treatment, in addition to the routine information about verbal training provided by an oncologist and booklets, and the control group only received the routine training.

Overall, it can be claimed that although multimedia tools have an advantage in conveying education, the provision of pre-treatment education entailing general information is more effective in reducing the anxiety of patients in Eastern Iran than giving a detailed image of the procedures.

In the present study, the score of self-care behaviors was significantly higher in the multimedia group in comparison with that in the pamphlet group in the first and fifth weeks of the treatment. In addition, self-care score increased in both groups during the fifth week, compared to that in the first week of the treatment. Moreover, self-care behavior score showed a significant decrease in both groups in the third week, compared to that in the first week. This can be due to an increase in the side effects of the treatment in the third week, and the patient's mismatch with these complications.

Therefore, the results are not surprising when considering the advantages of multimedia tools in training, including the capability of observing the progress trend, increased attractiveness of learning, and usability for low-literacy patients (19, 21). Another benefit of using multimedia tools is its capability in providing a step-by-step training based on the patient's educational needs and frequent reviews, which can maintain and enhance the patient's proper behaviors (23, 31).

In a study entitles as "Effect of a patient training program based on multimedia tools on the knowledge and willingness to screen for colorectal cancer", Makoul et al. (2009) observed that the patients' willingness to screen was significantly increased after the use of multimedia tools (31). They concluded that multimedia tools can be beneficial in learning, and that these tools improve the willingness of the patients, even that of the low-literacy individuals, to perform screening tests and participate in decision making by using graphic design, audio, and image.

In another study performed in Australia and entitled as "Comparison of compact discs and script methods in fall prevention training for the elderly admitted in hospitals", Hill et al. (2009) reported that the participants in the CD group had a significantly higher score than the controls in terms of the perceived risk of falling, self-confidence, and motivation for adopting self-care methods (25). Some studies have shown that the use of multimedia or script methods exert no effect on information recall rate (e.g., Astley et al., 2007). However, in the present study, the relationship between information recall and educational tools was not considered.

One of the limitations of the current study was the lack of possibility to perform the study on three groups to assess the effect of educational media on anxiety because we could not have a control group that did not receive any training due to moral reasons. In addition, the radiotherapy centers routinely deliver written materials to educate patients. Therefore, we used the same content for both groups to compare the two tools. Although we included the patients with no history of major stressful events in the last 6 months, it was impossible to control the usual stressful events during the study.

**Implications for Practice**
Considering the higher decrease in the anxiety of the patients in the pamphlet group after the intervention, and the accessibility, cost efficiency, and effectiveness of this tool, it is recommended to use this training tool for the patients candidate for radiotherapy. However, regarding the effectiveness of both pamphlet and multimedia tools in reducing anxiety, each of these tools can be used based on the patients' conditions and characteristics, including their level of education and interests.

Our findings also demonstrated a higher self-care score in the multimedia group, compared to that in the pamphlet group. Consequently, the use of this educational tool can be advantageous in strengthening the patients' self-care behaviors during the treatment period. In this regard, when patients are bored and have less energy to study, this educational tool is a good tool for reviewing the previous materials and reducing the severity of radiotherapy side effects.

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**Conflicts of Interest**
The authors declare no conflicts of interest regarding the publication of this article.

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