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The effect of text message reminders on nausea, vomiting and quality of life in children with cancer receiving cisplatin

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ABSTRACT

Purpose: This study was conducted to examine the effect of text message reminders on nausea, vomiting, and quality of life in children with cancer receiving cisplatin.
Methods: The study was conducted with a pretest-posttest unpaired group model design. The study included 80 children with cancer and their parents (40 controls and 40 experiments) aged between 8 and 18 years, who were on cisplatin treatment, who did not have cognitive disability as a clinical diagnosis, who received chemotherapy during their stay in the clinic, who were literate in Turkish and who volunteered to participate in the study. The educational contents prepared by the researchers to reduce nausea and vomiting were sent to the parents in the experimental group in the form of a text message every day for three weeks. Descriptive statistics, correlation analysis, and regression analysis were used to evaluate the data.
Results: While NVTS, ARINVc, ARINVp, Quality of Life Scale pretest and posttest mean scores of both 8–12 and 13–18 age control group children were similar, it was determined that the experimental group's posttest mean scores were higher than the pretest mean scores, and there was a statistically significant difference between the experimental group's pretest and posttest mean scores in terms of the group, time and group*time. In this study, the education program explains 42%, 15%, 16%, 43%, and 43% of the increase in the mean scores of NVTS, ARINVc, ARINVp, Quality of Life Scale Child and Parent Form, respectively, in children aged 8–12. Also, the education program explains 10%, 27%, 28%, 38%, and 39% of the increase in the mean scores of NVTS, ARINVc, ARINVp, Quality of Life Scale Adolescent and Parent Form, respectively, in children aged 13–18.
Conclusions: It has been observed that text message reminders effectively reduce the level of nausea and vomiting and increase the quality of life.
Practice implications: The results of this study, text message reminders can be applied as an alternative intervention method, and including technology-based practices in the care of children with cancer is important in increasing the quality of care.

Introduction

Nausea and vomiting are some of the treatment-related side effects observed in cancer patients, reducing the quality of life, especially in children. Therefore, planning interventions to reduce nausea and vomiting in children ensures the child's compliance with the treatment, makes the child feel good psychosocially, and increases the quality of life (Roila et al., 2016; Rosenberg et al., 2016). To address this issue, healthcare administrators should continuously evaluate the symptoms of nausea and vomiting, plan appropriate interventions, and provide education to patients and their families (Evans et al., 2020). Literature indicates that frequent repetition of symptom management education increases its efficiency and enables the parents to adapt to the information in a better manner. Several methods can ensure the permanence of the education applied, text message reminders being one of them. Text messages to mobile phones, using the Short Message Service, are a common, convenient, fast, and inexpensive method of communication. Its popularity can be determined by the fact that the total number of text messages sent worldwide tripled between 2007 and 2010, and approximately 200,000 text messages were sent every second. Therefore, as the use of new technologies like text messaging increases, researchers and clinicians need to discover new opportunities and adapt them to the healthcare system (Schwebel & Larimer, 2018).

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The basis of the intervention approach in this study is the social cognitive theory (SCT), which specifies a core set of factors and mechanisms influencing health behavior with a primary emphasis on self-regulation (i.e., the accuracy and consistency of self-observation and self-monitoring) and self-reflection, apart from self-efficacy (Bandura, 1997, 2004)SCT holds that cognition, behavior, and environmental influences interact and reinforce each other. Self-regulatory functions, for example, are enhanced by facilitative environmental conditions, such as reminder systems (Bandura, 1997, 2004). Also, the basic philosophy of pediatric nursing focuses on family-centered care, according to which, families have an important role in ensuring the health and well-being of children with cancer (Salvador et al., 2019)Therefore, it is important that parents take responsibility for the care of their children. In this context, text messages are a supportive external influence that is expected to develop self-regulation, especially a sense of control over the care of a child (Salvador et al., 2019).

Text message reminders have been extensively researched, and because of certain advantages, such as ease of use, relative cheapness, and fast and automatic message delivery, they can be extensively used in healthcare systems (Schwebel & Larimer, 2018). Its usage in healthcare applications requiring behavior change is quite rampant (Berrouiguet et al., 2016). In the transtheoretical model of change, it is stated that text message reminders serve as coaching prompts that help facilitates behavior change (M. A. McDaniel et al., 2004). Text message reminders are also used to educate pediatric patients and their parents about various diseases and conditions. Several studies have cited the utilization of text message reminders in vaccination, preoperative follow-ups, ensuring parental involvement. Results of these studies indicate that these reminders affect vaccination follow-ups, decrease cancellation of planned surgeries, and change parental participation in care (Bangure et al., 2015; Murray et al., 2015; Pratap et al., 2015). However, till now, no studies have examined the effect of text message reminders on reducing nausea and vomiting in children with cancer.

Methods

Aim and design

This study was conducted based on the pretest-posttest unpaired group model to examine the effect of text message reminders on nausea, vomiting, and quality of life in children with cancer receiving cisplatin.

The research was carried out in the pediatric hematology-oncology clinic of a university between January 2020 and March 2021. In this hospital, the routine antiemetic treatment protocol is applied to children with cancer. However, the hospital's education program does not include instructions regarding text message reminders.

Sample

In this study, the sample size was calculated based on the significance level 0.05, power 80%, and effect size 0.15 (medium effect size) utilizing the G*POWER 3.1 statistical analysis program. It was determined that 33 children and parents should be included in each dependent group for *t*-test analysis. Considering a 10% loss, a total of 80 children and parents, i.e., 40 children and parents for the experimental group and 40 children and parents for the control group, were included, and all the subjects voluntarily agreed to participate in the study. The study complies with the guidelines mentioned in the Consolidated Standards of Reporting Trials (CONSORT). The CONSORT 2010 checklist of information to include when reporting a randomized trial is given in Fig 1. Two of the five parents in the control group and one of the three parents in the experimental group whose children passed away left the study. In addition, three parents in the control group and two parents in the experimental group left the study.

The study included children with cancer, aged 8 to 18 years, and their parents. The inclusion criteria were children who were on cisplatin treatment, who were not clinically diagnosed to have cognitive disabilities, who received chemotherapy during their stay in the clinic, who were literate in Turkish, and who volunteered to participate in the study. The exclusion criteria included children with cancer in the terminal period and who did not want to participate in the study and their parents.

Data collection tools

Child and parent information form

The form, which was created by the researchers based on literature, consisted of 22 questions regarding the child's age, gender, diagnosis, treatment method, medications used other than in chemotherapy, medications used in chemotherapy, parental age, parental education, income, and employment status, and characteristics of the child's care and treatment (Flank et al., 2016; Hooke & Linder, 2019; Roila et al., 2016).

Nausea Vomiting Thermometer for Children with Cancer (NVTS)

A review of the literature was carried out to develop general and child-specific scales on nausea and vomiting. Based on this, a visual scale measuring nausea and vomiting, suitable and applicable for clinical use, was created (Akçay Didişen et al., 2018; Baxter et al., 2011; Tyc et al., 1995). The scale was in the form of a thermometer with the following five ratings: never (1), rarely (2), occasionally (3), often (4), and always (5). The visualization of the scale was performed with the support of a software developer. Also, with the increase in the scale score, the facial expression on the scale changed, which was visualized as a smiling face (1), unresponsive face (2), unhappy face (3), sad face (4), and crying face (5). The lowest and highest points on the scale were one and five, respectively. An increase in the scale score indicated an increase in the child's degree of nausea and vomiting (Kudubes & Bektaş, 2021) The scale-level content validity index was 0.94, which was coherent. As a result of the ROC analysis, the cut-off point was determined as three points. The NVTS showed good reliability, with an intra-class correlation coefficient of 0.99. In the linear regression analysis, a model was created based on chemotherapy drugs, nausea and vomiting type, vomiting status, and the number of children with cancer who vomited, explaining 44.9% of their nausea and vomiting status. The results of the Bland-Altman analysis indicated that the correlation coefficient between the differences in the two groups and their respective means was insignificant (Kudubes & Bektaş, 2021).

Adapted Rhodes Index of Nausea and Vomiting for Pediatrics by Child Scale (ARINVc)

ARINVc was first developed by Rhodes for adult oncology patients and later adapted to children by Lo and Hayman (1999). The validity and reliability study of the scale was conducted in the Turkish population in 2018 by Akçay et al. (Akçay Didişen et al., 2018; Lo & Hayman, 1999). The scale consists of five statements for each of the six items measuring the frequency, duration, and distress of nausea, the frequency, duration, and distress of the child in the last 12 h and is scored between zero and four. The first three items in the scale question the frequency, amount, and distress caused by vomiting during the last 12 h, while the remaining three items question the frequency, duration, and distress caused by nausea. The minimum and maximum points obtained from all ARINVc points vary between zero and 48 per day. The severity of nausea and vomiting increases as the score obtained from the scale increases. The Cronbach alpha coefficient of the scale is 0.85.

Adapted Rhodes Index of Nausea and Vomiting for Pediatrics by Parent Scale (ARINVp)

The scale was first developed by Rhodes for adult oncology patients and later adapted to parents of children with cancer by Lo and Hayman

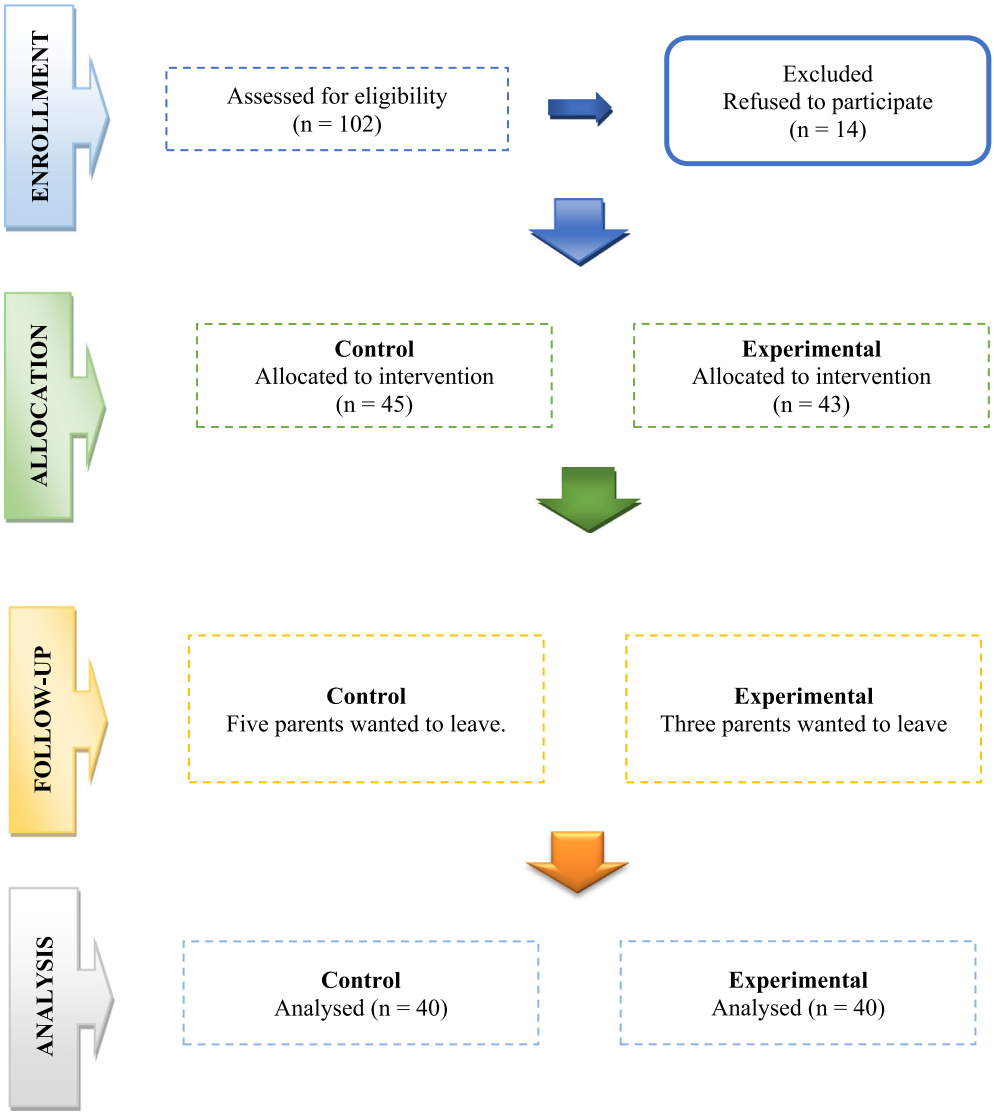

Fig. 1. The CONSORT flow diagram.

(1999). The validity and reliability of the scale were evaluated in the Turkish population in 2018 by Akçay et al. (Akçay Didişen et al., 2018; Lo & Hayman, 1999). The scale consists of five expressions for each of the six items that evaluate the frequency, duration, and distress of nausea and vomiting in the last 12 h and is scored between zero and four. The first three items in the scale question the frequency, amount, and distress of vomiting during the last 12 h, while the remaining three items question the frequency, duration, and distress of nausea; all of these are evaluated by the parents. The minimum and maximum points obtained from all ARINVp items vary between zero and 48 per day. The severity of nausea and vomiting increases as the score obtained from the scale increases. The Cronbach alpha coefficient of the scale was 0.84.

Scale for Quality of Life in Pediatric Oncology Patients Aged 7–12 Child Form

The scale was developed by Kudubeş and Bektaş in 2015 (Kudubes & Bektas, 2015). It consists of questions determining the quality of life in pediatric oncology patients aged 7–12. The total Cronbach's alpha value of the scale is 0.96. It consists of 32 items in total, and the eighth item is reverse-coded. The lowest and highest scores obtained on the scale are 32 and 160, respectively, and the cut-off point is 65 points. A score of ≤64.9 points indicates a high quality of life, whereas that of ≥65 points indicates a low quality of life. Thus, an increased score indicates a reduced quality of life.

Scale for Quality of Life in Pediatric Oncology Patients Aged 7–12 Parent Form

The scale was developed by Kudubeş and Bektaş in 2014 (Kudubes & Bektas, 2015). It is a parallel scale with the Pediatric Oncology Patients Quality of Life Scale aged 7–12, consisting of questions regarding the parents' quality of life in pediatric oncology patients aged 7–12. The total Cronbach's alpha value of the scale is 0.96. It consists of 32 items in total, and the eighth item is reverse-coded. The lowest and highest scores obtained on the scale are 32 and 160, respectively, and the cut-off point is 93 points. A score of ≤92.9 indicates a high quality of life, whereas a score of ≥93 indicates a low quality of life. Thus, an increase in the score points to a reduced quality of life.

Scale for Quality of Life in Pediatric Oncology Patients Aged 13–18 Adolescent Form

The scale was developed by Kudubeş et al. in 2016 (Bektas et al., 2016). It consists of 35 items in total, and the tenth item is reverse-coded. The total Cronbach's alpha value of the scale is 0.98. The lowest and highest scores obtained on the scale are 35 and 175, respectively.

Table 1
Text message reminder program content.

General Content for Nausea and Vomiting
1. It is important to monitor and keep track of your child's nausea and vomiting
2. It is important to monitor the amount of vomiting and the frequency of nausea and vomiting in your child
3. It is important to determine the triggers behind your child's nausea and vomiting
4. It is important to monitor the drugs causing nausea and vomiting in your child
5. You must inform the health personnel when your child has nausea and vomiting
6. It is important to monitor the time between the administration of a drug and your child's nausea and vomiting
7. It is important to monitor the duration of your child's nausea and vomiting after the administration of the drug
8. It is important to monitor the frequency of your child's nausea and vomiting after administration of the drug
9. Close monitoring of your child's nausea and vomiting can lead to a hassle-free treatment process
10. Dealing with your child's nausea and vomiting by utilizing appropriate interventions is important to improve his or her quality of life
11. Effective and correct interventions can reduce your child's nausea and vomiting
12. It is important to apply the interventions to reduce your child's nausea and vomiting in a timely manner
13. It is important that you obtain information and support about the interventions from the right sources, such as health personnel
14. It is important to monitor the effectiveness of the drugs that are administered to your child to reduce nausea and vomiting
15. It is important to monitor the effectiveness of non-drug interventions that are applied to reduce nausea and vomiting in your child
16. Evaluation of your child's nausea and vomiting at repeated intervals can prevent and reduce nausea and vomiting
17. A decrease in your child's nausea and vomiting can make your child feel better and improve their quality of life
18. A decrease in your child's nausea and vomiting can make you feel good.
Nutritional Content
1. You can actively use the kitchen in the clinic to create your child's meal plan. Sharing mealtimes with your child's friends and family will help distract him or her and reduce nausea
2. You can make your child's pre-meal preparation (oral care, hand washing, etc.) a habit. Plan mealtimes at the most appropriate time according to your child's well-being
3. You can create a checklist of pre-meal preparations and fill it in daily. You can evaluate each pre-meal preparation checklist with your child
4. You can give your child small amounts of nutritious foods throughout the day. It is important to pay attention to the variety of foods your child consumes. It is important that you give your child protein-rich food every day
5. It will be good to let your child rest before meals to prevent or reduce nausea and vomiting
6. You can give your child oral care after every meal
7. You can remove offensive odors, including food odors, to reduce your child's nausea-vomiting
8. You can make sure that the temperature of your child's room is ambient
9. You can make sure that your child wears comfortable clothes
10. Taking a short walk in the fresh air before your child's meal can reduce nausea and vomiting
11. Make sure that your child does not eat anything 1–2 h before the chemotherapy application
12. Make sure that your child does not eat anything immediately after the chemotherapy application
13. Eating at least 1 h after the treatment will help reduce your child's nausea and vomiting
14. Do not choose foods that your child likes during periods of nausea. This causes the child to dislike those foods later on
15. Your child needs to eat foods that are easy to digest (mashed potatoes, fruit puree, cheese, pasta, bananas, peaches, etc.). Make sure that your child does not consume very sweet, fatty, and carbonated foods
16. Your child must follow frequent, slow, and small meals to reduce nausea and vomiting
17. Eating five or six small meals a day instead of three large meals will help reduce nausea and vomiting
18. Consuming cold foods (ice cream, yogurt, skinless chicken, crackers, etc.) can prevent nausea and vomiting
19. It is important that your child sits and rests for at least half an hour after meals
20. Make sure that your child starts the meal slowly with small bites, increasing it every 5–10 min
21. Your child's preference for sleep during periods of extreme nausea can help him cope with nausea and vomiting.
Content for Liquid Consumption
1. Take care that your child does not drink anything 1–2 h before the chemotherapy application
2. Make sure that your child does not drink anything immediately after the chemotherapy application
3. Plan the drinking times at the most appropriate time according to your child's well-being
4. Drinking a beverage at least 1 h after the treatment will help reduce your child's nausea and vomiting
5. Take care that your child does not drink too much before the meal
6. Take care that your child does not drink too much during the meal
7. Your child must drink frequent, slow, and small amounts of drink to reduce nausea and vomiting
8. Drinking various fruit juices (such as cranberry, apple, grape juice, and lemonade), soda, and buttermilk during nausea can relieve your child's nausea
9. Do not choose your child's favorite drinks during periods of nausea. This will cause your child to dislike those drinks later on
10. Do not force your child to drink something during periods of severe nausea and vomiting
11. Start giving liquid foods at least two hours after your child vomits. It is important to start small amounts of solid foods afterward and continue with your normal diet if there is no problem
12. If your child cannot consume much liquid during the day and cannot eat for more than two days, inform your doctor
13. Ensure that your child does not drink liquid soon after waking up, as it can trigger nausea and vomiting
14. Your child's preference for sleep during periods of extreme nausea can help him cope with nausea and vomiting.
Contents for Drug Treatment
1. Nausea and vomiting may be seen in your child due to the treatments received. Nausea and vomiting of your child are controlled with the anti-nausea and vomiting drugs prescribed by your doctor and the recommendations given by the health personnel
2. You must take care of your child's nutrition, oral care, and fluid consumption in addition to the drugs that reduce nausea and vomiting
3. It is important that your child's anti-nausea and anti-vomiting drugs are administered 30–60 min before chemotherapy
4. It is important to monitor your child's nausea after the anti-nausea and anti-vomiting medications are administered
5. It is important to monitor your child's vomiting after the anti-nausea and anti-vomiting medications are administered
6. Nausea and vomiting may not go away despite the anti-nausea and anti-vomiting drugs. Therefore, continue to monitor your child's nausea and vomiting and inform the healthcare personnel
7. On the days when you will come to the outpatient treatment unit for day-to-day chemotherapy, using your medicine in the dose and form recommended by your doctor will allow you to control nausea and vomiting more easily.
Content for Oral Care
1. Oral care is an important part of chemotherapy treatment
2. Daily oral care reduces dry mouth and nausea-vomiting in your child by ensuring oral hygiene
3. Daily oral care reduces nausea and vomiting by removing bad odors that may occur in your child's mouth
4. It is important to repeat the oral-care routine at least four times a day

Table 1 (*continued*)

General Content for Nausea and Vomiting
5. If your child's blood values are appropriate, their teeth can be cleaned with a soft toothbrush
6. Washing your child's toothbrush with hot water helps to soften the brush and prevents infection
7. Your child should clean the toothbrush after use, dry it, and store it in a closed box
8. Your child's toothbrush should be changed every three months
9. In cases where your child cannot use a brush, the inside of the mouth, palate, tongue, and lips should be thoroughly wiped
10. After brushing, your child's mouth should be thoroughly rinsed with carbonated water, and their lips should be moistened
11. You must check your child's mouth thoroughly every day
12. Your child needs to keep his or her mouth moist by drinking small amounts of water frequently
13. When you detect an abnormal condition, such as a wound in your child's mouth, you should inform the health personnel about the situation.
Content to Divert Attention
1. Activities that will distract your child's attention are effective in reducing nausea and vomiting
2. The distraction method allows your child to better control their nausea by focusing their attention elsewhere
3. One of the distraction methods is watching videos and cartoons. Allowing your child to watch their favorite cartoon or video will distract them and ease their nausea
4. Another distraction method includes reading a favorite book. Active methods, such as reading a favorite book with a funny and interesting voice, will help your child be distracted and reduce nausea
5. Being with your child, touching, and talking about a topic that interests him or her are also examples of distraction methods
6. Inflating balloons and making balloons from foam are one of the favorite distraction methods that provide distraction and alleviate nausea
7. It is effective for your child to do relaxation and breathing exercises 30–60 min before the meal in order to reduce the tension caused by the food and increase the appetite.
Stress Management/Content for Coping with Stress
1. Inability to cope with stress adequately is an important factor that increases nausea and vomiting
2. It is valuable to be aware of the signs of stress that your child shows in order to prevent stress
3. When children feel physical stress, they may show behaviors, such as not being able to taste food, eating too much or less, headaches, tension/irritability, feeling tired, difficulty sleeping, pain in their muscles, stomachache, teeth grinding, and nausea and vomiting
4. When children feel emotional stress, they may show behaviors, such as a change in their habits, being happy for a moment, angry for a moment, having nightmares, crying spells, sadness, inability to concentrate, and distress
5. Recognizing the factors that cause stress in your child and knowing the methods of reducing stress will make your child feel better
6. Stress-reducing exercises reduce physical tension in your child's body. With the candle extinguishing or balloon blowing activity, you can reduce your child's stress and relieve his or her nausea by providing distractions.

An increase in the score obtained from this scale indicates an increased quality of life.

Scale for Quality of Life in Pediatric Oncology Patients Aged 13–18 Parent Form

The scale was developed by Kudubeş et al. in 2016 (Bektas et al., 2016). It consists of 35 items in total, and the tenth item is reverse-coded. The total Cronbach's alpha value of the scale is 0.97. The lowest and highest scores obtained on the scale are 35 and 175, respectively. An increase in the score obtained from this scale indicates an increased quality of life.

Content of the text message reminder program

In this study, a Short Message Reminder Program, an SMS program, was prepared based on the literature, which included information on reducing nausea and vomiting in children with cancer (Bodge et al., 2014; Green et al., 2010; Hooke & Linder, 2019; Momani & Berry, 2017; Patel et al., 2021; Roila et al., 2016). Since the chemotherapy protocols are planned every three weeks in the clinical unit, the Short Message Reminder Program was applied to children and parents who meet the sampling criteria for three weeks (Fig. 1).

Implementation of the education program

The education program was only applied to the parent who stayed with the child during the treatment period at the clinic (either the child's mother or father). In the experimental group, it was applied to the mothers of 38 children and the fathers of two children, while in the control group, it was applied to the mothers of 37 children and the fathers of three children. After the pretest data were collected from the participants in the study, the contents of the program designed to reduce nausea and vomiting were sent to the parents in the experimental group every day for three weeks in the form of a short message. By sending seven informative messages about each section of the education content every day, 147 informative messages reached the parents at the end of the education. Due to the possibility that not every participant had access to an internet connection, text message reminders were delivered to parents via SMS. The first part included 21 messages regarding general information on nausea and vomiting, the second part included 21 messages containing nutritional information, and the third part included 14 messages containing contents on liquid consumption. At the end of the second week, the same messages were sent to the parents again as reinforcement messages. The fourth part included seven messages containing contents on drug therapy, and these messages were sent repeatedly as reinforcement messages for three weeks. The fifth section included 14 messages containing contents related to oral care. At the end of the second week, the same messages were sent to the parents again as reinforcement messages. The sixth part contained seven messages aimed at diverting attention and was sent repeatedly over three weeks as reinforcement messages. The seventh part included seven messages containing contents on stress management/coping with stress, and these messages were sent repeatedly as reinforcement messages for three weeks (Table 1). After the three-week text message reminders ended, posttest data were collected at the third, sixth, and ninth weeks. Children in both the control and experimental groups received routine antiemetic treatment in the clinic. Following the completion of this study, the same education program was applied to the parents in the control group.

Statistical analysis

IBM SPSS Statistics for Windows (Version 23.0. Armonk, NY: IBM Corp.) program was used to evaluate the data. Descriptive analysis was performed by calculating the mean and percentage values. The Shapiro-Wilk test was utilized to evaluate the compliance of the data to normal distribution. *t*-test and analysis of variance (ANOVA) were used to examine the relationships between descriptive features and scale mean scores.

Multi-directional ANOVA was used in repeated measures to compare the mean scores of the nausea-vomiting and the quality-of-life scales according to the group, time, and group*time interactions. During the research process, "intention-to-treat" (ITT) analysis was applied due to the withdrawal of some participants from the study. The relationship

between the education program and the nausea-vomiting and quality-of-life scales was evaluated with Pearson's correlation analysis. The rate at which the education program can predict the changes in nausea, vomiting, and quality of life was evaluated by linear regression analysis. Tolerance and variance inflation factors (VIF) were performed to determine whether there were multiple correlations between the education program and the nausea-vomiting and quality-of-life scales and whether regression analysis could be performed with the variables. Independent variables with a VIF value below ten, tolerance value above 0.2, and condition index value below 15 were included in the regression analysis. The power and the effect size of the study were calculated based on the regression analysis. Results were evaluated at a 95% confidence interval and a significance level of $p < 0.05$.

Ethical considerations

Before starting the research, permission was obtained from the owners of the scales utilized in the study via e-mail. Apart from this, institutional permission was obtained to conduct the research. The study was approved by a university's Non-Interventional Clinical Research Ethics Committee. The purpose and scope of the research were explained to the participants, i.e., children and their parents, via the "Informed Consent Form." Data were collected from the participants, and the child and parents were informed that they could leave the study at any time without giving any reason.

Results

The results of the descriptive analysis revealed no differences among the groups in terms of variables in the child and parent information form, indicating that the groups were homogeneous ($p > 0.05$, Table 2).

Differences among the NVTS, ARINVC, ARINVP, Quality-of-Life Scale Child and Parent Form regarding total mean scores of the experiment and control groups with children aged 8–12 years were evaluated, and the results are presented within the scope of intention to treat analysis (Table 3).

Differences among the NVTS, ARINVc, ARINVp, Quality-of-Life Scale Child and Parent Form regarding total mean scores of the experiment and control groups with children aged 13–18 years were examined, and the results presented within the scope of intention to treat analysis (Table 4).

The rate of nausea-vomiting and the changes in quality of life in children aged 8–12 years in the study program were examined (Table 5). Results indicated that receiving the education decreased the NVTS score 0.649 times ($\beta = 0.649$), thereby explaining the decrease in the NVTS level by 42% ($R^2 = 0.422$). Also, the education program brought a 0.398 times ($= -0.398$) decrease in the ARINVc score, which explains the 15% ($R^2 = 0.159$) reduction in the ARINVc level. A 0.410 times ($= -0.410$) decrease in the ARINVp score was observed along with a 16% ($R^2 = 0.165$) reduction in ARINVp level after receiving the education program. After receiving the education program, a 0.660 ($\beta = -0.660$) times increase was observed in the quality of life of children along with a 43% ($R^2 = 0.435$) increase in the quality-of-life child form score. The education program also brought about an increase of 0.663 ($= 0.663$) times in the quality of life of children as reported by parents and a 43% ($R^2 = 0.436$) increase in the quality-of-life parental form score.

The rate of nausea-vomiting and the changes in quality of life in children aged 13–18 years in the study program were examined (Table 6). The education program decreased the NVTS level by 10% ($R^2 = 0.109$) and the NVTS score by 0.329 times ($\beta = -0.329$). Results also indicated that the education program brought about a 27% ($R^2 = 0.271$) reduction in the ARINVc level and decreased the

Table 2
Descriptive Characteristics of Participants.

	Control Group		Experimental Group		X^2	df	p
	n	%	n	%			
Age							
8–12 aged	20	50	19	47.5	0.050	1	0.510
13–18 aged	20	50	21	52.5			
Gender					0.050	1	0.502
Girl	20	50	19	47.5			
Boy	20	50	21	52.5			
Diagnosis							
Leukemias	18	45	12	30			
Central Nervous System Tumors	8	20	12	30	2.286	3	0.515
Solid Tumors	6	15	8	20			
Others	8	20	8	20			
Caregiver status							
Mother	37	92.5	38	95	0.213	1	0.644
Father	3	7.5	2	5			
Mothers age							
18–29	4	10	4	10			
30–39	14	35	14	35	0.910	3	0.823
40–49	16	40	13	32.5			
50 and above	6	15	9	22.5			
Mother working status							
Housewife	16	40	16	40			
Working	22	55	20	50	0.762	2	0.683
Retired	2	5	4	10			
Mothers education status							
Primary school	8	20	10	25			
High school	20	50	18	45	0.327	2	0.849
University	12	30	12	30			
Fathers age							
18–29	2	5	2	5	0.099	3	0.992
30–39	7	17.5	8	20			
40–49	15	37.5	15	37.5			
50 and above	16	40	15	37.5			
Fathers working status							
Working	32	80	30	75	0.287	1	0.592
Retired	8	20	10	25			
Fathers education status							
Primary school	3	7.5	6	15	1.191	2	0.551
High school	25	62.5	22	55			
University	12	30	12	30			
Income level							
Income equal to expenses	22	55	26	65	0.833	1	0.361
More than income	18	45	14	35			
The length of hospital stay (days)							
1–3 days	20	50	22	55			
4–6 days	20	50	18	45	0.201	1	0.654
How many days has been receiving chemotherapy?							
1–3 days	20	50	23	57.5	0.453	1	0.327
4–6 days	20	50	17	42.5			
Receiving chemotherapy drugs other than cisplatin							
Yes	20	50	18	45	0.201	1	0.412
No	20	50	22	55			
Antiemetic receive status							
Yes	37	92.5	38	95	0.213	1	0.644
No	3	7.5	2	5			
Nausea vomiting type							
Acute	20	50	18	45	0.489	1	0.783
Delayed	15	37.5	18	45			
Anticipatory	5	12.5	4	10			
Vomiting status							
Yes	18	45	19	47.5	0.050	1	0.506
No	22	55	21	52.5			
Number of vomiting							
1–3 times	10	55.5	12	63.2	0.480	2	0.786
4–6 times	7	38.8	5	26.3			
7 and above	1	5.7	2	10.5			
Symptom education status							
Yes	24	60	29	72.5	1.398	1	0.172
No	16	40	11	27.5			

Table 3
Comparison of the Total Means of the Experiment and Control Groups for the 8–12 age group NVTS, ARINVc, ARINVp, Quality of Life Scale Child and Parent Form.

Time Group		Pre-test X ± SD	Post-test 1 X ± SD	Post -test 2 X ± SD	Post-Test 3 X ± SD	F		p	Partial Eta^2	Observed Power
NVTS	Control Group	3.25 ± 1.68	3.25 ± 1.61	2.60 ± 1.23	2.85 ± 1.46	Group	10.886	0.002	0.232	0.894
	Experimental Group	3.83 ± 1.155	1.72 ± 0.82	1.16 ± 0.38	1.16 ± 0.38	Time	28.109	0.000	0.438	1.000
						Group*Time	14.170	0.000	0.282	1.000
NVTS (ITT)	Control Group	3.40 ± 1.68	3.40 ± 1.62	2.81 ± 1.36	3.04 ± 1.52	Group	14.359	0.001	0.269	0.959
	Experimental Group	3.73 ± 1.19	1.73 ± 0.80	1.21 ± 0.41	1.21 ± 0.41	Time	27.320	0.000	0.412	1.000
						Group*Time	14.141	0.000	0.266	1.000
ARINVc	Control Group	19.20 ± 4.60	18.00 ± 4.76	17.70 ± 4.95	17.70 ± 4.95	Group	20.270	0.000	0.925	0.992
	Experimental Group	16.66 ± 8.11	10.66 ± 5.26	10.00 ± 4.60	9.66 ± 4.66	Time	12.379	0.000	0.256	1.000
						Group*Time	5.164	0.002	0.125	0.916
ARINVc (ITT)	Control Group	19.63 ± 4.60	18.54 ± 4.86	18.27 ± 5.06	18.27 ± 5.06	Group	17.589	0.000	0.311	0.983
	Experimental Group	17.05 ± 8.06	11.36 ± 5.96	10.73 ± 5.50	10.42 ± 5.60	Time	12.452	0.000	0.242	0.986
						Group*Time	5.386	0.011	0.121	0.767
ARINVp	Control Group	19.20 ± 4.60	18.00 ± 4.76	17.70 ± 4.95	17.70 ± 4.95	Group	20.270	0.000	0.360	0.992
	Experimental Group	16.66 ± 8.11	10.66 ± 5.25	10.00 ± 4.60	9.66 ± 4.66	Time	12.379	0.000	0.256	1.000
						Group*Time	5.164	0.002	0.125	0.916
ARINVp (ITT)	Control Group	19.63 ± 4.60	18.54 ± 4.86	18.27 ± 5.06	18.27 ± 5.06	Group	17.586	0.000	0.311	0.983
	Experimental Group	17.05 ± 8.06	11.36 ± 5.96	10.73 ± 5.50	10.42 ± 5.60	Time	12.452	0.000	0.242	0.986
						Group*Time	5.386	0.011	0.121	0.767
QoL-S-Child Form	Control Group	140.80 ± 19.14	129.60 ± 28.38	129.60 ± 28.38	123.20 ± 31.61	Group	17.573	0.000	0.328	0.983
	Experimental Group	147.55 ± 16.05	92.44 ± 21.64	87.11 ± 24.06	81.77 ± 29.49	Time	47.900	0.000	0.571	1.000
						Group*Time	19.008	0.000	0.346	1.000
QoL-S-Child Form (ITT)	Control Group	141.09 ± 18.89	130.90 ± 27.77	130.90 ± 27.77	125.09 ± 31.08	Group	14.325	0.001	0.269	0.958
	Experimental Group	148.21 ± 15.85	96.00 ± 26.12	90.94 ± 28.74	85.89 ± 33.81	Time	44.971	0.000	0.536	1.000
						Group*Time	18.540	0.000	0.322	1.000
QoL-S-Parents Form	Control Group	140.80 ± 19.14	129.60 ± 28.38	129.60 ± 28.38	123.20 ± 31.61	Group	17.573	0.000	0.328	0.983
	Experimental Group	147.55 ± 16.05	92.44 ± 21.64	87.11 ± 24.06	81.77 ± 29.49	Time	47.900	0.000	0.571	1.000
						Group*Time	19.008	0.000	0.346	1.000
QoL-S-Parents Form (ITT)	Control Group	141.09 ± 18.89	130.90 ± 27.77	130.90 ± 27.77	125.09 ± 31.08	Group	14.325	0.001	0.269	0.958
	Experimental Group	148.21 ± 15.85	96.00 ± 26.12	90.94 ± 28.74	85.89 ± 33.81	Time	44.971	0.000	0.536	1.000
						Group*Time	18.540	0.000	0.322	1.000

NVTS: Nausea and Vomiting Thermometer Scale; ARINVc: Adapted Rhodes Index of Nausea and Vomiting for Pediatrics by Child; ARINVp: Adapted Rhodes Index of Nausea and Vomiting for Pediatrics by Parents; QoL-S: Quality of life Scale in Pediatric Oncology Patients Aged 7–12; ITT: Intention-to-treat analysis.

Table 4
Comparison of the Total Means of the Experiment and Control Groups for the 13–18 age group NVTS, ARINVc, ARINVp, Quality of Life Scale Child and Parent Form.

Time Group		Pre-test X ± SD	Post-test 1 X ± SD	Post -test 2 X ± SD	Post-Test 3 X ± SD	F		p	Partial Eta^2	Observed Power
NVTS	Control Group	3.55 ± 1.27	3.50 ± 1.27	3.20 ± 1.15	2.85 ± 1.30	Group	16.145	0.000	0.288	0.975
	Experimental Group	3.04 ± 1.64	2.63 ± 1.43	1.36 ± 0.49	1.35 ± 0.49	Time	19.600	0.000	0.329	1.000
						Group*Time	5.197	0.002	0.115	0.991
NVTS (ITT)	Control Group	3.69 ± 1.25	3.65 ± 1.26	3.39 ± 1.19	3.08 ± 1.37	Group	25.325	0.000	0.889	0.998
	Experimental Group	2.87 ± 1.67	2.50 ± 1.44	1.33 ± 0.48	1.33 ± 0.48	Time	19.139	0.000	0.298	1.000
						Group*Time	5.431	0.008	0.108	0.802
ARINVc	Control Group	12.90 ± 7.85	11.45 ± 6.48	11.10 ± 6.82	11.10 ± 6.82	Group	0.074	0.000	0.849	1.000
	Experimental Group	17.45 ± 6.65	10.99 ± 4.77	11.72 ± 1.27	8.18 ± 2.95	Time	23.811	0.000	0.373	1.000
						Group*Time	10.478	0.000	0.208	0.997
ARINVc (ITT)	Control Group	13.04 ± 7.60	11.78 ± 6.43	11.47 ± 6.74	11.47 ± 6.74	Group	0.464	0.499	0.010	0.102
	Experimental Group	18.00 ± 6.62	12.00 ± 5.86	12.75 ± 3.67	9.50 ± 5.28	Time	23.026	0.000	0.338	1.000
						Group*Time	10.575	0.000	0.190	0.975
ARINVp	Control Group	12.90 ± 7.85	11.40 ± 6.42	11.10 ± 6.82	11.10 ± 6.82	Group	0.079	0.000	0.749	1.000
	Experimental Group	17.45 ± 6.65	10.90 ± 4.77	11.72 ± 1.27	8.16 ± 2.95	Time	23.883	0.000	0.374	1.000
						Group*Time	10.454	0.000	0.207	0.998
ARINVp (ITT)	Control Group	13.04 ± 7.60	11.73 ± 6.39	11.47 ± 6.74	11.47 ± 6.74	Group	0.474	0.495	0.010	0.103
	Experimental Group	18.00 ± 6.62	12.00 ± 5.86	12.75 ± 3.67	9.50 ± 5.28	Time	23.092	0.000	0.339	1.000
						Group*Time	10.552	0.000	0.190	0.975
QoL-S-Child Form	Control Group	63.00 ± 21.54	54.25 ± 24.02	63.00 ± 24.35	63.00 ± 24.35	Group	46.688	0.000	0.554	1.000
	Experimental Group	70.00 ± 18.70	114.54 ± 44.72	127.27 ± 43.93	133.63 ± 35.84	Time	14.492	0.000	0.266	1.000
						Group*Time	15.150	0.000	0.376	1.000
QoL-S-Child Form (ITT)	Control Group	60.86 ± 21.67	53.26 ± 23.28	60.86 ± 24.10	60.86 ± 24.31	Group	38.751	0.000	0.463	1.000
	Experimental Group	68.54 ± 19.25	109.37 ± 46.51	121.04 ± 47.27	126.87 ± 42.31	Time	14.492	0.000	0.244	0.998
						Group*Time	15.112	0.000	0.251	0.998
QoL-S-Parents Form	Control Group	63.00 ± 21.54	52.25 ± 24.02	63.00 ± 24.35	63.00 ± 24.35	Group	47.684	0.000	0.544	1.000
	Experimental Group	70.00 ± 18.70	114.54 ± 44.72	127.27 ± 43.93	133.63 ± 36.84	Time	14.592	0.000	0.267	1.000
						Group*Time	15.250	0.000	0.276	1.000
QoL-S-Parents Form (ITT)	Control Group	60.86 ± 21.67	53.26 ± 23.28	60.86 ± 24.10	60.86 ± 24.10	Group	38.751	0.000	0.463	1.000
	Experimental Group	68.54 ± 19.25	109.37 ± 23.28	121.04 ± 47.16	126.87 ± 42.80	Time	14.492	0.000	0.244	0.998
						Group*Time	15.112	0.000	0.251	0.998

NVTS: Nausea and Vomiting Thermometer Scale; ARINVc: Adapted Rhodes Index of Nausea and Vomiting for Pediatrics by Child; ARINVp: Adapted Rhodes Index of Nausea and Vomiting for Pediatrics by Parents; QoL-S: Quality of life Scale in Pediatric Oncology Patients Aged 13–18; ITT: Intention-to-treat analysis.

Table 5
The predictive power of the educational program on the change in nausea-vomiting and quality of life based on the 8–12 aged children's and parent's self-assessment.

Variable	NVTS			ARINVc			ARINVp			Quality of Life- Child Form			Quality of Life- Parents Form		
	B	SE	β	B	SE	β	B	SE	β	B	SE	β	B	SE	β
Study*	−2.267	0.443	−0.649	−5.500	2.112	−0.398	−5.400	2.112	−0.410	48.178	9.152	0.660	49.167	9.165	0.663
	t: −5.122			***t: −2.604***			***t: −2.704***			***t: 5.264***			***t: 5.365***		
	p:0.000			***p:0.013***			***p:0.011***			***p:0.000***			***p:0.000***		
R	**0.649**			**0.398**			**0.410**			**0.660**			**0.663**		
R^2	**0.422**			**0.159**			**0.165**			**0.435**			**0.436**		
Adjusted R^2	**0.405**			**0.135**			**0.172**			**0.419**			**0.420**		
F	**26.231**			**6.763**			**6.893**			**27.714**			**27.718**		
P	**0.000**			**0.013**			**0.011**			**0.000**			**0.000**		
DW	**1.209**			**0.860**			**0.910**			**1.730**			**1.736**		

* When coding the study program, the intervention group was coded as "1" and the control group as "0." DW: Durbin Watson.

ARINVc score 0.521 times (= −0.521). Also, a 28% ($R^2 = 0.280$) decrease in the ARINVp level along with 0.522 times (β = −0.522) reduction in the ARINVp score was observed after the education program. Apart from this, the education program increased the Quality-of-Life Child Form score by 38% ($R^2 = 0.385$), thereby indicating that receiving the education increases the quality of life 0.621 (β = −0.621) times. The education program increased the Quality-of-Life Parental Form score by 39% (R2 = 0.392), apart from increasing the quality of life by 0.622 (= 0.622) times.

The power and effect size of the study for children aged 8–12 years were evaluated utilizing the regression analysis. Results of the analysis indicated that the power of the study for NVTS was 0.92, and the effect size (f^2) was 0.730. The power of the study and effect size for ARINVc was 0.49 and 0.189, respectively, whereas, for ARINVp, the values were 0.51 and 0.197, respectively. For the Quality-of-Life Scale Child Form, the power of the study was 0.99, and the effect size (f^2) was 0.769, whereas, for the Quality-of-Life Scale Parent Form, the values were 0.99 and 0.773, respectively.

The regression analysis was utilized for evaluating the power and effect size of the study for children aged 13–18 years. Results indicated that the power of the study for NVTS was 0.34, and the effect size (f^2) was 0.122. The power of the study and effect size for ARINVc was 0.88 and 0.371, respectively, whereas, for ARINVp, the values were 0.90 and 0.388, respectively. For the Quality-of-Life Scale Adolescent Form, the power of the study was 0.99, and the effect size (f^2) was 0.626, while for the Quality-of-Life Scale Parent Form, the values were 0.99 and 0.644, respectively.

Discussion

Results of this study revealed that in the control group, the NVTS, ARINVc, ARINVp, and Quality-of-Life Scale pretest and posttest mean scores of children aged 8–12 and 13–18 years were similar. However, the experimental group's posttest mean scores were higher than the pretest mean scores, and the experimental group's pretest and posttest mean scores were significantly different in terms of the group, time, and group * time parameters ($p < 0.001$; Tables 2 and 3). The reason behind the higher posttest mean scores in the experimental group may be due to the increase in the permanence of education contributed by the text message reminders. Text message reminders have been extensively researched for their application as a reminder method and are observed to be effective (Schwebel & Larimer, 2018); it is the preferred method for healthcare professionals due to the easy-to-use, cost-effective, and fast message delivery properties (Rathbone & Prescott, 2017). Although text message reminders are a frequently used method in the management of chronic diseases, especially in health practices that require behavior change, their use in the education of children with cancer and their parents have not been studied yet (Bangure et al., 2015; Murray et al., 2015; Pratap et al., 2015). The literature emphasizes the importance of repeating symptom management training in children with cancer and their parents frequently. Therefore, repeating the training with methods like text message reminders increases the permanence and provides better adaptation to the disease (Berrouiguet et al., 2016; Schilling et al., 2020). In this study, it is thought that text message reminders help facilitate behavior change in children with cancer and their parents and serve as a kind of coaching prompt duty.

In this study, the education program explains 42%, 15%, 16%, 43%, and 43% of the increase in the mean scores of the NVTS, ARINVc, ARINVp, and Quality-of-Life Scale Child and Parent Forms, respectively, in children aged 8–12 years (Table 4; $p < 0.001$). In addition, the education program explains 10%, 27%, 28%, 38%, and 39% increase in the mean scores of the NVTS, ARINVc, ARINVp, and Quality-of-Life Scale Adolescent and Parent Forms, respectively, in children aged 13–18 years (Table 5; $p < 0.001$). Literature indicates various applications of text message reminders, such as vaccination, preoperative follow-up, parental involvement. In these studies, while there is information about how to text message reminders affect immunization follow-ups, reduce cancellation of planned surgeries, and changes parental participation in

Table 6
The predictive power of the educational program on the change in nausea-vomiting and quality of life based on the 13–18 aged children's and parent's self-assessment.

Variable	NVTS			ARINVc			ARINVp			Quality of Life- Child Form			Quality of Life- Parents Form		
	B	SE	β	B	SE	β	B	SE	β	B	SE	β	B	SE	β
Study*	−0.982	0.445	−0.329	−7.473	1.937	−0.521	−7.573	1.968	−0.522	63.636	12.711	0.621	65.639	12.781	0.622
	t: −2.206			***t: −3.869***			***t: −3.859***			***t: 5.006***			***t: 5.106***		
	p:0.033			***p:0.000***			***p:0.000***			***p:0.000***			***p:0.000***		
R	**0.329**			**0.521**			**0.522**			**0.621**			**0.622**		
R^2	**0.109**			**0.271**			**0.280**			**0.385**			**0.392**		
Adjusted R^2	**0.086**			**0.253**			**0.260**			**0.370**			**0.380**		
F	**4.868**			**14.890**			**14.960**			**25.063**			**25.069**		
P	**0.033**			**0.000**			**0.000**			**0.000**			**0.000**		
DW	**0.709**			**0.895**			**0.905**			**1.665**			**1.666**		

* When coding the study program, the intervention group was coded as "1" and the control group as "0." DW: Durbin Watson.

care (Bangure et al., 2015; Murray et al., 2015; Pratap et al., 2015), limited information is available regarding its effect on nausea-vomiting and quality of life in children with cancer. Previous studies indicate that various factors affect the quality of life and nausea-vomiting in children with cancer (Hooke & Linder, 2019; Robson et al., 2021; Ruggiero et al., 2018; Sarin, 2020). It is known that practices like antiemetic drug applications, aromatherapy, and therapeutic approach are effective in reducing these side effects (Evans et al., 2018; Ho et al., 2019; Jain et al., 2018; Momani & Berry, 2017). Considering this scenario, the results of this study revealing the positive effects of text message reminders on the level of nausea-vomiting and quality of life in children with cancer can be considered promising, thereby asserting the effectiveness of the study. In this study, the effectiveness of text message reminders can contribute to the planning of the training time according to the duration of the chemotherapy protocols, the preparation of the educational content according to the needs of children with cancer and their parents, and the short and clear information in the messages (messages contained all the information aimed at reducing nausea and vomiting). Since parents spend a significant amount of their time using certain apps on their phones (Papadakis & Kalogiannakis, 2017), it is emphasized that the correct orientation of this time contributes positively to the care of children (B. T. McDaniel, 2019). Therefore, this application makes it easier for parents to access information, draws their attention, and is thought to be effective.

In this study, analysis of the power values indicates the statistical significance of the study, whereas the effect size gives information about the application/clinical significance. (Cohen, 1988; Cohen, 1992). In the literature, effect sizes in the range of 0.02–0.15, 0.15–0.35, and ≥ 0.35 are considered to be small, medium, and large, respectively (Cohen, 1988; Ellis, 2010). Analysis of the effect size values of this study indicates that the intervention has a medium effect size for nausea-vomiting and a large effect size for quality of life in children aged 8–12 years. Also, the intervention has a large effect size for both nausea-vomiting and quality of life in children aged 13–18 years. Because of the lack of previous studies on this subject, the power and effect size comparison could not be made. Thus, the large effect size in this study reveals that the intervention has high application significance and is a feasible and effective intervention.

Practice implications

Despite effective treatment strategies, additional interventions are required to address nausea and vomiting in children with cancer, thereby increasing their quality of life. Therefore, different types of interventions, including pharmacological interventions, are required to effectively manage nausea and vomiting in children with cancer. The results of this study, text message reminders can be applied as an alternative intervention method, and including technology-based practices in the care of children with cancer is important in increasing the quality of care.

Nowadays, mobile technology applications (such as phones and tablets) have become a part of the mobile health strategy. Text message reminders are actively used to support and strengthen health care and child health, contributing to health institutions in terms of cost management, and patients, in terms of quality of life. Nurses play an important role in proactively managing the care of children with cancer by increasing the awareness and usability of text message reminder systems. In the future, text message reminders can provide opportunities in the implementation of nursing care and education, thereby reducing the workload of nurses, facilitating communication between health personnel who are far from each other, and monitoring the status of children who do not have a health unit nearby or cannot reach the health unit for various reasons. Nurses should increase the awareness and usability of text message reminders, recognize barriers, and ultimately plan their nursing services accordingly, thereby supporting parents in protecting and improving the health of their children.

Limitations

The limitation of this study is that the research was carried out in a single institution which prevents the generalization of the findings. Also, in this study, the text message reminder intervention was applied only to children with cancer treated with cisplatin; further studies are required in pediatric cancer patients receiving other types of treatments.

Conclusion

It has been observed that text message reminders are effective in reducing the level of nausea and vomiting and increasing the quality of life in children with cancer receiving cisplatin; therefore, the findings of this study substantially contribute to literature. Also, it is thought that studies focusing on the effectiveness of interventions on patients have a significant impact on health care practiced by health professionals. Therefore, it can be concluded that technology-based health practices can be used as an adjunctive management approach for children with cancer and their parents, thereby increasing the quality of life in today's world, where technological applications are accelerating.

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Ethical statement

The study was approved by a university's Non-Interventional Clinical Research Ethics Committee.

Declaration of Competing Interest

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References

Akçay Didişen, N., Yavuz, B., Yardimci, F., & Basbakkal, D. Z. (2018). Validity and reliability of the Turkish version of the Adapted Rhodes Index of Nausea and Vomiting for Pediatrics by child (ARINVc) and by parent (ARINVp). *Journal of Pediatric Oncology Nursing*, *35*(5), 353–360.

Bandura, A. (1997). The anatomy of stages of change. *American Journal of Health Promotion : AJHP*, *12*(1), 8–10. https://doi.org/10.4278/0890-1171-12.1.8.

Bandura, A. (2004). Health promotion by social cognitive means. *Health Education & Behavior : The Official Publication of the Society for Public Health Education*, *31*(2), 143–164. https://doi.org/10.1177/1090198104263660.

Bangure, D., Chirundu, D., Gombe, N., Marufu, T., Mandozana, G., Tshimanga, M., & Takundwa, L. (2015). Effectiveness of short message services reminder on childhood immunization programme in Kadoma, Zimbabwe - a randomized controlled trial, 2013. *BMC Public Health*, *15*(1), 1–8. https://doi.org/10.1186/s12889-015-1470-6.

Baxter, A. L., Watcha, M. F., Baxter, W. V., Leong, T., & Wyatt, M. M. (2011). Development and validation of a pictorial nausea rating scale for children. *Pediatrics*, *127*(6) e1542–9. https://doi.org/10.1542/peds.2010-1410.

Bektas, M., Akdeniz Kudubes, A., Ugur, O., Vergin, C., & Demirag, B. (2016). Developing the scale for quality of life in pediatric oncology patients aged 13–18: adolescent form and parent form. *Asian Nursing Research*, *10*(2). https://doi.org/10.1016/j.anr.2016.03.002.

Berrouiguet, S., Baca-García, E., Brandt, S., Walter, M., & Courtet, P. (2016). Fundamentals for future mobile-health (mHealth): A systematic review of mobile phone and web-based text messaging in mental health. *Journal of Medical Internet Research*, *18*(6). https://doi.org/10.2196/jmir.5066.

Bodge, M., Shillingburg, A., Paul, S., & Biondo, L. (2014). Safety and efficacy of aprepitant for chemotherapy-induced nausea and vomiting in pediatric patients: A prospective, observational study. *Pediatric Blood & Cancer*, *61*(6), 1111–1113. https://doi.org/10.1002/pbc.24901.

Cohen, J. (1988). The concepts of power analysis BT - statistical power analysis for the behavioral sciences (revised edition). *Statistical power analysis for the behavioral*

sciences (2nd ed.). Hillsdale, N.J: L. Erlbaum Associates. https://doi.org/10.4324/9780203771587.

Cohen, J. (1992). A power primer. *Psychological bulletin*, *112*(1), 155–159. https://doi.org/10.1037/0033-2909.112.1.155.

Ellis, P. D. (2010). The essential guide to effect sizes. *The essential guide to effect sizes*. Cambridge University Press. https://doi.org/10.1017/cbo9780511761676.

Evans, A., Malvar, J., Garretson, C., Pedroja Kolovos, E., & Baron Nelson, M. (2018). The use of aromatherapy to reduce chemotherapy-induced nausea in children with cancer: A randomized, double-blind, placebo-controlled trial. *Journal of Pediatric Oncology Nursing*, *35*(6), 392–398. https://doi.org/10.1177/1043454218782133.

Evans, A., Vingelen, M. B., Yu, C., Baird, J., Murray, P., & Bryant, P. (2020). Nausea in numbers: Electronic medical record nausea and vomiting assessment for children with cancer. *Journal of Pediatric Oncology Nursing*, *37*(3), 195–203. https://doi.org/10.1177/1043454219900467.

Flank, J., Robinson, P. D., Holdsworth, M., Phillips, R., Portwine, C., Gibson, P., ... Dupuis, L. L. (2016). Guideline for the treatment of breakthrough and the prevention of refractory chemotherapy-induced nausea and vomiting in children with cancer. *Pediatric Blood & Cancer*, *63*(7), 1144–1151. https://doi.org/10.1002/pbc.25955.

Green, R., Horn, H., & Erickson, J. M. (2010). Eating experiences of children and adolescents with chemotherapy-related nausea and mucositis. *Journal of Pediatric Oncology Nursing*, *27*(4), 209–216. https://doi.org/10.1177/1043454209360779.

Ho, K. Y., Lam, K. K. W., Chung, J. O. K., Xia, W., Cheung, A. T., Ho, L. K., ... Li, H. C. W. (2019). Systematic review of the effectiveness of complementary and alternative medicine on nausea and vomiting in children with cancer: A study protocol. *BMJ Open*, *9*(10), 31834. https://doi.org/10.1136/bmjopen-2019-031834.

Hooke, M. C., & Linder, L. A. (2019). Symptoms in children receiving treatment for cancer—Part I: Fatigue, sleep disturbance, and nausea/vomiting. *Journal of Pediatric Oncology Nursing*, *36*(4), 244–261.

Jain, S., Kapoor, G., Koneru, S., & Vishwakarma, G. (2018). A randomized, open-label non-inferiority study to compare palonosetron and ondansetron for prevention of acute chemotherapy-induced vomiting in children with cancer receiving moderate or high emetogenic chemotherapy. *Supportive Care in Cancer*, *26*(9), 3091–3097. https://doi.org/10.1007/s00520-018-4158-5.

Kudubes, A. A., & Bektas, M. (2015). Developing a scale for quality of life in pediatric oncology patients aged 7-12 - children and parent forms. *Asian Pacific Journal of Cancer Prevention*, *16*(2), 523–529. https://doi.org/10.7314/APJCP.2015.16.2.523.

Kudubes, A. A., & Bektaş, M. (2021). Developing the nausea and vomiting thermometer scale in children with Cancer. *Turkish Journal of Medical Sciences*. https://doi.org/10.3906/SAG-2005-88.

Lo, L. H., & Hayman, L. L. (1999). Parents associated with children in measuring acute and delayed nausea and vomiting. *Nursing & Health Sciences*, *1*(3), 155–161. https://doi.org/10.1046/j.1442-2018.1999.00020.x.

McDaniel, B. T. (2019). Parent distraction with phones, reasons for use, and impacts on parenting and child outcomes: A review of the emerging research. *Human Behavior and Emerging Technologies*, *1*(2), 72–80. https://doi.org/10.1002/hbe2.139.

McDaniel, M. A., Einstein, G. O., Graham, T., & Rall, E. (2004). Delaying execution of intentions: Overcoming the costs of interruptions. *Applied Cognitive Psychology*, *18*(5), 533–547. https://doi.org/10.1002/acp.1002.

Momani, T. G., & Berry, D. L. (2017). Integrative therapeutic approaches for the management and control of nausea in children undergoing cancer treatment: A systematic review of literature. *Journal of Pediatric Oncology Nursing*, *34*(3), 173–184. https://doi.org/10.1177/1043454216688638.

Murray, K. W., Woodruff, K., Moon, C., & Finney, C. (2015). Using text messaging to improve attendance and completion in a parent training program. *Journal of Child and Family Studies*, *24*(10), 3107–3116. https://doi.org/10.1007/s10826-015-0115-9.

Papadakis, S., & Kalogiannakis, M. (2017). Mobile educational applications for children: What educators and parents need to know. *International Journal of Mobile Learning and Organisation*, *11*(3), 256–277. https://doi.org/10.1504/IJMLO.2017.085338.

Patel, P., Robinson, P. D., Devine, K. A., Positano, K., Cohen, M., Gibson, P., ... Dupuis, L. L. (2021). Prevention and treatment of anticipatory chemotherapy-induced nausea and vomiting in pediatric cancer patients and hematopoietic stem cell recipients: Clinical practice guideline update. *Pediatric Blood & Cancer*, *68*(5), 28947. https://doi.org/10.1002/pbc.28947.

Pratap, J. N., Varughese, A. M., Mercurio, P., Lynch, T., Lonnemann, T., Ellis, A., ... Bedinghaus, C. (2015). Reducing cancelations on the day of scheduled surgery at a children's hospital. *Pediatrics*, *135*(5), e1292–e1299. https://doi.org/10.1542/peds.2014-2418.

Rathbone, A. L., & Prescott, J. (2017). The use of mobile apps and SMS messaging as physical and mental health interventions: Systematic review. *Journal of Medical Internet Research*, *19*(8), Article e7740. https://doi.org/10.2196/jmir.7740.

Robson, P. C., Dietrich, M. S., & Akard, T. F. (2021). Associations of age, gender, and family income with quality of life in children with advanced cancer. *Journal of Pediatric Oncology Nursing*, *104345422199232*. https://doi.org/10.1177/1043454221992321.

Roila, F., Molassiotis, A., Herrstedt, J., Aapro, M., Gralla, R. J., Bruera, E., ... participants of the MASCC/ESMO Consensus Conference Copenhagen 2015 (2016). 2016 MASCC and ESMO guideline update for the prevention of chemotherapy- and radiotherapy-induced nausea and vomiting and of nausea and vomiting in advanced cancer patients. *Annals of Oncology : Official Journal of the European Society for Medical Oncology*, *27*(Suppl. 5), v119–v133. https://doi.org/10.1093/annonc/mdw270.

Rosenberg, A. R., Orellana, L., Ullrich, C., Kang, T., Geyer, J. R., Feudtner, C., ... Wolfe, J. (2016). Quality of life in children with advanced cancer: A report from the PediQUEST study. *Journal of Pain and Symptom Management*, *52*(2), 243–253. https://doi.org/10.1016/j.jpainsymman.2016.04.002.

Ruggiero, A., Rizzo, D., Catalano, M., Coccia, P., Triarico, S., & Attiná, G. (2018). Acute chemotherapy-induced nausea and vomiting in children with cancer: Still waiting for a common consensus on treatment. *Journal of International Medical Research*, *46*(6), 2149–2156. https://doi.org/10.1177/0300060518765324.

Salvador, Á., Crespo, C., & Barros, L. (2019). The benefits of family-centered care for parental self-efficacy and psychological well-being in parents of children with cancer. *Journal of Child and Family Studies*, *28*(7), 1926–1936 2019https://doi.org/10.1007/S10826-019-01418-4.

Krishnamurthy, & Sarin, R. (2020). Quality of life of Indian children with cancer: Measuring what matters. *Cancer Research, Statistics, and Treatment*, *3*(3), 566. https://doi.org/10.4103/CRST.CRST_275_20.

Schilling, S., Ritter, V., Wood, J. N., Fine, J., & Zolotor, A. J. (2020). Child-adult relationship enhancement in primary care: A randomized trial of a skill-based parent training with parent mentor adaptation. *Journal of Developmental and Behavioral Pediatrics : JDBP*, *41*(4), 272–280. https://doi.org/10.1097/DBP.0000000000000759.

Schwebel, F. J., & Larimer, M. E. (2018). Using text message reminders in health care services: A narrative literature review. *Internet Interventions*, *13*, 82–104. https://doi.org/10.1016/j.invent.2018.06.002.

Tyc, V. L., Mulhern, R. K., Jayawardene, D., & Fairclough, D. (1995). Chemotherapy-induced nausea and emesis in pediatric cancer patients: An analysis of coping strategies. *Journal of Pain and Symptom Management*, *10*(5), 338–347. https://doi.org/10.1016/0885-3924(95)00019-u.