

## The Effect of Peer Education on Knowledge, Comprehension, and Knowledge Application of Patients Regarding Chemotherapy Complications

### Abstract

**Background:** The aim of the present study was to determine the effect of peer education on the level of knowledge, comprehension, and knowledge application of patients regarding chemotherapy complications. **Materials and Methods:** This study was performed on 80 patients with cancer undergoing chemotherapy in 2018. The participants were selected through convenience sampling and randomly allocated to the two groups of control and intervention (40 participants per group). Before the intervention, the participants in both groups completed a demographic characteristics form and the Educational Needs Assessment Questionnaires. Then, the peer education intervention was designed based on the educational needs of the patients regarding chemotherapy complications for the intervention group. Peer education was performed face-to-face and individually during two chemotherapy sessions. The questionnaires were re-administered to both groups 2 weeks after the end of the second chemotherapy session and data analysis was performed using independent *t*-test, Chi-square. **Results:** The means of knowledge ( $t_{78} = 19.74, p < 0.001$ ), comprehension ( $t_{78} = 17.27, p < 0.001$ ), and knowledge application ( $t_{78} = 14.84, p < 0.001$ ) were significantly increased after peer education in the intervention group compared to the control group. The difference in the means of knowledge ( $t_{39} = 17.40, p < 0.001$ ), comprehension ( $t_{39} = -18.53, p < 0.001$ ), and knowledge application ( $t_{39} = -13.94, p < 0.001$ ) after peer education, compared to before the intervention, was significant in the intervention group. **Conclusions:** Peer education can lead to increased level of knowledge, comprehension, and knowledge application of patients in terms of chemotherapy complications.

**Keywords:** Cancer, complications, comprehension, education, Iran

### Introduction

Today, complex diseases such as cancer, diabetes, and Cardiovascular Disease (CVD) cause serious social and financial problems and place a heavy burden on health systems.<sup>[1]</sup> Cancer is one of the major causes of death and disability in the world. Because of aging and population growth, the global cancer burden will continue to increase.<sup>[2]</sup> Cancer is the most difficult challenge for modern medicine and is responsible for about 9 million deaths worldwide, with above 14 million new cases reported per year.<sup>[3]</sup> In Iran, cancer is the third leading cause of death.<sup>[4]</sup> The progress made in cancer treatment has led to a considerable recovery rate among the patients with cancer. These treatments consist of surgery, chemotherapy, targeted

agents, immunotherapy, and radiation therapy. Although new therapies and a combination of treatments improve survival, many patients with cancer experience the side effects that persist even after the end of the treatment, which could reduce the Quality of Life (QOL).<sup>[5]</sup> Chemotherapy is among the important components of treatment for many cancers; however, due to the nature of chemotherapy, causing damage to cancer cells can also lead to damage in healthy cells, and thus, side effects.<sup>[6]</sup> Patients with cancer and their families lack awareness of chemotherapy, expected side effects, possible toxicity, and patient care or self-care for minimizing the side effects, and thus, should receive the necessary education on the nature of the disease as well as control and prevention of treatment side effects.<sup>[7]</sup>

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Peer education is being increasingly used as a tool for patient education, because it improves the learning results and has positive clinical outcomes. Peer education programs reduce the use of health services and increase the patient's confidence in the primary care and hospital system. Peer-facilitated patient education creates an important bridge between patients and medical professionals; one could argue that despite continuous advancements in technology and medical care and increased access to online information, there is still no replacement for traditional human contact.<sup>[8]</sup> Thus, in the study by Gozum *et al.* peer education led to positive changes in women's health beliefs and breast self-examination knowledge.<sup>[9]</sup> For success in teaching, it is necessary to evaluate all the factors effective in and relevant to the ability and desire of the client in terms of learning and specify their educational needs in order to determine the educational content.<sup>[10]</sup> The educational needs are the distance between what the person knows and what s/he must know; this distance could be caused by lack of knowledge, attitudes, or skills.<sup>[11]</sup>

Studies carried out in Iran have focused on investigating the effect of patient care education on the level of knowledge, comprehension, and knowledge application of caregivers for patients with cancer undergoing chemotherapy<sup>[7]</sup> and evaluating the impact of knowledge and performance of patients with breast cancer on chemotherapy complications.<sup>[12]</sup> However, the effect of peer education on knowledge, comprehension, and knowledge application of patients regarding chemotherapy complications has not been investigated. The present study was conducted on individuals who were recently diagnosed with cancer, were referring to Imam Khomeini Educational Therapeutic Center, Urmia, Iran, in 2018, and, based on their medical records, had no previous history of cancer or chemotherapy. The use of peers at hospitals provides an easy way to engage patients under chemotherapy. Today, it is expected of nurse educators to use creative communication technologies to enrich the learning environment. Thus, the aim of the present research was to determine the effect of peer education on the level of knowledge, comprehension, and knowledge application of patients with cancer undergoing chemotherapy.

## Materials and Methods

This randomized clinical trial (with code IRCT20161116030926N2) was conducted in 2018. The research population comprised patients referring to the Blood and Oncology Clinic of Imam Khomeini Educational Therapeutic Center to which patients in West Azarbaijan Province located in the Northwest of Iran were referring. We calculated that the sample size for each group should be 40 individuals (total: 80 participants) at an alpha of 0.05, a power of 0.80,  $d = 4$  [the minimum mean difference for each of the variables between the two groups], and  $s_1 = 7.44$  and  $s_2 = 3.71$  [based on the results of similar

studies],<sup>[13]</sup> and assuming a 10% dropout rate for each group [Figure 1].

The participants were selected using convenience sampling method and blocked randomization methods from among patients with cancer who first visited this center for chemotherapy. The size of the blocks was determined as 8 in this study (a combination of AAAABBBB). Based on the sample size, the number of the required blocks was considered as 10.

All the possible combinations (70 combinations) of AAAABBBB were listed and a code was assigned to each one. From among these codes, 10 were selected using drawing method and listed in order. The assignment of the individuals to the groups was based on the combination of the selected blocks, which guarantees the lack of prediction of the assignment of the participants to the intervention and control groups due to its random nature, and that the size of each group remains equal.

The inclusion criteria were age of 18–65 years, a type of cancer that requires chemotherapy for the first time with the diagnosis of the specialist, ability to communicate with others, willingness and informed consent to participate in the study, awareness of time and place, and ability to read, write, study the pamphlet, and fill in the Educational Needs Assessment Questionnaire. The exclusion criteria were recent participation in similar educational and research sessions as well as absence of the patient from educational sessions.

In this research, for data collection, a demographic characteristics form and the Educational Needs Assessment Questionnaire were used. The demographic characteristics form contained questions regarding individual information and disease information, and the Educational Needs Assessment Questionnaire contained questions about the knowledge, comprehension, and knowledge application of patients undergoing chemotherapy. The questions concerning level of knowledge and comprehension were related to the short-term and long-term complications of chemotherapy, and questions on knowledge application level were related to short-term complications of chemotherapy (occurring at least 2 weeks after chemotherapy). To determine the level of knowledge, scores of 1–8, 9–16, and 17–25 represented a poor, medium, and good level of knowledge, respectively. To determine comprehension level, scores of 1–3, 4–6, and 7–9 signified poor, medium, and good comprehension, respectively. Moreover, to determine the level of knowledge application, scores of 1–4, 5–8, and 9–11 illustrated poor, medium, and good knowledge application, respectively. The questionnaire was completed before and 4 weeks after the intervention by the patients. This questionnaire was designed by Farahani *et al.* in 1999, and its validity was investigated and approved by faculty members of the Islamic Azad University in Tehran, Iran, and its reliability was approved by a correlation coefficient of 0.85.<sup>[14]</sup>

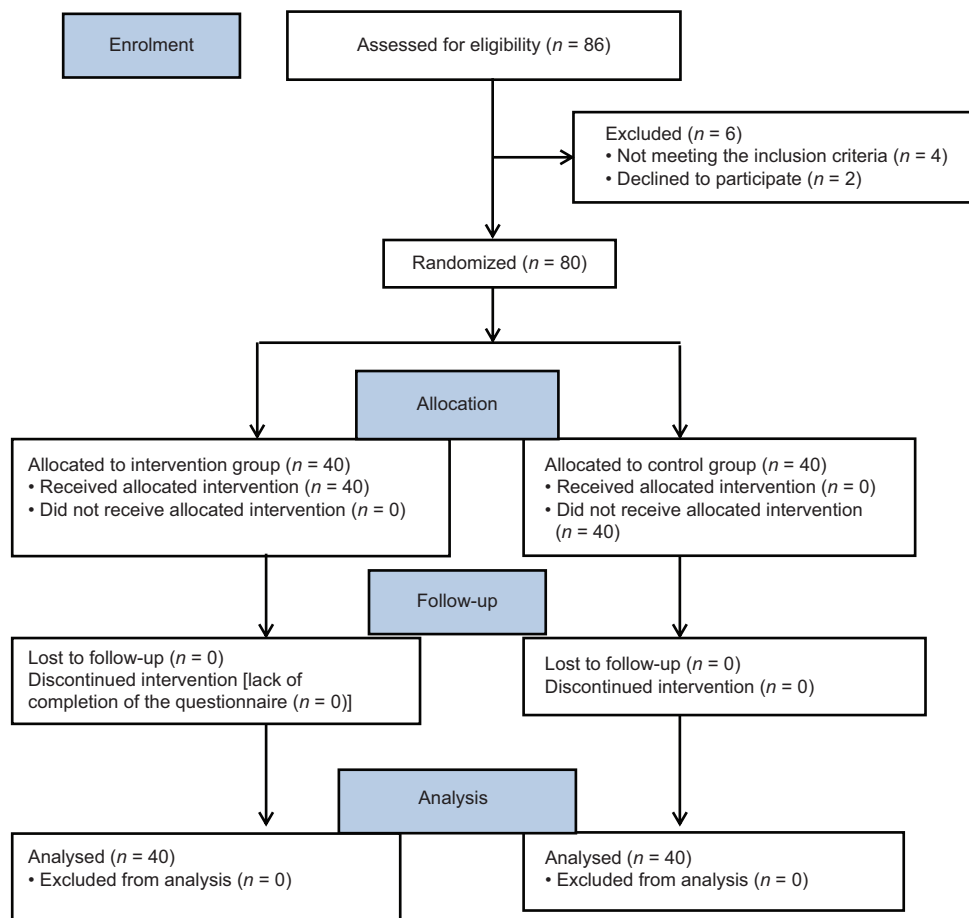


Figure 1: CONSORT flow diagram for the study

In order to perform the study, after acquiring permission and making the necessary arrangements, in the first step, 3 patients with cancer who had been undergoing chemotherapy for at least 6 months and had the ability to communicate with others and were interested in participating in educational activities were introduced as peer educators by oncology specialists and selected based on the evidence in the patient's file in terms of the incidence of chemotherapy complications and success in disease management. After obtaining the consent of the interested persons for participation as peers and before starting the intervention, the aim of the research and method of educating patients were explained by the researcher to the peers in order to observe the ethical considerations. The educational content included the definition of peer, the purpose, role, and responsibility of the peer, communication skills such as attention to verbal and nonverbal behaviors of the patient, principles of education on chemotherapy (introduction to chemotherapy and its complications, and management and control of chemotherapy complications), responses to peer questions, correction of wrong beliefs on chemotherapy complications, and their management. These were presented to the peers during a 2-hour session at the Oncology Clinic of Imam Khomeini Educational

Therapeutic Center through lectures, group discussions, questions and answers, and exchange of the information and experiences of peers on chemotherapy. At the end of the session, the educated items were discussed. In the next step, the purposes of the research was explained to each of the participants referring for chemotherapy for the first time, and they were encouraged to participate in the research, the researcher obtained informed consents, and then, distributed the questionnaires among the participants. Subsequently, the researcher extracted the educational needs of the participants by studying the questionnaires and, based on the counted needs regarding complications of their chemotherapy drugs, the required trainings were designed and provided by the peers face-to-face and individually 1 hour before the start of the first and second chemotherapy sessions along with the educational pamphlet. At the end of each session, the educational pamphlets related to the strategies for coping with chemotherapy complications were given to the intervention group. In addition to the presence of a researcher in the hospital, the patients were given a phone number to answer any questions they may have on chemotherapy complications during the implementation of the research, so the participants could be supported for better education. In the control group, no intervention

was offered during the research period. The Educational Needs Assessment Questionnaire was again completed by the participants in the intervention and control groups 2 weeks after the end of the intervention.

The collected data were imported into SPSS software (version 16, SPSS Inc., Chicago, IL, USA) and the independent *t*-test was used to compare the quantitative data (scores of knowledge, comprehension, and knowledge application) between the two intervention and control groups. Paired *t*-test was employed to compare the quantitative values before and after the intervention in the control and intervention groups at the significance level of 0.05. Multiple regression analysis was used to control the potential confounding variables. For this purpose, the variables of age, sex, education, and groups under study were introduced into the three dependent variables (knowledge, comprehension, and knowledge application) using backward methods.

### Ethical considerations

This study was approved by the Ethics Committee of Urmia University of Medical Sciences (1397.118 IR.UMSU.REC). Obtaining informed consents, explaining the nature, method, and purpose of the research to patients, and performing the study in accordance with the Helsinki Statement, observing the principle of secrecy and confidentiality of the data, and freedom of the research participants to leave the study were the ethical principles observed in this research.

### Results

In order to evaluate the data distribution, Kolmogorov-Smirnov test was used. As *P* was higher than 0.05 in the test, it could be concluded that the data had a normal distribution; thus, it was possible to use parametric tests. The demographic characteristics of the statistical population of the research, which shows the absolute and relative distributions of the research units, are presented in Table 1. As can be seen, the two groups of intervention and control were homogeneous in terms of demographic information and the statistical tests showed no significant differences between the two groups, which indicated the statistical uniformity of the subjects in the intervention and control groups ( $p > 0.05$ ) [Table 1].

The absolute and relative frequency distributions of the patients with cancer undergoing chemotherapy based on the level of knowledge, comprehension, and knowledge application showed that the majority of the participants in both groups had poor knowledge ( $\chi^2 = 1.37, p = 0.500$ ), comprehension ( $\chi^2 = 0.05, p = 0.970$ ), and knowledge application ( $\chi^2 = 0.23, p = 0.630$ ) before the educational intervention. However, scores of knowledge ( $\chi^2 = 72.26, p < 0.001$ ), comprehension ( $\chi^2 = 67.77, p < 0.001$ ), and knowledge application ( $\chi^2 = 66.71, p < 0.001$ ) in the intervention group showed a significant increase after the intervention [Table 2].

According to Table 3, the independent *t*-test showed no statistically significant difference between the

**Table 1: Socio-demographic characteristics of patients undergoing chemotherapy in the intervention and control groups**

Characteristics	Intervention group (n=40) N (%)	Control group (n=40) N (%)	$\chi^2$	<i>p</i>
Age range (year)			0.47	0.79
18-35	5 (12.50)	5 (12.50)		
36-45	6 (15.00)	4 (10.00)		
46-65	29 (72.50)	31 (77.50)		
Gender			0.85	0.33
Male	17 (42.50)	13 (32.50)		
Female	23 (57.50)	27 (67.50)		
Marital status			1.80	0.41
Married	30 (75.00)	28 (70.00)		
Single	6 (15.00)	4 (10.00)		
Divorced or Widowed	4 (10.00)	8 (20.00)		
Education (years)			5.27	0.07
Pre-diploma (11-)	18 (45.00)	19 (47.50)		
Diploma (12)	7 (17.50)	14 (35.00)		
University (13+)	15 (37.50)	7 (17.500)		
Type of cancer			5.03	0.29
Digestive	10 (25.00)	7 (17.500)		
Genitourinary	9 (22.50)	16 (40.00)		
Blood and Bone marrow	11 (27.50)	5 (12.50)		
Breast	6 (15.00)	8 (20.00)		
Intestine	4 (10.00)	4 (10.00)		

Data are presented as number (percentage) unless otherwise stated



intervention and control groups in terms of the mean scores of knowledge ( $t_{78} = -0.14, p = 0.880$ ), comprehension ( $t_{78} = 0.27, p = 0.780$ ), and knowledge application ( $t_{78} = -0.48, p = 0.620$ ) of the participants before the intervention. However, this test showed a statistically significant difference between the two groups in the mean scores of knowledge ( $t_{78} = 19.74, p < 0.001$ ), comprehension ( $t_{78} = 17.27, p < 0.001$ ), and knowledge application ( $t_{78} = 14.84, p < 0.001$ ) of the participants after the intervention. The paired *t*-test demonstrated a significant difference in the mean scores of knowledge ( $t_{39} = 17.40, p < 0.001$ ), comprehension ( $t_{39} = -18.53, p < 0.001$ ), and knowledge application ( $t_{39} = -13.94, p < 0.001$ ) of the patients in the intervention group before and after the intervention. This test confirmed the lack of a statistically significant difference in the mean scores of knowledge, comprehension, and knowledge application of the patients in the control group ( $p < 0.050$ ).

To control potential confounders, multiple regression analysis was used as a back ward by the simultaneous application of variables such as age, education, gender, and marital status. Results of the regression analysis indicated that the four predictors explained 84.30% of the variance [ $R^2(\text{adjusted}) = 0.84, F_{3,76} = 142.22, p < 0.001$ ] in knowledge, 79% of the variance [ $R^2(\text{adjusted}) = 0.79, F_{1,78} = 298.53, p < 0.001$ ] in comprehension, and 73.50% of the variance [ $R^2(\text{adjusted}) = 0.74, F_{1,78} = 220.30, p < 0.001$ ] in knowledge application. According to the result of regression analysis [Table 4], by controlling the effects of other variables, the differences in the three dependent variables (knowledge, comprehension, and knowledge application) were statistically significant between the two groups (control and intervention).

### Discussion

The results of this research and a review of the results of other similar studies showed that peer-based education

**Table 2: Comparison of absolute and relative frequency scores of patients' knowledge, comprehension, and knowledge application in the intervention and control groups before and after the intervention**

		Before Education			After Education		
		Knowledge N (%)	Comprehension N (%)	Application N (%)	Knowledge N (%)	Comprehension N (%)	Application N (%)
Poor	Control	23 (57.50)	24 (60.00)	26 (65.00)	24 (60.00)	27 (67.50)	29 (72.50)
	Intervention	25 (62.50)	23 (57.50)	28 (70.00)	1 (2.50)	0 (0.00)	1 (2.50)
Moderate	Control	17 (42.50)	15 (37.50)	14 (35.00)	15 (37.50)	13 (32.50)	11 (27.50)
	Intervention	14 (35.00)	16 (40.00)	12 (30.00)	0 (0.00)	4 (10.00)	3 (7.50)
Good	Control	0 (0.00)	1 (2.50)	0 (0.00)	1 (2.50)	0 (0.00)	0 (0.00)
	Intervention	1 (2.50)	1 (2.50)	0 (0.00)	39 (97.50)	36 (90.00)	36 (90.00)
$\chi^2$		1.37	0.05	0.23	72.26	67.77	66.71
df		2	2	1	2	2	2
<i>p</i>		0.500	0.970	0.630	<0.001	<0.001	<0.001

**Table 3: Comparison of mean scores of patients' knowledge, comprehension, and knowledge application in the intervention and control groups before and after the intervention**

Variable		Intervention Mean (SD)	Control Mean (SD)	independent <i>t</i> -test	df	Mean difference ( <i>p</i> *)
Knowledge	Baseline	8.02 (4.32)	8.15 (3.37)	-0.14	78	-0.12 (0.88)
	Post-intervention	22.57 (2.70)	8.60 (3.56)	19.74	78	13.97 (<0.001)
	Paired <i>t</i> -test	17.40	1.69			
	Df	39	39			
	Mean difference ( <i>p</i> *)	14.55 (<0.001)	0.45 (0.09)			
Comprehension	Baseline	3.32 (1.18)	3.25 (1.27)	0.27	78	0.07 (0.78)
	Post-intervention	7.77 (1.09)	3.20 (1.26)	17.27	78	4.57 (<0.001)
	Paired <i>t</i> -test	18.53	-0.49			
	Df	39	39			
	Mean difference ( <i>p</i> *)	4.45 (<0.001)	-0.05 (0.62)			
Knowledge application	Baseline	3.65 (1.40)	3.80 (1.34)	-0.48	78	-0.15 (0.62)
	Post-intervention	9.85 (2.23)	3.65 (1.40)	14.84	78	6.20 (<0.001)
	Pair <i>t</i> -test	-13.94	-1.03			
	df	39	39			
	Mean difference ( <i>p</i> *)	6.20 (<0.001)	-0.15 (0.30)			

SD: Standard deviation; df: Degree of freedom; *p*\*: *p* value using *t*-test

**Table 4: Multiple regression analysis in the intervention and control groups**

Model		Unstandardized Coefficients	Standardized Coefficients	p	95% Confidence Interval for B	
		B	Beta		Lower	Upper
Knowledge	(Constant)	32.66		<0.001	-29.15	36.17
	Group	-13.97	-0.91	0.001	-15.35	-12.59
	Sex	1.59	0.10	0.028	-0.17	2.99
	Education	0.72	0.08	0.084	-0.10	1.54
Comprehension	(Constant)	12.35		<0.001	-11.52	13.18
	Group	-4.58	-0.89	<0.001	-5.10	-4.05
Knowledge application	(Constant)	16.05		<0.001	-14.74	17.36
	Group	-6.20	-0.86	<0.001	-7.03	-5.37

is essential to increase the knowledge, comprehension, and knowledge application of methods to control chemotherapy complications and obtain the necessary skills in this regard. In the present study, before the peer education, the knowledge and comprehension of the research population regarding the controlling of chemotherapy complications were poor and moderate, respectively. The findings of this study were consistent with those of Torabi Parizi *et al.*<sup>[15]</sup>

In their research on the awareness level of complications of chemotherapy and radiotherapy in patients with head and neck cancers referring to health centers in Kerman, Iran, it was shown that no effective education was provided on the complications of radiotherapy and chemotherapy, because the awareness level of the patients was not acceptable.<sup>[15]</sup>

In the present study, the peer education intervention considerably increased the knowledge, comprehension, and knowledge application in controlling chemotherapy complications, which was consistent with the results of Sharif *et al.*<sup>[16]</sup> who studied the effect of peer-based education on the QOL of 99 patients with breast cancer undergoing mastectomy in Shiraz, Iran. The results indicated that peer education can improve the QOL of patients after mastectomy.<sup>[16]</sup> Najafi *et al.* in an evaluation of the effect of peer support on health promotion style in women with breast cancer showed that peer support increased the health promotion score of the patients.<sup>[17]</sup> Lu *et al.* examined the effect of peer education on postoperative rehabilitation in 240 patients with laryngeal cancer and the results demonstrated that the response of the patients in the intervention group to the treatment and care was greater than that of the control group.<sup>[18]</sup>

The present study results were indicative of the effect of peer education on knowledge and comprehension of controlling chemotherapy complications in patients. The results of this research were consistent with the results of the study by Mbachu *et al.*<sup>[19]</sup> In their study, health education by peers on comprehension and the willingness for cervical cancer screening among 300 Nigerian women during childbearing age resulted in increased comprehension of individual

risk of cervical cancer and benefits of the early diagnosis of cervical cancer through screening.<sup>[19]</sup> Furthermore, the results of this study were consistent with those of the study by Kisuya *et al.*, who reported considerable improvement in the level of knowledge on breast cancer after an educational session held for women in breast cancer screening events in western Kenya.<sup>[20]</sup>

Berger *et al.* believed that there were interpersonal differences in the knowledge of patients about disease and planned treatment.<sup>[21]</sup> The results showed that people with daily access to the Internet and those with higher education had the highest baseline scores. After receiving information from the doctor, the average knowledge level of the patients was significantly increased from 21.3 to 25 (83%).<sup>[21]</sup> In the study performed on 40 female freshmen in a 6-month educational course in the form of short speeches to improve awareness and prevent weight gain, Matvienko *et al.* demonstrated significant differences in the variation in knowledge score between the control and intervention groups.<sup>[22]</sup>

One of the limitations of this research was the use of a self-report questionnaire, which was only based on the statements made by participants. The other limitations included the psychological state and problems of the living environment, possibility of subjects' communication outside the clinic and hospital and their impact on each other, education through the media or reading, and obtaining information from other sources; all of which were outside the control of the researcher. In this research, the researchers tried to eliminate the typical techniques of behavior training and used peers as instructors. Peers facilitated learning, increased the patients' awareness, and reduced their anxiety and concern.

## Conclusion

In general, it can be concluded that knowledge, comprehension, and knowledge application regarding chemotherapy complications in patients with cancer who participated in the peer education program were considerably higher than that of patients who did not participate in these programs. The study demonstrated the potential benefit of peer education intervention;

therefore, in addition to improving the knowledge of the patients on chemotherapy complications, an appropriate treatment communication can be established between the peers and patients. Furthermore, with the promotion of patient knowledge, patient's comprehension of chemotherapy complications is transformed which, in addition to the management of chemotherapy complications, will, probably affect the acceptance and continuation of treatment. It is hoped that the results of this research can attract the attention of authorities to peer education, which has thus far received little attention, and cause them to consider it as an essential part of the education program of patients with chronic diseases such as cancer. It is suggested that future studies focus on the effect of peer education on knowledge, comprehension, and knowledge application of individuals with other diseases including patients with Multiple Sclerosis (MS) and chronic renal failure and undergoing dialysis, or patients with cancer undergoing radiotherapy.

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### Conflicts of interest

Nothing to declare.

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