



# Can tele-nursing affect the supportive care needs of patients with cancer undergoing chemotherapy? A randomized controlled trial follow-up study

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## Abstract

**Purpose** In some countries, telephone-based support is one of the key services used for supporting patients with cancer. However, there is a lack of research on the efficacy of this method in Iran. This study aimed to evaluate the effects of tele-nursing on supportive care needs (SCNs) of patients with cancer undergoing chemotherapy.

**Methods** This randomized controlled trial was conducted on 60 patients with cancer undergoing chemotherapy who were randomly assigned and allocated to two groups, an intervention group and a control group. Patients' SCNs were assessed in the baseline, and 1 and 2 months after commencement of the intervention using the SCNs Survey -Short Form 34. The data were analyzed through descriptive statistics, *t*-test, and repeated measure test, by SPSS version 16.

**Results** There were no significant statistical differences in the mean score of dimensions and total SCNs between the two groups in baseline ( $p>0.05$ ). However, the results showed that the mean score of dimensions and total SCNs in the intervention group were significantly less than the control group, after the intervention ( $p<0.05$ ).

**Conclusions** Telephone-based support is an effective method to address and reduce SCNs of patients with cancer undergoing chemotherapy through increasing access to support for this population especially who may be in rural and remote settings. During the COVID\_19 pandemic and given the vulnerability of patients with cancer, telephone support can be used to avoid unnecessary visits to hospitals and reduced the risk of transmitting the virus to the patients.

**Trial registration number** IRCT20170404033216N1

**Keywords** Cancer · Supportive care needs · Tele-nursing · Quality of life

## Introduction

Cancer is a chronic disease with recurrent and long-lasting stages [1]. According to global cancer statistics, about 110,000 cases of cancer occurred and about 56,000 patients died in Iran in 2018. The prevalence rate of cancer was 248.392 patients [2]. Depending on the type of cancer, its stage, and the patient's condition, there are many types of cancer treatment such as surgery, radiotherapy, immunotherapy, and chemotherapy. Chemotherapy is still used as the primary or sole treatment for cancer. This treatment may damage or kill any rapidly dividing cell, tumor or normal cells. Damage to healthy cells leads to side effects including diarrhea, low blood pressure, drowsiness, constipation, nausea and vomiting, hair loss, fatigue, muscle aches, weight changes, and skin problems [3, 4].

However, most patients and their caregivers have little knowledge about the side effects associated with these cancer

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treatments, and how to manage them. Therefore, they incur high costs for frequent visits to hospital or their treatment provider due to a lack of information and knowledge about common or serious side effects, stopping the treatment, and worsening of symptoms [5]. These issues may be due to a lack of available and active supportive care for patient counseling and education which requires the effective teamwork of health care providers, especially nurses and access to the best available resources and technologies [6, 7].

Human resilience is about learning the knowledge and skills to cope with any life-altering situation. Dealing with a potentially life-limiting illness is one situation which poses an increased need for help and education. Patient education has emerged as one of the key roles of nurses in providing health care services [8, 9]. More than 70% of health care team are nurses who play an important role in educating clients because, they spend more time with patients. There is ample opportunity to educate them and evaluate the effectiveness of patient education [10]. Health care systems are providing better-quality educational programs for patient education [11], and educating patients with cancer can lead to achieving improved treatment outcomes and reduced the side effects of treatment (i.e., fatigue, nausea, vomiting and pain, anxiety, and depression). The significance of education and supporting patients at every stage of the cancer journey is well known. According to Dodd's study on patients with cancer, the patients who were educated to deal with the side effects of chemotherapy and radiotherapy started self-care earlier than the patients who had not received education [12]. Due to the complexity of cancer treatment and patients' knowledge level, various methods and educational materials are needed for patient education. The challenge therefore is to identify patients' needs and select appropriate instructional methods and technology for different age ranges, level of literacy, and emotional and social characteristics to meet their needs [13].

Telephone communication is one of the educational and follow-up methods used for cancer care by nurses [14]. This communication is an effective method for providing low-cost supportive care and improving the relationship between patient and professionals, and removing time and space barriers to access to cancer care. Telephone communication reduces the number of hospitalizations, improves patient education, promotes patients' self-management, and ultimately improves patient care quality.

The finding of a systematic review evaluating the efficacy of telephone interventions on heart failure, Clark et al. reported a 21% reduction in readmission rates and a 20% reduction in mortality of patients [15]. Another study showed that the patients were satisfied with asking questions during a phone conversation and sending a short message, which led to reduced medical expenses and improved patients' quality of life [16]. A telephone communication allows savings in time, financial burdens imposed on patients due to frequent traveling

for visiting health care professionals, and it reduces medical expenses. In addition, the number of referrals to hospitals, emergency wards and, consequently, hospital costs and personnel workload are also reduced. The telephone call, also, helps the patients and their families participate actively in self-care, caring for the patient at home and contact health care professionals as needed 24 h a day, 7 days a week, and patients do not require any special skills and access to certain facilities (such as the internet) [17].

Therefore, telephone communication can be an appropriate option in providing supportive care and education by nurses for patients with cancer who have many unmet needs. Despite the importance of providing supportive care services for patients with cancer and their families, there are no systematic structures for providing supportive care in Iran. Although the usefulness of phone supports is clear, the efficiency of this method needs to be investigated in Iran due to cultural and social differences between countries and patients' preference for face-to-face communication with professionals. This study aimed to evaluate the effects of tele-nursing on supportive care needs (SCNs) of patients with cancer undergoing chemotherapy.

## Method

### Design and participants

The study was a randomized controlled trial. The participants were patients with cancer who were undergoing chemotherapy and referred to a cancer hospital or clinic affiliated to Arak University of Medical Sciences, Arak, Iran. According to the study by Javadi et al., and with a type-I error of 0.05, and a power of 0.80, the sample size for each study group was estimated to be 30 and 60 in total [18]. The inclusion criteria were patients 18–80 years of age with a diagnosis of cancer from an oncologist, suffering from no metastasis, and who were undergoing chemotherapy, had awareness of the diagnosis, had access to a landline or cell phone, who had no hearing and speech impairments, and no mental illness. After signing a consent form, patients were randomly assigned to either an intervention or a control group through block randomization. A computerized random number generator performed the randomization of the assignment. Researchers began the randomization by assigning an identification number to each subject. Patients were excluded if they experienced unexpected events during the intervention (i.e., death, migration to other cities, changing telephone numbers) or were unable to continue the participation in the study.

### Measures

The data were collected using the questionnaires of demographic (personal information including marital status,

education level, gender, and age), clinical (the type of cancer, chemotherapy courses, and time from diagnosis), and the supportive care needs (SCNs-SF34). The SCNs-SF34 questionnaire assesses a cancer patient's needs in 5 dimensions: psychological (10 items), health system and information (HIS) (11 items), patient care and support (5 items), physical and daily living (5 items), and sexuality (3 items). For each item, participants were asked to rate the level of their needs for help over the last month on a 5-point Likert-type scale as follows: (1) "Not applicable" (i.e., "This was not a problem for me as a result of having cancer"); (2) "Satisfied" (i.e., "I did need help with this, but my need for help was satisfied at the time"); (3) "Low need" (i.e., "This item caused me little concern or discomfort. I had little need for additional help"); (4) "Moderate need" (i.e., "This item caused me some concern or discomfort. I had some need for additional help"); and (5) "High need" (i.e., "This item caused me a lot of concern or discomfort. I had a strong need for additional help"). The first two responses are interpreted as "no need," while the last three responses are interpreted as "some need." The total score of SCNs-SF34 varies from 34 to 170, with a higher score indicating more need for help [19, 20]. The validity and reliability of the Persian version of SCNs-SF34 were reported acceptable with Cronbach's alpha of 0.9 [21, 22].

## Intervention

The intervention group received telephone support services for 2 months (two telephone calls per week of 15 to 30 min). The master's prepared research nurse who was experienced in a cancer hospital, and skilled in communicating and caring for patients with cancer, made the telephone calls with participants. The content of the telephone calls was developed as a protocol based on the results of the latest studies and textbooks on cancer nursing [23] and supportive care [24]. The protocol was approved by the oncology department of Arak University of Medical Sciences. This protocol included explanations about cancer and type of treatment, side effects of chemotherapy, and managing the side effects (including nausea, vomiting, diarrhea, constipation, mucositis, and fatigue), and self-care in cancer in the fields of nutrition, physical activity, and sleeping.

The control group received routine face-to-face educational interventions provided to patients with cancer, about cancer and chemotherapy by physicians and nurses.

All participants in both groups completed SCNs-SF34 at the beginning of the study and 1 month and 2 months after starting the intervention via the telephone.

## Data analysis

All data were evaluated for normality using the Kolmogorov-Smirnov test. Descriptive statistics (M, SD, N, %) were calculated to summarize this data on participant characteristics and disease-related information. Chi-square or Fisher's exact tests were used for comparing the qualitative data of demographic and disease-related information. Also, a *t*-test was used for the quantitative data. The repeated measure test was used for comparing these two groups. Data analysis was performed by the Statistical Package for the Social Sciences (SPSS) software version 16.0 (SPSS Inc., Chicago, IL, USA). *P* value < 0.05 was considered to be statistically significant.

The study was performed adhering to the standards as outlined in the Declaration of Helsinki [25]. This study was registered in the Ethics and Research Center of Arak University of Medical Sciences with the code of ethics (IR.ARAKMU.REC.1396.159), and in the Iranian Clinical Trial Center under the code (IRCT20170404033216N1).

## Results

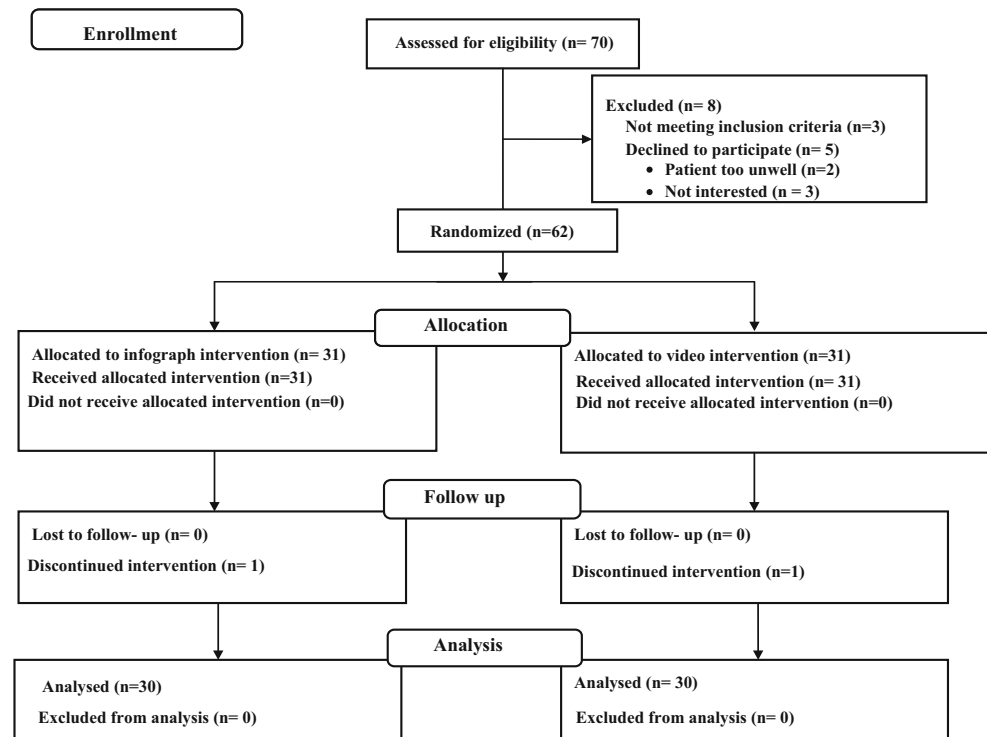
A total of 70 patients with cancer were screened for eligibility, of which 3 patients did not meet the inclusion criteria, 5 refused to participate in the study (2 patients were too unwell and 3 patients were not interested), and 2 passed away during the study (Fig. 1).

The study finished with 60 patients (30 in each group). The participants' mean age in the intervention and control groups was  $47.9 \pm 17.44$  and  $54.6 \pm 17.09$  years, respectively, indicating no significant statistical difference ( $P > 0.05$ ). Table 1 shows demographic and clinical information. There was no significant statistical difference in the mean scores of HIS, psychological, physical and daily living, patient care and support, and sexuality dimensions in the baseline between the two groups ( $P > 0.05$ ).

Furthermore, the results of the repeated measure test between the groups showed that the mean scores of all dimensions of HIS ( $F = 9.801$ ,  $P = 0.003$ ), psychological ( $F = 4.835$ ,  $P = 0.032$ ), physical and daily living ( $F = 4.816$ ,  $P = 0.032$ ), patient care and support ( $F = 6.636$ ,  $P = 0.013$ ), and sexuality ( $F = 11.933$ ,  $P = 0.001$ ) in the intervention group were significantly lower than those of the control group (Table 2).

In the total mean score of the baseline of both groups, no significant statistical difference was found ( $P > 0.05$ ). Also, the results of the repeated measure test (intergroup) showed that the total mean score of the two groups were significantly different ( $F = 14.329$ ,  $P = 0.0001$ ) while that of the intervention group was lower than that of the control group.

**Fig. 1** The CONSORT flow diagram of the participants' recruitment



## Discussion

The results of the present study showed that patients with cancer undergoing chemotherapy have supportive care needs in different aspects, with some needs being higher than others. This result is inconsistent with the findings of other studies conducted in the world and Iran [26–28].

The highest level of supportive care needs in both groups in this study was the HIS dimension, which was in line with the findings of some studies [29, 30]. Hwang et al. argued that the patients with cancer in Asian countries had a lower education level and thus they needed more information on different aspects of supportive care [31]. Similarly, more than half of the participants in this study were illiterate or had education at the level of elementary school. It is predicted that one of the issues that require more information on this dimension is the participant's education level.

The psychological dimension, in both groups, ranked as the second factor with a high need for supportive care. Many studies have shown that patients with cancer have a strong need for this dimension [32–34]. However, Wendy et al. found that the patient's priority in Hong Kong was not in this dimension of needs [35]. This discrepancy can be attributed to the unknown of chemotherapy for patients and their fears and anxieties about the side effects of this type of treatment, especially physical aspects such as hair loss [36]. Cultural differences, coping strategies, the types of services provided in different countries or health centers, and even religious beliefs can affect the psychological needs [37]. When providing

telephone supports, the psychological needs in the intervention group were reported to be lower than those of the control group. Through telephone support, many of the questions asked by patients on this dimension can be answered sooner and their worries can be mitigated. Alfred et al. reported that a variety of psychological supports can be provided to patients with breast cancer through telephone support and counseling [10]. Meanwhile, the results of another study showed that telephone support did not affect supportive care needs and depression [6]. This result may be due to the patient characteristics in addition to caregivers' features and capabilities.

The physical and daily living in both groups were placed in the third priority. However, the results of another study showed that this need has not been classified as one of the first three priorities [38]. Chemotherapy can cause many side effects such as nausea, vomiting, fatigue, and the loss of physical ability to do daily activities. Undoubtedly, these patients can better control these conditions if they receive the required support and training to manage the side effects of chemotherapy by a professional care team, especially nurses. The results of the present study demonstrated that telephone support can reduce participants' needs on this dimension. This finding is in keeping with other studies which identified the relevance and applicability of this method in reducing or resolving physical needs and daily activities [14, 39–41].

The patient care and support for the participants of this study were in fourth place. Most people live with family when they are sick and there are sincere and responsible connections between family members. This paves the way to provide

**Table 1** Comparison of demographic and clinical characteristics in the control and intervention groups

		Control group (N %)	Intervention group (N %)	P value <sup>a</sup>
Gender	Males	21 (70)	13 (43.3)	0.067
	Females	9 (30)	17 (56.7)	
Marital status	Single	4 (13.3)	6 (20)	0.825
	Married	23 (76.7)	22 (73.3)	
	Widow	3 (10)	2 (6.7)	
Educational level	Illiterate	6 (20)	4 (13.3)	0.217
	Primary	15 (50)	8 (26.7)	
	Guidance	3 (10)	4 (13.3)	
	High school	3 (10)	8 (26.7)	
	Academic	3 (10)	6 (20)	
Type of cancer	Liver	0	2 (6.7)	0.057
	Breast	1 (3.3)	8 (26.7)	
	CML	3 (10)	0	
	Lymphomas	1 (3.3)	5 (16.7)	
	CRC	5 (16.7)	3 (10)	
	ALL	3 (10)	1 (3.3)	
	Lung	3 (10)	2 (6.7)	
	Esophagus	2 (6.7)	0	
	Gastric	3 (10)	1 (3.3)	
	Prostate	2 (6.7)	1 (3.3)	
	Bone marrow	1 (3.3)	0	
	Small intestine	0	1 (3.3)	
	AML	2 (6.7)	3 (10)	
	Sarcoma	1 (3.3)	1 (3.3)	
	Thyroid	0	1 (3.3)	
	Brain	1 (3.3)	1 (3.3)	
Pancreatic	2 (6.7)	0		
Age (years)		Mean (SD)	Mean (SD)	P value <sup>b</sup>
		54.66 (17.09)	47.93 (17.44)	0.137
Time from diagnosis (years)		1.93 (1.85)	2.54 (2.85)	0.333
Chemotherapy course		8.7 (8.25)	4.83 (3.24)	0.02

<sup>a</sup> Chi-square and Fisher's exact tests<sup>b</sup> *t*-test

CML chronic myelogenous leukemia, CRC colorectal cancer, AML acute myeloid leukemia

support to the patient in different forms of physical, nutritional, and financial care by the family. In this context, the cancer patient is likely to identify needs in this dimension. Fatmawati et al. found that different types of family (nuclear and extended) lead to improving the performance indicators and thus reduce the cancer patient's need for support [42].

Sexuality was the last need identified for both groups, which is consistent with other studies [18, 32, 43], while it was one of the highest priorities reported in other studies [35]. Sexuality may be considered a taboo subject in Iran [44]. It is possible that the participants may not have willing to express these needs despite some sexual and marital problems [18].

The limitations of this study were the telephone support was provided for patients who were receiving chemotherapy,

and investigating the effectiveness of the intervention in a short period. Short follow-up period a further limitation is that the study was only in one province. Therefore, the findings of this study may have limited generalizability in different societies and may not be generalizable to patients at other phases of cancer.

It is recommended further longitudinal research is undertaken to assess the effects of telephone-based support on patients with cancer during different phases of cancer, including at the time of diagnosis, undertaking other treatment options, and with those undergoing rehabilitation. Furthermore, considering cultural diversity in different provinces of Iran is important to reflect different types of remote supportive care services.

**Table 2** Comparison of repeated measure test results with respect to the mean scores of supportive care needs

SCNS subscales	Groups	Mean ± SD		Mean ± SD		Mean ± SD		Repeated measure test (pairwise comparisons Bonferroni)		Means ± SD	Repeated measure test (Between groups)	
		Before	1 month after	2 months after	Before and 1 month after	Before and 2 months after	1 month after and 2 months after	F =	P value =			
Psychological	Control	29.86 ± 9.08	29.56 ± 9.35	29.2 ± 9.62	0.999	0.999	0.999	29.54 ± 1.41	F = 4.835	F = 95.98		
	Intervention	32.6 ± 8.66	23.4 ± 5.42	19.46 ± 4.16	0.0001	0.0001	0.0001	25.15 ± 1.41	P value = 0.032	P value = 0.0001		
Health systems and Information	Control	37.9 ± 9.93	36.7 ± 10.11	36.6 ± 10.10	0.193	0.201	0.0001	37.06 ± 1.39	F = 9.801	F = 235.88		
	Intervention	40.83 ± 5.59	30.03 ± 4.75	21.83 ± 3.48	0.0001	0.0001	0.0001	30.9 ± 1.39	P value = 0.003	P value = 0.0001		
Physical and daily living	Control	14.76 ± 5.11	14.83 ± 4.69	14.83 ± 4.48	0.999	0.999	0.999	14.81 ± 0.723	F = 4.816	F = 74.049		
	Intervention	16.56 ± 4.62	11.46 ± 3.15	9.66 ± 2.26	0.0001	0.0001	0.0001	12.56 ± 0.723	P value = 0.032	P value = 0.0001		
Patient care and support	Control	14.5 ± 4.67	14.26 ± 4.81	14.03 ± 4.82	0.999	0.999	0.999	14.26 ± 0.683	F = 6.636	F = 34.108		
	Intervention	14.43 ± 3.6	11.4 ± 2.41	9.5 ± 2.41	0.0001	0.0001	0.0001	11.77 ± 0.683	P value = 0.013	P value = 0.0001		
Sexuality	Control	8.23 ± 3.68	8.13 ± 3.46	7.93 ± 3.48	0.999	0.582	0.552	8.1 ± 0.514	F = 11.933	F = 27.11		
	Intervention	7.03 ± 2.79	5.23 ± 1.75	4.5 ± 1.41	0.0001	0.0001	0.0001	5.58 ± 0.514	P value = 0.001	P value = 0.0001		
Total	Control	105.26 ± 21.66	103.5 ± 21.96	102.6 ± 22.7	0.773	0.434	0.999	103.78 ± 3.32	F = 14.329	F = 255.79		
	Intervention	111.46 ± 19.35	81.53 ± 13.2	64.96 ± 10.23	0.0001	0.0001	0.0001	85.98 ± 3.32	P value = 0.0001	P value = 0.0001		

## Conclusions

Telephone-based support can be an effective method and appropriate alternative for providing supportive care services for patients with cancer, especially those who often have no easy access to health services. This method can be considered by policymakers to inform the development holistic supportive care programs and, by nurses, to reduce the SCNs for patients with cancer and improve both health care access and their quality of life. The strengths of this study were having a wide range of participants with different types of cancer and following up the effect of the intervention 1 and 2 months after the intervention.

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**Availability of data and material** The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

**Code availability** N/A.

**Author contribution** Conceptualization: [Maryam Ebrahimabadi], [Nazi Nejat]; methodology: [Nazi Nejat], [Maryam Ebrahimabadi]; formal analysis and investigation: [Fatemeh Rafiei], [Maryam Ebrahimabadi]; writing - original draft preparation: [Maryam Ebrahimabadi]; writing - review and editing: [Maryam Ebrahimabadi], [Nazi Nejat]; funding acquisition: [Nazi Nejat]; resources: [Maryam Ebrahimabadi], [Nazi Nejat]; supervision: [Nazi Nejat]. All authors read and approved the final manuscript.

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## Declarations

**Ethics approval** The study received ethical approval from Arak University of Medical Sciences with the code of ethics (IR.ARAKMU.REC.1396.159).

**Consent to participate** All participants provided informed consent prior to enrolling onto the study.

**Consent for publication** All authors consent to the publication of this manuscript in Supportive Care in Cancer.

**Conflict of interest** The authors declare no competing interests.

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