The Impact of Telenursing on the Self-management of Gastrointestinal Symptoms in Adolescent Cancer Patients Receiving Chemotherapy

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Background: Chemotherapy is one of the cancer treatments among adolescents, after which nursing care at home is required due to developing side effects such as constipation, nausea, vomiting, and diarrhea. One solution to deliver nursing care is to provide remote self-management training.
Objective: The aim of this study is to investigate the impact of telenursing on the self-management of gastrointestinal (GI) symptoms among adolescents undergoing chemotherapy.
Methods: In this intervention study, 66 adolescents 12 to 18 years of age who were referred to teaching hospitals for receiving chemotherapy were selected through randomized block sampling. The data were collected through demographic and clinical questionnaires, the researcher-made form for GI symptoms and conditions, and the researcher-made questionnaire for the self-management of GI symptoms among adolescents. Data analysis was done using SPSS version 20.
Results: The findings show that there was no significant statistical difference between the control group and the intervention group in terms of demographic characteristics. According to the independent-samples *t* test and repeated-measures analysis of variance, using an educational website had a significant positive impact on the scores of GI symptoms self-management, 1 week and 1 month after the intervention ($P < .001$).
Conclusions: Given that the intervention group patients could better manage their GI symptoms on their own by visiting the educational website *Cancer Information*, it can be concluded that telenursing can affect the self-management of GI symptoms among adolescent patients with cancer who receive chemotherapy.
Implications for Practice: The website Cancerinformation.ir can be used in the self-management of GI symptoms in cancer patients.

KEY WORDS: Adolescents with cancer, Chemotherapy, Self-management, Telenursing

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Adolescence is one of the most sensitive periods of life, during which being diagnosed with cancer can heavily influence the adolescent's health.[1] The prevalence of chronic disease such as cancer is increasing.[2] In this regard, according to the World Health Organization, an average of 400 000 children and adolescents develop cancer annually.[3]

According to the patient's condition, various treatments are offered for cancer including chemotherapy.[4] By damaging healthy and cancerous cells alike, chemotherapy results in many physical side effects such as gastrointestinal (GI) symptoms, including diarrhea (50%–90%), constipation (50%–87%), and nausea and vomiting (30%–80%).[5–9] Even though many pharmacological interventions have been carried out over the last 10 years to control nausea and vomiting, these remain major side effects of chemotherapy.[10] Constipation is the third most common complication after chemotherapy, and adolescents may remain constipated for 2 weeks or more after chemotherapy.[8,11] Diarrhea, which is also one of the common side effects of chemotherapy, can affect the results of cancer treatment; it may be persistent for years after chemotherapy, which puts the patient's life at risk.[10]

These complications among adolescents decrease the quality of life. As a result, in order to improve the quality of personal and social life, they should also be monitored at home in terms of chemotherapy complications.[12] Considering that the clinical condition of adolescents with cancer may change every day, by receiving self-management training on common symptoms and how to control them, the adolescent and the family can be provided with support.[4,13,14] The healthcare system spends a amount large of money to provide care for cancer patients. Thus, if they can practice self-care and manage the complications and the symptoms of the disease on their own, it can lead to improved general health, active participation in the process of care, and, ultimately, reduced treatment costs.[15]

The participation of adolescents with cancer in their own care plans will result in behavioral changes and improved health.[15] Telenursing is one of the approaches that can lead to the adolescent and the family's cooperation in managing the disease symptoms. The rapid development of information and communication technologies has changed the paradigm of nursing care and has turned telenursing into reality. The provision of nursing care, patient education, and support services using telecommunication technology is known as telenursing. Advances in information and communication technologies have equipped nurses with new resources and platforms to communicate with patients remotely, assess their health, transfer knowledge, and provide assistance. Telenursing can be useful in chronic diseases, especially cancer. Moreover, it is the most modern method that can provide quality care in the

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shortest possible time. Telenursing can be delivered via phone, SMS, email, mobile apps, and websites.[16] Telenursing improves the quality of life in cancer patients through teaching self-care for symptoms.[6] In this regard, in a systematic review and meta-analysis study in 2021, the results showed that the use of patient telenursing can contribute to self-managing symptoms at home and preventing unnecessary visits to the hospital.[17] In addition, another study investigated the impact of the Computerized Symptom Capture Assessment Tool on the self-efficacy of adolescents and young adults in symptom management, their ability to self-manage symptoms, and the way they communicate with caregivers; the results showed that this method positively affects the self-management of disease symptoms among adolescents.[18]

Because remote self-management programs empower cancer patients, using them can improve the quality of life among patients. Additionally, considering the prevalence of various GI symptoms in cancer patients, due both to the nature of the disease and treatments such as chemotherapy, the importance of self-managing these symptoms increases even more. The present study aims to determine the impact of a 4-week telenursing program on the self-management of GI symptoms in adolescents with cancer undergoing chemotherapy, compared with adolescents with similar conditions who did not receive this intervention.

Conceptual Framework

Cancer is one of the leading causes of death globally, triggering uncontrolled cell division, changes in cellular metabolism, and a reduction in the survival of transformed cells. On the other hand, chemotherapy has altered the course of cancer from an inevitably catastrophic outcome to, at times, a treatable disease. Gastrointestinal dysfunction caused by chemotherapy is a common phenomenon, associated with various classes of chemotherapy drugs.

Furthermore, adolescence is a stressful period, especially when the natural changes of this age, such as puberty, are accompanied by illness. It is also an important time for establishing health-promoting and self-care behaviors. Additionally, adolescents actively pursue and are attracted to technological devices and innovations. They typically have the potential to accept new technologies, including the internet, mobile phones, social media, and other related applications, during the early stages of their introduction into society.

It seems that technology can play a useful role in health interventions and promoting healthy lifestyles, especially for children and adolescents. Therefore, it is necessary for care providers, especially nurses, who spend the most time with adolescents, to focus on this as a care objective where adolescents are concerned. This requires establishing supportive and stable relationships with adolescents, which leads to improved health and the achievement of care goals. In fact, the rapid development of information and communication technologies has altered the nursing care paradigm, making telenursing a reality.

MATERIALS AND METHODS

In this experimental clinical trial study with 1 intervention and 1 control group, the participants consisted of 66 adolescents with cancer between 12 and 18 years of age, who were referred to 2 teaching hospitals affiliated with Shahid Beheshti University of Medical Sciences to receive inpatient and outpatient chemotherapy.

Based on the results of the study by Linder et al,[19] considering the mean value of 8 and the SD of 4 for one group, and the mean value of 11 and the SD of 7 for another, a sample size of 33 was determined for each group, according to the following equation, where the type I error is 0.05%, and the power, 80%.

$$n = \frac{\left(z_{1-\alpha/2} + z_{1-\beta}\right)^2 s_p^2}{\left(\mu_1 - \mu_2\right)^2} = 33$$

In this research, based on randomized block sampling, the participants were assigned to intervention and control groups in equal numbers and consecutive time intervals, based on the inclusion criteria. Complex permuted-block technique was used for randomization. In addition to equalizing the number of participants between the 2 groups, this technique prevents predicting the allocation of the intervention sequence.[20] The randomized block sequence was achieved through STATA software (StataCorp, College Station, Texas). In this study, 11 blocks with the size of 6 were selected. The first block was selected randomly, and the next ones, sequentially from the first one. In each block, 3 participants were assigned to the intervention group, and 3 to the control groups. The adolescents (12-18 years of age) who were included in randomized block sampling were those who were diagnosed with leukemia, lymphoma, osteosarcoma, and glioma; had received at least 1 session of chemotherapy; and had the ability for self-care. They also had to have access to the Internet and an electronic device (computer, laptop, mobile phone, or tablet) and the ability to read and write in Farsi. The exclusion criteria included adolescents who did not want to continue the study.

Research Tools

In order to collect data, 3 tools were used as follows:

(1) Adolescents' demographic and clinical data: This questionnaire has 8 items about the demographic and clinical information of the adolescents with cancer undergoing chemotherapy, including age, gender, level of education, the type of cancer, disease duration, the number of received chemotherapy cycles, and the parents' level of education.
(2) Researcher-made GI symptoms and problems: This part contains 4 short-answer items and 3 multiple-choice items about the intensity of diarrhea, constipation, and nausea and vomiting during the last week, which compares the prevalence of GI symptoms on 3 occasions prior to the intervention, 1 week after, and 1 month after the intervention.
(3) Researcher-made questionnaire for GI among adolescents: The researcher-made questionnaire for self-management of GI symptoms among adolescents was developed with 18 items, by merging the 2 scales Self-efficacy for Managing Chronic Conditions—Managing Symptoms (28 items) and the Self-management Assessment Scale for patients with type 2 diabetes (28 items in the 5 dimensions of goals for future, daily routines, social support, knowledge, and emotional adjustment). This questionnaire is scored on a 5-point Likert scale ranging from 1 to 5, with the overall

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score falling between 18 and 90. Higher scores indicate a more effective self-management of symptoms.

In the above tools, face validity was measured, with the help of 15 adolescents who met the inclusion criteria, and the tools were approved. In the Self-management of Gastrointestinal Symptoms in Adolescent Scale, quantitative content validity was calculated with the participation of 9 nursing faculty members and tool development experts. First, the experts' answers were checked based on the content validity ratio formula. In the present study, any item with a content validity ratio greater than the Lawshe table value (0.78) remained on the questionnaire with a significance level of .05.[21] The content validity index (CVI) was determined with the help of the same experts, and the answers were checked based on the CVI formula. The minimum value for CVI in this study was considered to be 80% in this study. The internal consistency was also investigated with the presence of 15 adolescents who met the inclusion criteria, and Cronbach's α was reported to be .87.[22]

Data Collection Method

Based on the inclusion criteria, 66 adolescents were randomly selected from hospitals A (intervention group) and B (control group) through randomized block sampling. Informed consent forms were signed by adolescents and their parents. The patients in both intervention and control groups completed the 3 research tools prior to the intervention on the first day, the introduction day, when the research objectives were explained to them after signing the informed consent. On the same day, after the questionnaires were completed, the participants and the researcher exchanged phone numbers, for any possible contacts. Usernames and passwords were also created for the participants, which were distributed among them, along with a website address (www.cancerinformation.ir).

Intervention Plan

The educational material was gradually uploaded on the website over 4 weeks as follows:

In the Introduction, explanations were given to the patients in the intervention group regarding cancer, chemotherapy, and its complications. In the Diarrhea, Constipation, Nausea, and Vomiting section, the medicines and nursing care training were presented. In the New Information section, new content was uploaded about the self-management of the aforementioned GI symptoms. In the Question and Answer box, the questions asked anonymously by adolescents were answered. Given that the educational material was provided to the adolescents in a gradual manner, the participants could view them according to their own schedule. The entire material was fully accessible after the 1-month educational sessions. All the participants were notified via SMS to complete the questionnaires again on 2 occasions: immediately after and 1 month after the intervention. Next, the data collected from all 3 occasions were analyzed.

The educational content in the field of controlling GI symptoms was based on the books *Nutrition and Cancer* and *Gastrointestinal Cancer*, and the websites MEDSACAPE, Patient Education Resources Oncology, Free Gastrointestinal Cancer, and the Ruesch Center for the Cure of Gastrointestinal Cancers. Content collection and validation were approved by 7 professors of the Faculty of Nursing and Midwifery, as well as chemotherapy and oncology experts including 2 physicians, 3 nurses, and 1 nutritionist.[23–28] The content was gradually uploaded to the website over the course of 4 weeks. Every time, after sending new materials, the researcher contacted the patients and answered their questions about the new content. In addition, the patients' questions were sent to the researcher through the Question and Answer section of the site. It should be noted that the participant can ask questions from the researcher and receive the answers anonymously, due to the design of the FAQ section of the website. The link to the research tools, created using Porsline software, was sent to the control group via SMS and to the intervention group via the website, 1 week and 1 month after the end of the intervention, respectively Participants completed the tools accordingly. The selection of 1-week and 1-month time intervals was done based on the study by Roberts et al.[29] The control group received only routine care during this period. Then, after the completion of the intervention, the website address was provided to the control group via SMS so that they could also use the training (Figure). Then, the collected data from all 3 stages were analyzed using descriptive statistics such as mean and SD, and the statistical tests including χ^2, Fisher' exact test, Kolmogorov-Smirnov test, independent-samples *t* test, and repeated-measures analysis of variance using SPSS version 20 (IBM Corp, Armonk, New York).

Sampling was carried out under the ethics code IR.SBMU.PHARMACY.REC.1401.244 and the clinical trial code IRCT20161024030474N6, after receiving a letter of introduction from the university officials and the necessary permits from the hospital authorities and obtaining informed consent from all the adolescent participants visiting the outpatient and inpatient departments of the 2 teaching hospitals affiliated with Shahid Beheshti University of Medical Sciences, in order to receive their chemotherapy treatment.

RESULTS

The present study showed that the control and intervention groups had no significant differences in terms of gender, education level, type of cancer, and the number of chemotherapy cycles. In the present study, the mean and the SD of age were 15.55 ± 1.85 years in the intervention group and 15.21 ± 1.79 in the control group. The mean and the SD of the duration of the disease were 15.09 ± 2.46 and 15.06 ± 2.72 in the intervention and the control groups, respectively. Other demographic information is shown in Table 1.

The incidence of GI symptoms among adolescents was investigated before the intervention, 1 week after the intervention, and then 1 month after it. According to the results, in the intervention group, a greater decline in nausea and vomiting was observed 1 week after the intervention, compared with other examined symptoms (Table 2).

By performing Kolmogorov-Smirnov test, the assumption of normality for the scores of the self-management of GI symptoms is accepted in both control and intervention groups before the intervention, 1 week after the intervention, and 1 month after it. Therefore, independent-samples *t* test was used to compare the scores of self-managing GI symptoms, before the intervention, 1 week after the intervention, and 1 month after it, between the 2 groups. Moreover, the repeated-measures

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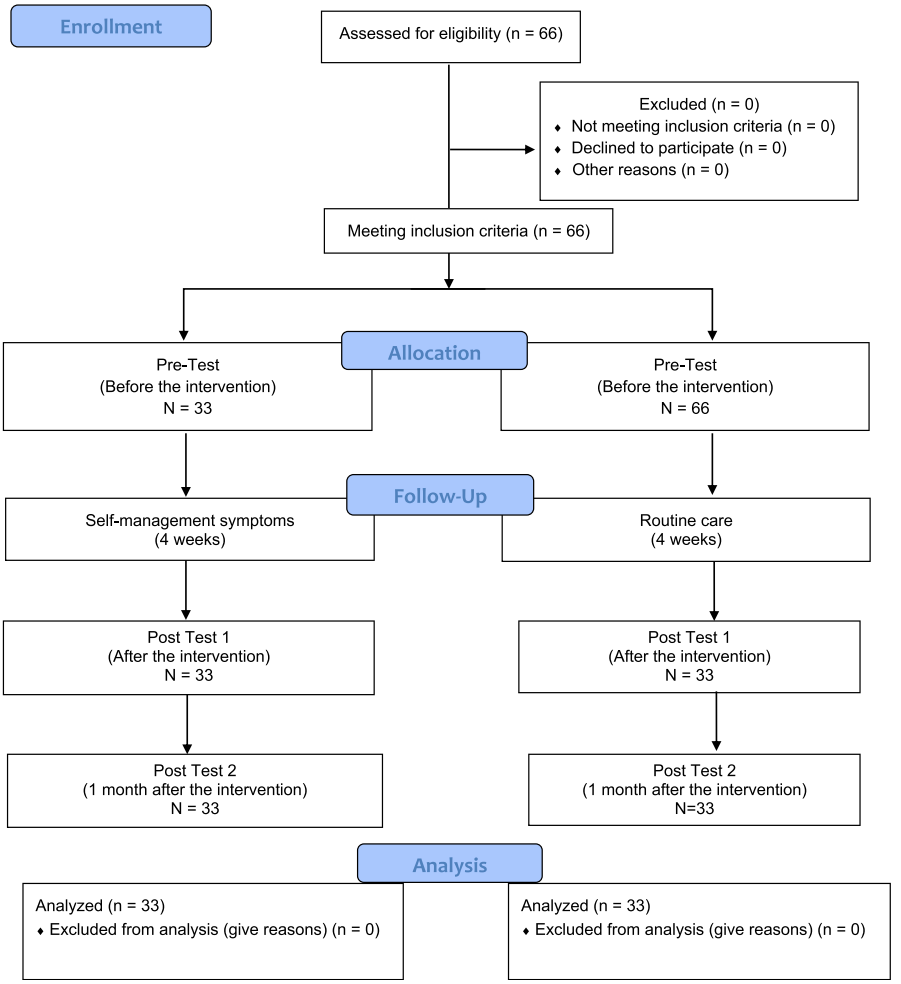

FIGURE. CONSORT flow diagram. CONSORT, Consolidated Standards of Reporting Trials.

analysis of variance was performed to compare the intragroup scores within the intervention and control groups.

The results of the comparison of the mean scores of GI symptoms self-management among adolescents showed that using the *Cancer Information* educational website had a significant positive correlation with the scores of the self-management of GI symptoms, 1 week after the intervention and 1 month after it ($P < .001$) (Table 3).

The comparison of the results using the Bonferroni post hoc test showed that there was a significant positive effect ($P < .001$) in the intervention group 1 week after the intervention. There was also a significant positive effect ($P < .001$) in both groups 1 month after the intervention. In addition, the comparison of the results was significant both 1 week after the intervention and 1 month after it only in the intervention group, which indicates the positive effect of the intervention from 1 week to 1 month after its implementation (Table 4).

DISCUSSION

The present study has investigated the effect of a telenursing-based program in the form of an educational website for the self-management of GI symptoms in adolescents with cancer undergoing chemotherapy.

Based on the results of the present study, self-management was reported to be low in both the intervention and control groups before the intervention. The low level of self-management before the intervention may be due to the patients' lack of sufficient knowledge, the chronic nature of the disease, treatment nonadherence, and so on. In line with the results of the present study, Chiauzzi et al reported a low level of self-management manifesting as pain, stress, and depression, as well as low levels of adaptation to the existing conditions in the patients with chronic back pain in their study before conducting a web-based educational intervention.[30] Furthermore, according to Koller and colleagues' study, self-management of symptoms and pain in cancer patients was low in both the intervention and control groups.[31]

The results of the present study, comparing the incidence of GI symptoms, showed that the symptoms started to decrease 1 week after the start of the intervention and continued to decrease over the following month. However, the rate of decrease in the symptoms was greater in the first week compared with the first month. In line with the present results, the study by França et al also showed that teaching control of nausea and vomiting through telenursing to adult cancer patients undergoing chemotherapy had significant positive effects on both the

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TABLE 1. Demographic and Clinical Characteristics of Adolescents With Cancer Undergoing Chemotherapy

Variables	Groups: Intervention (n = 33) Mean (SD)	Groups: Control (n = 33) Mean (SD)	*P*
Gender			.138[a]
Girl	18 (54.5)	12 (36.4)	
Boy	15 (45.5)	21 (36.6)	
Education			.469[b]
Upper primary school	4 (12.1)	3 (9)	
Junior high school	10 (30.3)	15 (45.5)	
Senior high school	19 (57.6)	15 (45.5)	
Cancer type			.892[a]
Leukemia	8 (24.2)	7 (21.2)	
Lymphoma	9 (27.3)	10 (30.3)	
Glioma	9 (27.3)	7 (21.2)	
Osteosarcoma	7 (21.2)	9 (27.3)	
No. of chemotherapy sessions			.592[a]
Once	24 (72.7)	22 (66.7)	
Twice	9 (27.3)	11 (33.3)	

[a] χ^2 Test.
[b] Fisher exact test.

intensity and the occurrence of nausea between 2 periods, 24 hours to 3 days after chemotherapy, and from the third to the fifth day after chemotherapy.[6] Moreover, the results of Shimoyama and colleagues' research also showed that using video calls 3 months after the intervention decreased the incidence of respiratory symptoms and rehospitalization, thanks to the improved self-care status.[32] Nevertheless, the results of the research conducted by White et al on patients with colorectal cancer showed that remote training through telephone calls did not have any effect on meeting the patients' care needs immediately after the intervention and that these needs still existed.[33] In this regard, the nature of the disease, the type of education, and the conditions and quality of education can be pointed out, each of which can act as an intervening factor and lead to contradictory results.[34] In the present study, comparing the results 1 week after the intervention and 1 month after it in the intervention group shows the positive effect of the intervention on self-management in adolescents from 1 week to 1 month after interventionist implementation. In line with the present study, the research of Cheng and Tan also showed that all the children and adolescents and their parents in the intervention group had stated that the multidimensional symptom self-management program had increased their level of perception of the symptoms related to chemotherapy and had prepared them for further preparation, identification, and coping.[35] Morrison et al also showed that having a positive attitude toward adherence to treatment regimen and self-management and being supported by family and friends (to reduce the adolescent's stress), as well as training patients and their caregivers through MYCHART software, facilitate self-management immediately. On the other hand, physical and mental symptoms, such as fatigue, weakness, nausea, mucositis, depression, anxiety, and fear, prevent the improvement of self-management in patients.[36] The results of another study also showed that mobile phone programs have the potential to empower patients by providing immediate and personalized support and increase their well-being in the long term, depending on the type of treatment and the level of patient participation.[37] Nonetheless, Meng and colleagues' study showed that in the intervention group, who had received self-management training, there was a weak effect on the patients' initial outcome at discharge and that there was no effect on achieving health behaviors 6 months and then 12 months after the intervention.[38] The results of another study also indicated that the use of intervention applications for multiple sclerosis had no effect on the long-term improvement of complications and that the patients were not very satisfied with the use of these applications.[39] This difference probably has its roots in the nature of the disease or the type of contacts.

According to the findings of the present study, after the intervention, digestive problems decreased, but the patients had

TABLE 2. Gastrointestinal Symptoms of Adolescents With Cancer Undergoing Chemotherapy, Before the Intervention, 1 Week After the Intervention, and 1 Month After It

Have You Had the Following Symptoms in the Past Week?	Prior to Intervention: No	Prior to Intervention: Yes	1 wk After the Intervention: No	1 wk After the Intervention: Yes	1 mo After the Intervention: No	1 mo After the Intervention: Yes
Diarrhea						
Control group (n = 33)	10 (30.3)	23 (69.7)	8 (24.3)	25 (75.7)	12 (36.4)	21 (63.6)
Intervention group (n = 33)	9 (27.3)	24 (72.7)	16 (48.5)	17 (51.5)	14 (42.4)	19 (57.6)
Constipation						
Control group (n = 33)	13 (39.4)	20 (60.6)	12 (36.4)	21 (63.6)	14 (42.4)	19 (57.6)
Intervention group (n = 33)	15 (45.5)	18 (54.5)	19 (57.6)	14 (42.4)	17 (51.5)	16 (48.5)
Nausea						
Control group (n = 33)	8 (243)	25 (75.7)	11 (33.3)	22 (66.7)	10 (30.3)	23 (69.7)
Intervention group (n = 33)	13 (39.4)	20 (60.6)	25 (75.7)	8 (24.3)	21 (63.6)	12 (36.4)
Vomiting						
Control group (n = 33)	7 (21.3)	26 (78.7)	9 (27.3)	24 (72.7)	11 (33.3)	22 (66.7)
Intervention group (n = 33)	10 (30.3)	23 (69.7)	22 (81.9)	6 (18.1)	20 (60.6)	13 (39.4)

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TABLE 3. Comparison of the Mean Scores of the Self-management of Gastrointestinal Symptoms in Adolescents With Cancer Undergoing Chemotherapy in the Groups Under Study Before, 1 Week After, and 1 Month After the Intervention

Time / Group	Before the Intervention		1 wk After the Intervention		1 mo After the Intervention		Repeated-Measures ANOVA[a] (P and η^2)			
								Overall		
	Mean	SD	Mean	SD	Mean	SD	Single	Time	Group	Time × Group
Intervention	25.54	3.64	43.87	3.95	33.30	4.75	$P < .001$ $\eta^2 = 0.819$	$P < .001$ $\eta^2 = 0.672$	$P < .001$ $\eta^2 = 0.811$	$P < .001$ $\eta^2 = 0.672$
Control	26.06	2.65	27.12	1.86	27.84	1.98	$P = .007$ $\eta^2 = 0.159$			
P[b]	.514		>.001		>.001					

Abbreviations: ANOVA, analysis of variance; η^2, effect size.

[a]Repeated-measures ANOVA test.

[b]Independent t test.

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lower levels of symptom self-management 1 month after the intervention compared with 1 week after it. Because patients are more exposed to the complications of chemotherapy in the first days after it, they are more affected by these symptoms. However, the patients were trained to control the complications. Nevertheless, due to the intensity of the complications, the patients tried to control them with home remedies; therefore, in the control group, partial control could be seen in the participants.

Implications for Practice

The implementation of telenursing can significantly enhance the self-management of symptoms in adolescents with cancer, leading to better health outcomes and improved quality of life. By focusing on education, personalized interventions, technology, regular follow-ups, support systems, and caregiver training, healthcare teams can empower adolescents to effectively manage their symptoms and direct their own cancer treatment course.

Following chemotherapy, adolescents with cancer need continuous nursing interventions to manage and reduce their physical symptoms. Self-management applications on electronic devices can empower cancer patients and improve their quality of life. Furthermore, due to the prevalence of multiple GI symptoms in cancer patients, resulting from both the nature of the disease and the treatments, such as chemotherapy, self-management of these symptoms is doubly important.

Therefore, it is recommended to consider a longer follow-up period, such as 2 or 3 months after the intervention, and to compare the results. Doing this might help establish a lasting habit in adolescents.

Limitations

The participants might have been exposed to the training provided by other media such as television programs, as well. The extent of the family's spiritual and emotional support for the adolescent may have influenced the results, but controlling for this was not possible in the study. Because the study has a limited scope and was conducted in a single city, the results may have been affected. Therefore, generalization should be approached with caution. Incomplete questionnaires were excluded from the analysis process due to the potential to influence the findings. In addition, if the adolescent's condition deteriorated to the point that he/she needed rehospitalization, he/she was excluded from the study; these 2 other cases are limitations for this study. In this way, these adolescents were deprived of receiving telenursing.

CONCLUSION

Because most adolescents currently have access to the internet, laptops, tablets, and mobile phones and are willing to use them, teaching telenursing care can be effective in improving their performance and self-management of symptoms. This research focused only on the GI symptoms caused by chemotherapy, and a positive result has been obtained. Accordingly, it is suggested that future research investigate the effect of telenursing on the self-management of other common symptoms such as mental symptoms, sleep disorders, appetite loss, and fatigue, in adolescents with cancer undergoing chemotherapy.

TABLE 4. Comparison of the Self-management of Gastrointestinal Symptoms in Adolescents With Cancer Undergoing Chemotherapy in the Groups Under Study Before, 1 Week After, and 1 Month After the Intervention Using Bonferroni Post Hoc Test

Variables	Assessment Stages		Intervention Group		Control Group	
			Mean Difference	Probability Value	Mean Difference	Probability Value
Self-management of gastrointestinal symptoms	Before the intervention	1 wk after the intervention	18.33	>0.001	1.06	0.283
	Before the intervention	1 mo after the intervention	7.75	>0.001	1.78	>0.001
	1 wk after the intervention	1 mo after the intervention	10.57	>0.001	0.72	0.468

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REFERENCES

1. Dehkordi AH, Askarpour H, Pordanjani FK, Khazaei Z, Pordanjani SR. Crude incidence, age-specific incidence, and standardized incidence rates of leukemia in children under 14 years of age in Iran: a meta-analysis. *Przegl Epidemiol*. 2021;75(4):546–555.
2. Eskandari Sabzi H, Shirinabadi Farahani A, Rassouli M, Khanali Mojen L, Beikmirza R, Heidari M. Factors related to spiritual coping in adolescent with cancer based on the "Reed Self-transcendence Theory". *Hayat*. 2021;27(2):130–145.
3. World Health Organization. Childhood cancer. https://www.who.int/news-room/fact-sheets/detail/cancer-in-children. Accessed May 27, 2023.
4. Owolabi EO, Mac Quene T, Louw J, Davies JI, Chu KM. Telemedicine in surgical care in low- and middle-income countries: a scoping review. *World J Surg*. 2022;46(8):1855–1869.
5. Ebrahimabadi M, Rafiei F, Nejat N. Can tele-nursing affect the supportive care needs of patients with cancer undergoing chemotherapy? A randomized controlled trial follow-up study. *Support Care Cancer*. 2021;29(10):5865–5872.
6. França AC, Rodrigues AB, Aguiar MIFd, Silva RA, Freitas FMC, Melo GAA. Telenursing for the control of chemotherapy-induced nausea and vomiting: a randomized clinical trial. *Texto Contexto Enferm*. 2019;28:e20180404.
7. Toygar I, Yeşilbalkan ÖU, Kürkütlü M, Aslan A. Complementary and alternative medicines used by cancer patients to cope with chemotherapy-induced constipation. *Complement Ther Clin Pract*. 2020;39:101108.
8. Belsky JA, Stanek JR, O'Brien SH. Prevalence and management of constipation in pediatric acute lymphoblastic leukemia in U.S. children's hospitals. *Pediatr Blood Cancer*. 2020;67(11):e28659.
9. Oncology Nursing Society. Chemotherapy-induced diarrhea is the abnormal increase in stool liquidity and frequency associated with the administration of chemotherapeutic agents. https://www.ons.org/pep/chemotherapy-induced-diarrhea?display=pepnavigator&sort_by=created&items_per_page=50. Accessed April 12, 2023.
10. Ward JA, Balian C, Gilger E, Raybin JL, Li Z, Montgomery KE. Electronic symptom assessment in children and adolescents with advanced cancer undergoing hematopoietic stem cell transplantation. *J Pediatr Oncol Nurs*. 2020;37(4):255–264.
11. Belsky J, Stanek J, Yeager N, Runco D. Constipation and GI diagnoses in children with solid tumours: prevalence and management. *BMJ Support Palliat Care*. 2024;13(e3):e1166–e1173.
12. Pourfarid Y, Dehghani A, Hojat M. The effect of self-care education with the telenursing approach on health-promoting behaviors in multiple sclerosis patients during the COVID-19 pandemic: a clinical trial study. *Mult Scler Relat Disord*. 2023;70:104507.
13. Brick R, Padgett L, Jones J, et al. The influence of telehealth-based cancer rehabilitation interventions on disability: a systematic review. *J Cancer Surviv*. 2023;17(6):1725–1750.
14. Khademi F, Rassouli M, Khanali Mojen L, Heidarzadeh M, Shirinabadi Farahani A. Psychometric evaluation of the Caring Ability of Family Caregivers of Patients With Cancer Scale—Mothers' Version for the mothers of children with cancer. *Cancer Nurs*. 2022;45(1):e179–e186.
15. Taheri AS, Norouzi E, Sadoughi F. Developing a mobile-based self-care application for patients with breast cancer undergoing chemotherapy. *J Health Admin*. 2019;22(04):35–49.
16. Bahmanpour S, Farahani AS, Nourian M, Nasiri M, Nikfarid L, Derakhshan HB. The impact of telenursing on hope and perceived self-efficacy of the mothers of premature infants after discharge from the NICU. *J Neonatal Nurs*. 2023;29(1):e179–e186.
17. Komariah M, Maulana S, Platini H, Pahria T. A scoping review of telenursing's potential as a nursing care delivery model in lung cancer during the COVID-19 pandemic. *J Multidiscip Healthc*. 2021;14:3083–3092.
18. Erickson JM, Beck SL, Christian BR, et al. Fatigue, sleep-wake disturbances, and quality of life in adolescents receiving chemotherapy. *J Pediatr Hematol Oncol*. 2011;33(1):e17–e25.
19. Linder LA, Erickson JM, Stegenga K, et al. Symptom self-management strategies reported by adolescents and young adults with cancer receiving chemotherapy. *Support Care Cancer*. 2017;25:3793–3806.
20. Kang M, Ragan BG, Park J-H. Issues in outcomes research: an overview of randomization techniques for clinical trials. *J Athl Train*. 2008;43(2):215–221.
21. Ayre C, Scally AJ. Critical values for Lawshe's content validity ratio: revisiting the original methods of calculation. *Meas Eval Couns Dev*. 2014;47(1):79–86.
22. Polit D, Beck C. *Essentials of Nursing Research: Appraising Evidence for Nursing Practice*. Philadelphia, PA: Lippincott Williams & Wilkins; 2020.
23. Shaw C. *Nutrition and Cancer*. Chichester, UK: John Wiley & Sons; 2010.
24. Bekaii-Saab T, El-Rayes BF, Pawlik TM. *Handbook of Gastrointestinal Cancers: Evidence-Based Treatment and Multidisciplinary Patient Care*. New York: Springer Publishing Company; 2019.
25. Medscape. https://reference.medscape.com/. Accessed February 5, 2023.
26. Lilly Medical Education. Patient Education Resources. Oncology. https://medical.lilly.com/us/diseases/patient-education-resources/oncology/gastrointestinal-cancer?redirect-referrer=https%3A%2F%2Fwww.google.com%2F. Accessed February 5, 2023.
27. CE/CME. Free gastrointestinal cancer. https://www.gotoper.com/pages/gastrointestinal-cancer. Accessed February 5, 2023.
28. The Ruesch Center for the Cure of Gastrointestinal Cancers. Georgetown Lombardi Comprehensive Cancer Center. GI Cancers Alliance. https://ruesch.georgetown.edu/gicancersalliance/#. Accessed February 10, 2023.
29. Roberts CM, Plevinsky JM, Gamwell KL, Noser AE, Denson LA, Hommel KA. Self-Management Assistance for Recommended Treatment (SMART) IBD app randomized control trial in adolescents with IBD: design and methodology. *Health Care Transitions*. 2024;2:100031.
30. Chiauzzi E, Pujol LA, Wood M, et al. painACTION-back pain: a self-management website for people with chronic back pain. *Pain Med*. 2010;11(7):1044–1058.
31. Koller A, Miaskowski C, De Geest S, Opitz O, Spichiger E. Results of a randomized controlled pilot study of a self-management intervention for cancer pain. *Eur J Oncol Nurs*. 2013;17(3):284–291.
32. Shimoyama M, Yoshida S, Takahashi C, Inoue M, Sato N, Sato F. Effectiveness of a telenursing intervention program in reducing exacerbations in patients with chronic respiratory failure receiving noninvasive positive pressure ventilation: a randomized controlled trial. *PloS One*. 2023;18(10):e0269753.
33. White VM, Macvean ML, Grogan S, et al. Can a tailored telephone intervention delivered by volunteers reduce the supportive care needs, anxiety and depression of people with colorectal cancer? A randomised controlled trial. *Psychooncology*. 2012;21(10):1053–1062.
34. Selen F, Polat Ü. The effect of web based type 2 diabetes education on diabetes self management. *Digit Health*. 2023;9:20552076231205739.
35. Cheng KK-F, Tan LML. A pilot study of the effect of a home-based multimodal symptom-management program in children and adolescents undergoing chemotherapy. *Cancer Rep (Hoboken)*. 2021;4(3):e1336.
36. Morrison CF, Pai ALH, Martsolf D. Facilitators and barriers to self-management for adolescents and young adults following a hematopoietic stem cell transplant. *J Pediatr Oncol Nurs*. 2018;35(1):36–42.
37. Tabi K, Randhawa AS, Choi F, et al. Mobile apps for medication management: review and analysis. *JMIR Mhealth Uhealth*. 2019;7(9):e13608.
38. Meng K, Reusch A, Musekamp G, et al. Self-management education for rehabilitation inpatients: a cluster-randomized controlled trial. *Patient Educ Couns*. 2018;101(9):1630–1638.
39. Zeidabadi Nejad M, Bahaadinbeigy K, Cheshmekaboodi M, Amiri P. Investigating the quality of Persian mobile applications related to patients with MS. Narrative review articles. *J Health Biomed Inform*. 2022;8(4):338–346.

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