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## Effect of video training on anxiety and knowledge level among caregivers of children and adolescents chemotherapy: A randomized clinical trial

### **Graphical abstract**



## **Highlights**

- Video training has positive effect on reducing state anxiety (STAI-State)
- The video training contributed to knowledge acquisition
- The technology is low cost and has been validated by experts

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In brief Cancer; Psychology.



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### Article



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#### **SUMMARY**

This study aimed to evaluate the effect of video training compared to verbal guidelines for acquiring knowledge and reducing anxiety in caregivers of children and adolescents undergoing chemotherapy. A randomized, controlled, double-blind, two-arm clinical trial with simple randomization was carried out. 26 caregivers of children and adolescents recently diagnosed with cancer participated in the study, who were randomly assigned to the experimental group, who received verbal guidance associated with an educational technology in video format about the chemotherapy process; or to the control group, which received only verbal instructions. Patients in the experimental group showed better performance in answering the questions correctly. Caregivers in the experimental group showed a reduction in State-Trait Anxiety Inventory (STAI)-State when comparing the initial period with the final period with value (95% confidence interval [CI]; p < 0.05).

#### INTRODUCTION

Cancer is considered a chronic disease and represents a public health problem, affecting approximately 429,000 children worldwide every year.<sup>1</sup> Because its development is marked by uncertain mutations and unexplained risk factors, it becomes a challenge for the scientific community. Regarding leukemia, tumors of the central nervous system and lymphomas are the main types of malignant neoplasms in childhood.<sup>2</sup>

Chemotherapy is still the basis of therapy for treatment and can be used in association with other methods, such as surgery and radiotherapy. Due to the long hospitalization periods for both the child and for the family and/or main caregiver, there is a break in the routine of their activities, constituting an illness process for all involved. Thus, the caregiver of the child/adolescent goes through a process of change and coping that requires support to perform the task of caring.<sup>3</sup> Chemotherapy treatment causes some side effects, which are surrounded by meanings of fear, stigma, and anxiety on the part of parents, family members, or caregivers responsible for children and adolescents, mainly because they do not know the therapy, its effects, and the purpose of the treatment.<sup>4</sup>

It is noteworthy that this lack of knowledge about chemotherapy treatment, its side effects, and general care on the part of caregivers mainly causes anxiety, which is one of the most common symptoms of those experiencing the chemotherapy process. Health education is one of the ways associated with

reducing anxiety due to the clarification of doubts and necessary guidance for care with chemotherapy drugs, for example, for managing the side effects of chemotherapy and care with nutrition, hygiene, and hydration.<sup>5,6</sup>

In this context, it is clear that caregivers lack information regarding the disease and chemotherapy treatment. Therefore, parents or the main caregiver of the child/adolescent, when they do not understand the disease and the effects of chemotherapy treatment, prolong suffering due to the lack of information.<sup>7</sup> Verbal guidelines provided by health professionals, especially nurses who are involved in the entire care process during chemotherapy treatment, must be accessible, enlightening, simple, and objective, which allows guiding the caregiver based on doubts.5

The use of educational technologies stands out, which allows the insertion of resources that can contribute to strengthening health guidelines and, when associated with standard guidelines provided by institutions, can clarify doubts in a dynamic way. Information can be transmitted through audio, video, and animation simultaneously.7,8

The study carried out by Handam et al. (2020)<sup>5</sup> showed that the use of a video-type educational technology to instruct the caregiver before the administration of intrathecal chemotherapy contributed to a decrease in the levels of palpitation, sweating, and fear related to anxiety in parents of children with cancer. Furthermore, video training contributed to increased knowledge and support for caregivers.9

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#### Figure 1. CONSORT flow diagram of participants

## Comparison of IAC in patients according to the study group

With regard to neoplasms, 53.85% (n = 14) of the children were diagnosed with hematological tumors, followed by solid tumors 46.15% (n = 12), with diagnosis time in relation to the start of chemotherapy treatment between 5 to 15 days, with mean and standard deviation of 8.08 ± 2.78 days.

Using the Student's t test, assigning a significance level of 5%, we have evidence of a statistical difference between the IAC and the study group, where patients in the EG showed better performance in answering the questions correctly (Table 2).

## Comparison of STAI in patients according to the study group

With regard to the classification of anxiety, the GE presented a significance level of p < 0.05 in the State-Trait Anxiety In-

The study is based on the hypothesis that the use of video training can be effective in guiding caregivers and consequently reducing the level of anxiety when compared to the verbal guidelines that are established in oncology institutions. It is necessary to conduct a randomized clinical trial to investigate the effect of educational strategies aimed at supporting caregivers during chemotherapy treatment. Therefore, this study aimed to evaluate the effect of video training compared to verbal guidance for reducing anxiety and acquiring knowledge among caregivers of children and adolescents undergoing chemotherapy.

#### RESULTS

#### **Characterization of participants**

A total of 26 caregivers were evaluated during the data collection period, being randomized and allocated as follows: 13 in the control group (CG) and 13 in the experimental group (EG). The flowchart with the participants is illustrated in Figure 1. The sociodemographic and clinical characteristics compared with the groups studied at the baseline of the study are presented in Table 1.

There is homogeneity between the studied groups, since there was no statistically significant difference. It is noteworthy that all study participants were parents of children/adolescents. In this context, the study sample was predominantly female 96.15% (n = 25), with a mean age of  $33.50 \pm 10.40$  years, with a minimum and maximum age of 20 and 56 years; moreover, 50% (n = 13) of caregivers were married, most had high school (50%, n = 13) and elementary education (38.46%, n = 10), and 50% (n = 13) had income of up to one minimum salary.

DISCUSSION

from moderate to low (Table 3).

The study aimed to evaluate the effect of a digital animation video compared to verbal guidance for reducing anxiety and acquiring knowledge among caregivers of children and adolescents undergoing chemotherapy. It was found that the digital animation video has a positive effect on the acquisition of knowledge and the reduction of state anxiety in caregivers of children and adolescents with cancer. However, the interventions did not affect the caregivers' trait anxiety. Regarding the level of knowledge, there was an increase in the acquisition of knowledge in both groups, with the group that used digital animation video obtaining better results.

ventory (STAI)-State, showing a reduction in the level of anxiety

A study carried out by Nova et al. (2019)<sup>10</sup> showed a significant improvement in the knowledge level of parents of children with cancer after multimedia-based education. Collaborating with these data, Hapsari et al. (2012)<sup>11</sup> highlighted significant differences in the level of knowledge, attitude, and skills of caregivers of children undergoing chemotherapy, after using a multimedia strategy for health education about the treatment.

Furthermore, a study comparing the guidelines generated with the aid of an educational technology on chemotherapy treatment with the guidelines not aided by technology showed statistical significance in the guidelines, with a higher mean of agreement with the educational technology prevailing in the EG when compared to the CG.<sup>12</sup>

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#### Table 1. Baseline characteristics of participants

		Group			
Characterization		Control n (%)	Experimental n (%)	Effect size	p value
Sex	Female	13 (100)	12 (92.31)	0.31	1.000 <sup>a</sup>
	Male	0 (0)	1 (7.69)		
Age range	up to 30 years	5 (38.46)	8 (61.54)	0.49	0.239 <sup>a</sup>
	over 30 years	8 (61.54)	5 (38.46)		
Education	Elementary	6 (46.15)	4 (30.77)	0.35	0.667 <sup>a</sup>
	high school	6 (46.15)	7 (53.85)		
	post-secondary	1 (7.69)	2 (15.38)		
Civil status	Married	8 (61.54)	5 (38.46)	0.49	0.239 <sup>a</sup>
	Single	5 (38.46)	8 (61.54)		
Monthly income	up to 1 minimum salary	7 (53.85)	6 (46.15)	0.16	0.695 <sup>a</sup>
	over 1 minimum salary	6 (46.15)	7 (53.85)		
Residence	Natal	4 (30.77)	5 (38.46)	0.31	1.000 <sup>b</sup>
	other location	9 (69.23)	8 (61.54)		
Diagnosis of the patient	solid tumors	7 (58.84)	5 (38.46)	0.67	0.116 <sup>a</sup>
	non-solid tumors (hematological)	6 (46.15)	8 (61.54)		
Received guidance on chemotherapy	Yes	5 (38.46)	7 (53.84)	0.39	0.334 <sup>a</sup>
from a professional at the institution?	No	8 (61.53)	6 (46.15)		
Time from diagnosis to start of treatment	$\geq$ 5 to <10 days $\geq$ 10 to $\leq$ 15 days	6 (46.15) 7 (53.84)	8 (61.53) 5 (38.46)	0.39	0.334 <sup>a</sup>
How do you feel as a caregiver at the moment?	unprepared but confident prepared and confident prepared but fearful	3 (23.08) 7 (53.85) 3 (23.08)	1 (7.69) 8 (61.54) 4 (30.77)	0.37	0.546 <sup>b</sup>
Total		13 (100)	13 (100)		
Source: The author, 2023.					

<sup>a</sup>Note: chi-squared test.

<sup>b</sup>Fisher's exact test.

Collaborating with the results of the study, the theory of meaningful learning stands out, developed in the 1960s by psychologist David Ausubel, which takes into account the relationship between the individual's prior knowledge and the generation of new information. It seeks to attribute meaning to each person's reality. In the theory of meaningful learning, there is an intentionality of the student to learn.<sup>13</sup> In this study, caregivers of children with cancer seek to learn and understand more about the diagnostic and therapeutic process. The use of digital animation video is potentially significant, given that it uses several elements that arouse curiosity and facilitate understanding, such as the use of images, sound, and text. The teaching-learning process in health services involves the integration of users with the health team. In this sense, the approach to the daily life and situations experienced by caregivers and health professionals can make health education meaningful.<sup>14</sup>

The development and use of educational technologies as tools to help the health education process have shown a positive effect on knowledge acquisition and the construction of a new healthcare modality. At this level, the role of nursing professionals who have collaborated in producing technologies in the educational, managerial, and care areas stands out.<sup>15–18</sup> It is noteworthy that the nurse is involved in providing guidance on

Table 2. Cor	mparison of IAC	C in patient	s according	to the stu	udy group							
Variable		Minimum	Maximum	25%	Median	75%	IQ	Mean	SD	CV	Effect size	p value
IAC (number	control	6.00	8.00	6.00	7.00	7.00	1.00	6.92	0.76	10.97	1.37	0.002
of hits)	experimental	7.00	8.00	8.00	8.00	8.00	0.00	7.77	0.44	5.64		
IAC (%	control	75.00	100.00	75.00	87.50	87.50	12.50	86.54	9.49	10.97	1.37	0.002
of hits)	experimental	87.50	100.00	100.00	100.00	100.00	0.00	97.12	5.48	5.64		
IQ. interquarti	le range: SD. sta	ndard devia	ion: CV. coef	ficient of v	variation.							



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Table 3. Comp	arison of STAI i	n patients	according to	the study grou	a								
Comparison			Minimum	Maximum	25%	Median	75%	Ø	Mean	SD	CV	Effect size	<i>p</i> value
Control	STAI-State	bre	40.00	71.00	44.00	47.00	52.00	8.00	49.69	8.86	17.84	0.40	0.183
		post	42.00	71.00	43.00	47.00	49.00	6.00	48.15	7.50	15.58		
	Stai-Trait	bre	39.00	58.00	46.00	48.00	50.00	4.00	48.69	5.33	10.94	0.03	0.911
		post	33.00	67.00	46.00	48.00	51.00	5.00	48.92	9.59	19.60		
Experimental	STAI-State	bre	34.00	72.00	41.00	48.00	53.00	12.00	47.92	10.56	22.03	0.72	0.020
		post	34.00	69.00	36.00	45.00	51.00	15.00	45.54	9.86	21.66		
	STAI-Trait	bre	30.00	55.00	44.00	47.00	50.00	6.00	46.62	6.58	14.11	0.51	0.093
		post	30.00	52.00	36.00	46.00	48.00	12.00	43.15	7.86	18.22		
IQ, interquartile r	ange; SD, standa	rd deviatior	η; CV, coefficieι	nt of variation.									

chemotherapy treatment and the general care of children with cancer. And, every day, resources are used in clinical practice that contribute to the health education process.<sup>19</sup>

Educational technologies provide caregiver support and access to key evidence-based guidelines. In addition, the caregiver seeks to understand the technical terms related to the childhood cancer process at the beginning of cancer treatment, which can be facilitated by the use of an educational technology.<sup>19–21</sup>

In addition to the effects on knowledge acquisition, the development of studies associating reduced anxiety with the use of multimedia strategies aimed at health education can be highlighted.<sup>5,9</sup> Thus, multimedia-based education involves the visual and auditory senses of the participants, which contributes to knowledge acquisition and consequent reduced anxiety, with great potential to be used before invasive procedures.<sup>5,22</sup>

In a study carried out by Handam et al. (2020),<sup>5</sup> the positive influence of a multimedia strategy in video format was evidenced as a tool for health education for caregivers of children undergoing intrathecal chemotherapy with consequent reduced anxiety, in which the group that watched the video had lower anxiety levels compared to the control group.

Reducing fear and anxiety regarding the effects of chemotherapy was also evidenced in a study by Fazelniya et al. (2017),<sup>23</sup> who used a computer multimedia strategy for health education of children/adolescents with cancer. In the studies carried out, it was observed that the use of educational technologies with audiovisual resources such as videos had a positive effect on reducing anxiety when compared to printed materials or educational programs.<sup>24</sup>

It is noteworthy that, in the present study, caregivers who watched the digital animation video showed reduced anxiety on the STAI-State when compared to the group that received only verbal instructions. The STAI-State is related to transient anxiety, demonstrating how the individual feels in face of a stimulus or threat, which in this case is the diagnosis of cancer and the start of chemotherapy treatment for the child/ adolescent.<sup>25-27</sup>

There are other factors that can influence the anxiety level of the caregiver of a child with cancer, for example, social, economic, and family factors, which must be taken into account during educational interventions.<sup>5</sup> Furthermore, studies indicate that parents of children with cancer have higher anxiety levels in the period close to the diagnosis when compared to parents of healthy children or acute and chronic diseases. The diagnosis of any type of neoplasm causes feelings of anguish, fear, and anxiety in parents.<sup>28</sup>

It is noteworthy that there were no significant changes in relation to the STAI-Trait when compared to the sum of scores between pre- and post-intervention. This result may be related to the fact that the STAI-Trait demonstrates the feeling of the individual in general and their usual anxiety, which does not undergo significant momentary changes.<sup>29</sup>

In this way, the study contributed to health education for caregivers of children and adolescents with cancer, demonstrating the effect of an easily accessible educational strategy that can be used to provide information to parents and consequently reduce the anxiety generated at the beginning of chemotherapy treatment. It should be noted that educational

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technologies developed for pediatric oncology are still incipient, requiring resources that can contribute to the health education of parents who care for children and adolescents undergoing chemotherapy.

#### Limitations of the study

The sample size stands out as a limitation of the study, which may compromise the generalization of the research; however, it is noteworthy that the study was carried out with a specific audience of caregivers of children and adolescents with cancer at a single moment before the start of chemotherapy treatment. The study is limited to a single educational assessment activity, requiring the development of long-term studies to evaluate the benefits of educational strategies. Despite this, it is hoped that the study can contribute to future research on the topic.

#### Conclusion

This study showed that guidance to caregivers with the aid of a multimedia strategy (a digital animation video) has a positive effect on reducing the anxiety level and increasing knowledge acquisition compared to standardized verbal guidance at the institution. Therefore, the alternative hypothesis of the study was accepted, which states that a multimedia strategy has a positive effect on reducing anxiety and acquiring knowledge in caregivers of children and adolescents undergoing chemotherapy treatment.

#### **RESOURCE AVAILABILITY**

#### Lead contact

Requests for further information, resources, and reagents should be directed to and will be fulfilled by the lead contact, Daniele Vieira Dantas (daniele. vieira@ufrn.br).

#### **Materials availability**

This study did not generate new unique reagents.

#### Data and code availability

- The patient data reported in this study cannot be deposited in a public repository in order to preserve patient privacy and confidentiality.
- This study did not generate new original code.
- Any additional information required to reanalyze the data reported in this paper is available from the lead contact upon request (daniele.vieira@ ufrn.br).

#### **AUTHOR CONTRIBUTIONS**

Conceptualization, S.d.O.S., N.M.d.A., and N.T.B.L.; methodology, M.E.S., K. V.G.d.S., and T.T.M.d.S.; investigation, S.d.O.S., J.F.d.F., and N.T.B.L.; writing – original draft, S.d.O.S. and M.E.S.; writing – review and editing, S. d.O.S., K.R.B.R., and D.V.D.; supervision, D.V.D. and R.A.N.D.

#### **DECLARATION OF INTERESTS**

The authors declare no competing interests.

DECLARATION OF GENERATIVE AI AND AI-ASSISTED TECHNOLOGIES IN THE WRITING PROCESS

We do not use Al.

#### STAR \* METHODS

Detailed methods are provided in the online version of this paper and include the following:

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#### SUPPLEMENTAL INFORMATION

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### **STAR**\*METHODS

#### **KEY RESOURCES TABLE**

REAGENT or RESOURCE	SOURCE	IDENTIFIER
Software and algorithms		
G*Power 3.1.9.2 (University Kiel, Germany)	Kang H.	https://www.psychologie.hhu.de/ arbeitsgruppeN/Allgemeine- psychologie-und-arbeitspsychologie/gpower
IBM SPSS Statistics for Windows, Version 24.0 (Armonk, NY: IBM Corp).	IBM SPSS	https://www.ibm.com/cn-zh/products/spss-statistics

#### **EXPERIMENTAL MODEL AND STUDY PARTICIPANT DETAILS**

This is a randomized, two-arm, controlled clinical intervention trial with a double-blind design. It evaluated the effect of an educational technology used as a tool for health education in the experimental group (EG) of caregivers, comparing it with the effects of verbal guidelines, herein titled "standard guidelines", which were provided to the control group (CG) of caregivers. Both interventions are related to the chemotherapy treatment of children and adolescents. This study was analyzed and approved by the Research Ethics Committee of the Federal University of Rio Grande do Norte (UFRN) (CAAE - 52597121.9.0000.5537 (02/03/2022) and CEP 5.176.784 (02/03/2022). The participation of caregivers was voluntary, non-profit and occurred by reading and signing the Informed Consent Form (ICF). This study is also registered in the Brazilian Registry of Clinical Trials (REBEC–RBR-4wdm8q9) as a clinical trial.

The study followed the standards of the Consolidated Standards of Reporting Trials (CONSORT).<sup>30</sup> The study protocol can be found: https://doi.org/10.1371/journal.pone.0285250.<sup>31</sup>

#### **METHOD DETAILS**

#### Sample size

The sample was probabilistic and simple random. The sample calculation was performed using the G Power version 3.1.9.2 program (available at: http://www.gpower.hhu.de/), considering the study by Bernardi et al. (2019),<sup>32</sup> which evaluated the State-Trait Anxiety Inventory (STAI) score in caregivers of children and adolescents with cancer. The means and standard deviation of the parameters to be evaluated were calculated based on the results of the anxiety scale. In comparing the control group ( $46.20 \pm 3.31$ ;  $44.00 \pm 2.37$ ) and experimental group ( $40.00 \pm 5.76$ ;  $37.40 \pm 5.78$ ) in the anxiety variable with a Cohen effect size of 1.80, test power of 0.95 and significance level of 5%, we found a sample size per group of 13, totaling 26 caregivers. More details on the sampling calculation can be found in the S1 support file.

	Treatment	N =
Experimental group	Video training	13
Active control group	Verbal Instructions	13

#### **Eligibility criteria**

Caregivers of children and adolescents diagnosed with cancer at the beginning of chemotherapy treatment participated in the study. Caregivers of both sexes, aged 18 years or older and who were the main caregivers of a child or adolescent with cancer at the beginning of chemotherapy treatment were included.

Participants who had the following conditions were excluded from the study: disorder that disabled understanding and participation in the study; caregivers of children and adolescents who are starting chemotherapy treatment with disease recurrence; caregivers who have already had experience in caring for patients undergoing chemotherapy; and people with visual or hearing deficits.

#### **Recruitment, randomization and allocation**

The recruitment period occurred after the study approval by the Brazilian Registry of Clinical Trials (ReBec), from March 24 to December 2022. The participants were randomized through the website: www.randomizer.org, which previously selected the



participants for each group (CG and EG) by simple randomization and without influence from the researchers. This site generates a list with the sequence of participants equally divided into the two intervention groups.

Caregivers were recruited upon admission of the child/adolescent to the pediatric oncology sector of the hospital where the study was carried out. Caregivers were contacted and the eligibility criteria for participation in the research were evaluated.

The recruited participants who agreed to participate in the study after signing the informed consent form were introduced to the study, clarifying their doubts before the intervention. After this step, participants were allocated into one of two groups (CG or EG) according to the randomization list generated prior to the initial assessment.

#### Intervention

A educational technology was applied in the EG associated with standardized verbal guidelines in the Institution. The educational technology was to show a digital animation video lasting 12 min and 22 s, which addresses the pediatric chemotherapy treatment process. This feature was developed by Pinheiro et al. (2020),<sup>33</sup> validated by experts in the field and for the target audience, and authorized to be used in the study, but is not available for open access.<sup>34</sup>

The digital animation video is a narrative presentation for children that tells the story of the first treatment of a character who is diagnosed with cancer and needs to undergo chemotherapy. During the video, guidance is provided on what chemotherapy is and how to administer the medication, as well as general care during treatment, adverse effects of chemotherapy, such as the importance of a healthy diet, proper hygiene, the risk of infections, need for blood collections and the importance of medication for treatment.

The digital animation video shows the administration of medications for cancer treatment in a playful way. The video is set in a hospital and has characters that refer to doctors and nursing professionals. There are also characters referring to caregivers and children. During the narration, the characters establish dialogues based on the doubts of the caregivers and the child.

The CG received only the institution's own verbal guidelines regarding chemotherapy treatment. The verbal guidelines, which are provided at the institution follow as support material.

The intervention period was carried out over two days, consisting of three stages: the first stage - performed on the first day of contact after admitting the child/adolescent to the chemotherapy unit with the caregiver who was assigned to the study after accepting and signing the informed consent form.

The second stage was performed on the first day of the child's chemotherapy. Before starting the procedure, the main researcher applied the instrument to assess the anxiety level (State Trait Anxiety Inventory - STAI) in caregivers in both groups (CG and EG). A meeting room located in the ward where the children are admitted was used. While the caregiver participated in the research, the child stayed in the ward's toy room with the pedagogues, who provided recreation and reception. Thus, the caregiver participated in the research in a reserved and silent environment.

Then, the intervention was conducted according to the formed groups, in which the main researcher performed the health education using the video associated with verbal guidelines in the EG, and only with verbal guidelines in the CG.

It should be noted that to watch the digital animation video, a tablet and headphones were used. It should be noted that standards were followed to avoid risks of infection, cleaning materials with 70% alcohol.

The third step was performed 30 min after the end of the interventions. This step was performed by a second researcher who was trained in applying the STAI and the Knowledge Assessment Instrument (KAI) and who did not understand the patient allocation, and applied these instruments to the participants of both the CG and EG groups.

It is noteworthy that the intervention was carried out taking advantage of the waiting time for the preparation of chemotherapy drugs, as well as, it was previously agreed with the pedagogy professionals that during the intervention with the caregivers, the children would be in the moment of recreation with the pedagogues, which which facilitated the application of the study.

A pilot test was performed with the first nine participants, which served to analyze the study in order to adapt the instruments and methodological approach as necessary to meet the objectives for better adherence to the intervention protocol. Pilot study participants were randomized to Control Group or Experimental Group.

The inclusion, randomization and analysis flowchart of the research groups adapted from the Declaration of the Consolidated Standards of Reporting Trials (CONSORT, 2010),<sup>30</sup> the systematization of data collection and the study protocol are found in the supplementary files.

#### **Data collection instrument**

Two instruments were used for data collection.

(1) State Trait Anxiety Inventory (STAI)<sup>35</sup> is a validated instrument which assesses trait and state anxiety, with the former related to the usual anxiety that the caregiver presents and the latter to transient anxiety related to a stressful event. In doing so, the purpose was to obtain the anxiety level of the participants before and after the intervention, then compare these values to evaluate the management of anxiety by both interventions, as well as compare between groups in order to evaluate which is the best management.





The STAI was translated and validated into Portuguese by Biaggio, Natalício and Spielberger (1977).<sup>35</sup> It is an instrument composed of two distinct self-report scales, each with 20 statements. The instrument measures state anxiety (A-State) and trait anxiety (A-Trait) of anxiety in patients without cognitive changes. For each statement, there are four alternatives: 1- Almost never; 2- Sometimes; 3 - Often; 4- Almost always.

(2) Knowledge Assessment Instrument (KAI), validated and adapted from the study by Oliveira, Souza and Pellanda (2016)<sup>36</sup> in order to assess the effectiveness of the educational technology used in the participants' knowledge acquisition.

This instrument has a semi-structured questionnaire composed of three stages: the first consists of sociodemographic data of the participants; the second is information about previous guidance by other professionals and the participant's opinion about the intervention performed, with the aim of reporting whether the intervention was able to resolve doubts about the chemotherapy procedure. Finally, the third step is nine questions about the chemotherapy process to quantify the knowledge that the participant has on the subject after the intervention.

#### Blinding

The second researcher responsible for applying the STAI and KAI after the intervention did not know the groups to which the participants belonged. Also, data analysts were blinded to the treatment group to which participants were randomized.

To guarantee the reliability and validity of the study, measures related to the blinding of the researcher who applied the post-intervention instruments and the statistician were adopted, as well as the randomization process guaranteed the direction of participants to the Experimental or Control Group without interference from the main researcher.

#### **QUANTIFICATION AND STATISTICAL ANALYSIS**

#### **Statistical details of experiments**

In the result description, flow diagram and Table 1, n represents number of participants. In Table 2 and 3, mean, SD and CI of outcomes can be found.

#### The statistical tests used

The data collected in this study were stored and processed in a computerized database using Microsoft Office Excel 2010 and IBM SPSS Statistics para Windows, Versão 20.0. Armonk, NY: IBM Corp. Descriptive and inferential statistics of the collected variables were performed, and the data were presented in tables, charts and figures.

Statistical analysis of comparison and correlation of the obtained data was performed. The Kolmogorov-Smirnov test was performed to analyze the normality of the sample. Depending on the results obtained in the normality test, Analysis of Variance (data with normal distribution). Likewise, Pearson's or Spearman's tests were used for correlational analyses.

Categorical variables were analyzed using the chi-squared test or Fisher's exact test 2-tailed, with a significance level of 5% (p = 0.05) being used throughout the study. The statistical analysis report is located in the S1 support file.

#### **ADDITIONAL RESOURCES**

Trial Registration: RBR-4wdm8q9–Brazilian Registry of Clinical Trials - REBEC. https://ensaiosclinicos.gov.br/search/query/simple? q=+RBR-4wdm8q9#gsc.tab=0&gsc.q=%20RBR-4wdm8q9&gsc.page=1.

Protocol download website: https://doi.org/10.1371/journal.pone.0285250.