

Educational technology for patient participation in the safe administration of antineoplastic chemotherapy: methodological study

Tecnologia educacional para a participação do paciente na administração segura de quimioterápicos antineoplásicos: estudo metodológico

Tecnología educativa para la participación de paciente em la administración segura de quimioterapia antineoplásica: estudio metodológico

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ABSTRACT

Objective: to develop an educational technology to promote patient participation in the safe administration of antineoplastic chemotherapy drugs.

Method: applied methodological study conducted between 2021 and 2023, in three hospitals in a city in the interior of São Paulo, developed in five stages: integrative literature review; approach to the reality of the healthcare production environment; development of educational technology; evidence of face and content validity by judges; analysis of semantic agreement of the educational technology.

Results: an infographic and nine verification cards were developed. In the validation of 15 judges, the overall Content Validity Index for the infographic and verification cards was obtained at 82% and 84%, respectively, and the overall Content Validity Ratio was 0.63 and 0.75. In the last stage. Semantic validation was conducted by applying the technologies to 15 patients with a Semantic Agreement Index of 0.97.

Conclusion: the educational technology developed was considered valid in terms of face, content and semantics and can be applied to patient participation during the administration of antineoplastic chemotherapy drugs.

Descriptors: Patient participation; Educational technology; Antineoplastic agents; Patient safety; Oncology nursing.

RESUMO

Objetivo: desenvolver tecnologia educacional para promover a participação do paciente na administração segura de quimioterápicos antineoplásicos.

Método: estudo metodológico aplicado realizado entre os anos de 2021 e 2023, em três hospitais de município no interior de São Paulo, desenvolvido em cinco etapas: revisão integrativa da literatura; aproximação com a realidade do ambiente de produção assistencial; construção da tecnologia educacional; evidência de validade de face e conteúdo pelos juízes; análise de concordância semântica da tecnologia educacional.

Resultados: foram elaborados um infográfico e nove cartões de verificação. Na validação de 15 juízes, foram obtidos o Índice de Validade de Conteúdo global para o infográfico e cartões de verificação de 82% e 84%, respectivamente. O *Content Validity Ratio global* foi de 0,63 e 0,75. A validação semântica foi realizada com a aplicação das tecnologias em 15 pacientes com Índice de Concordância Semântica de 0,97.

Conclusão: a tecnologia educacional desenvolvida foi considerada válida quanto à face, conteúdo e semântica, e pode ser aplicada para a participação do paciente durante a administração de quimioterápicos antineoplásicos.

Descritores: Participação do paciente; Tecnologia educacional; Segurança do paciente; Antineoplásicos; Enfermagem oncológica.

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RESUMEN

Objetivo: desarrollar tecnología educativa para promover la participación del paciente en la administración segura de fármacos quimioterapéuticos antineoplásicos. **Método:** estudio metodológico aplicado realizado entre 2021 y 2023, en tres hospitales de una ciudad del interior de São Paulo, desarrollado en cinco etapas: revisión integrativa de la literatura; acercamiento a la realidad del entorno productivo del cuidado; construcción de la tecnología educativa; evidencia de la validez aparente y contenido por parte de los jueces; análisis de acuerdo semántico de la tecnología educativa.

Resultado: se elaboró una infografía y nueve tarjetas de verificación. En la validación de 15 jueces, el Índice de Validez de Contenido global para la infografía y las tarjetas de verificación se obtuvo en 82% y 84%, respectivamente. *El Content Validity Ratio global* fue de 0,63 y 0,75. La validación semántica se realizó aplicando las tecnologías a 15 pacientes con un Índice de Acuerdo Semántico de 0,97.

Conclusión: la tecnología educativa desarrollada se consideró válida en términos de apariencia, contenido y semántica y puede ser aplicada a la participación de los pacientes durante la administración de fármacos quimioterapéuticos antineoplásicos.

Descriptores: Participación del paciente; Tecnología educativa; Antineoplásico; Seguridad del paciente; Enfermería oncológica.

■ INTRODUCTION

Non-communicable chronic diseases, such as cardiovascular diseases and cancer, have been the main causes of illness and death worldwide, with a similar scenario observed in Brazil. In this context, malignant neoplasms represent a public health problem, constituting one of the main causes of mortality in the country⁽¹⁾.

Antineoplastic chemotherapy is the most frequent form of treatment of malignant neoplasms and its complexity contributes to a high rate of errors and increased severity at all stages of the process. Therefore, there are challenges to reducing errors in chemotherapy, such as: defining safe practice standards and guidelines; performing prospective risk assessment using performance improvement tools to mitigate adverse events; using information technology with electronic systems for prescribing and dispensing medications and patient engagement⁽²⁾.

In a retrospective study conducted in a chemotherapy outpatient clinic within a hospital complex in southern Brazil, of the 861 safety-related incidents, 38.1% were medication errors, of these, 75.3% caused harm to patients and 33.5% occurred mainly during medication administration⁽³⁾.

In 2004, the World Health Organization (WHO) launched the World Alliance for Patient Safety. In 2017, the WHO introduced the third Global Challenge, "Medication Without Harm", with the involvement of

patients and/or their families and caregivers in care actions being one of the five goals for medication safety. This challenge aims to "empower patients, families and caregivers to actively be involved in decisions related to their healthcare, asking questions, identifying errors and effectively managing their medications"⁽⁴⁾.

Patient engagement and commitment are important for care safety⁽⁵⁾. Increasingly, patients are moving from a passive role as recipients of care, to a more active role as partners of healthcare professionals⁽⁶⁾. However, there is a lack of empirical knowledge about the feasibility and effectiveness of interventions to promote patient participation in care safety⁽⁷⁾.

There are gaps in strategies to promote patient participation in the context of health care safety. The need to establish methodologies and strategies to promote patient participation in care is urgent⁽⁶⁾, especially regarding the safe administration of drug therapies, such antineoplastic chemotherapeutic agents (ACA). Cancer patients have a compromised physiological reserve due to the nature of the disease, its effects on vital organs and immune function; the therapeutic and toxicity levels of drugs have a very narrow threshold; multiple therapies involve combinations of several agents; treatment is prolonged, occurs in a high-demand clinical environment with risks of communication failure among team members⁽²⁾.

Educational actions to improve patient knowledge and support decision-making about treatment, such

as the development of booklets about the disease or condition; development and implementation of institutional plans and guidelines in partnership with professionals; and patient training by healthcare services to enhance risk perception, have proven effective as strategies to promote patient participation in care safety⁽⁶⁾.

The Agency for Healthcare Research and Quality (AHRQ) proposes the use of the Teach-Back Method (TBM) as an effective strategy to engage patients in safety, adherence and quality of care. TBM is a low-cost approach that facilitates communication, enhances understanding and can improve decision-making in healthcare. However, when applying TBM specifically to patient participation in the administration of ACA, there is a gap regarding the effects of this method for this intervention⁽⁸⁾.

In view of this, the question arises: can the development of educational technology (ET) for use through TBM promote the participation of cancer patients in the safe administration of ACA? Therefore, this study aims to develop ET to promote patient participation in the safe administration of ACA.

■ METHOD

This is an applied methodological study, conducted between December 2021 and October 2023, according to the Polit and Beck framework⁽⁹⁾, consisting of five stages: development (integrative literature review and approximation to the reality of the healthcare environment); construction (development of the ET); validation (evidence of face and content validity by the judges), and application and evaluation (semantic agreement analysis of the ET).

Stage 1 – Literature review

An integrative review was conducted with the objective of identifying the strategies published in the literature to promote the participation of people with cancer in the safe administration of ACA. To develop the guiding question, the PICO strategy was used (without component C, since there was no comparison between the strategies developed to promote patient participation). The strategy was defined as: Population:

adult cancer patients; Issues of interest: strategies for the participation of cancer patients; and Outcomes: the safe administration of ACA. Therefore, the question to be answered was: what are the strategies used to promote the participation of cancer patients in the safe administration of ACA?

To select the articles, searches were performed in the following databases: Latin American and Caribbean Health Sciences Literature (LILACS); US National Library of Medicine/National Institutes of Health (PubMed/MEDLINE); Cumulative Index to Nursing and Allied Health Literature (CINAHL); and Embase. The review was carried out between December 2021 and July 2022. The protocol of this review was published in the Open Science Framework with the access link: https://osf.io/zcj7e/?view_only=c430223f95584155b5efc9d-49c1ac2b9.

Stage 2 – Approaching the reality in the healthcare environment

Interviews were conducted with the aim of understanding the perception of patients and professionals regarding the safe administration of ACA. The study was conducted in the chemotherapy outpatient clinics of three hospitals in a city located in the Central-West region of the state of São Paulo, which are state references, including for oncological treatment, for 62 other municipalities.

Data collection took place between March and July 2022. Patients/companions were interviewed during the chemotherapy session, that is, during the ACA administration. Professionals were interviewed during their work shift, in a room designated by the institution. Both groups were informed about the objectives of the research and invited to participate in the study. The interviews were recorded and lasted an average of 12 minutes with patients/companions and 15 minutes with professionals.

The study population included patients/companions aged 18 or older, regardless of sex, who were undergoing outpatient intravenous chemotherapy treatment, with no restrictions regarding the treatment cycle. Patients who had clinical conditions that prevented them from participating were excluded. However, if the patient agreed, they could delegate participation

to their companion. The sample was selected in a non-probabilistic manner, for convenience, consisting of participants who were undergoing chemotherapy sessions on the dates of data collection. A total of 34 people were approached, and 30 interviews were conducted, ten in each participating hospital. There were four refusals: one patient who was sleepy; one who was unwell; one who had abdominal pain; and one who did not have time for the interview.

Data collection ended when upon reaching theoretical saturation of data, in the absence of relevant information based on the "5 Moments for Medication Safety" framework⁽¹⁰⁾, a tool designed to engage patients at all levels and settings of health care. This tool is part of the third WHO Global Patient Safety Challenge: Medication Without Harm⁽⁴⁾. The five moments correspond to: starting my medication; taking my medication; adding a medication; reviewing my medication; and stopping my medication.

The interview script for the patient was standardized and semi-structured, including sociodemographic data (initials of the name, medical record, age in years, sex, occupation, education level, and medical diagnosis) collected from the patient's medical records and data related to the safe administration of medications. Such data correspond to checking the data on the identification wristband; presenting the medical prescription before administering medications; knowledge of the names and purposes of the medications; presence of identification labels on medications; identification of medication administration errors; and clarifying doubts during the administration of chemotherapy agents.

The professional population working in the chemotherapy outpatient clinics consisted of medical, nursing, and pharmaceutical staff, with specific experience in oncology for at least six months and who were not on vacation or medical leave. Of the total of 59 professionals in the chemotherapy outpatient clinics in the three local hospitals studied, the sample consisted of 16 professionals (those who were on duty at the time of data collection), distributed as follows: three physicians; three pharmacists; five nurses; three licensed practical nurses; and two nursing assistants.

For the professionals, an open-ended interview script was developed, including sociodemographic and professional information (age in years, sex, profession, time

since graduation in years, time working in oncology in years, time working at the institution in years), in addition to information related to the safe administration of medications, such as what they consider important in the safe administration of ACA, what actions were taken to ensure this safety and patient participation during the administration of chemotherapy agents.

The sociodemographic data were treated quantitatively and presented through descriptive analysis, with absolute and relative frequency calculation. The analysis of the verbal reports was performed using the "5 Moments for Medication Safety" tool⁽¹⁰⁾, designed to engage the patient at all levels and settings of healthcare.

Stage 3 – Development of the educational technology

Two types of materials were defined to be used in the two phases of the TBM.

In the first phase, in which guidance and information on the administration of ACA is provided, an infographic was defined, which is a text that presents the information, combining words and images⁽¹¹⁾, which in this study had its content and presentation based on the "5 Moments for Medication Safety"⁽¹⁰⁾. The infographic was constructed on two pages (front and back) with a white background, and the colors of the text boxes corresponded to the five moments: starting a medication (green); taking a medication (orange); adding a medication (yellow); reviewing my medication (blue); and stopping my medication (red).

In the second phase, when the patient's understanding of the information is assessed, nine verification cards were created, whose colors also corresponded to the aforementioned framework, with texts referring to each of these and located inside a balloon with a white background. For development of the ET, written communication guidelines were followed to create a health education material, considering aspects related to language, illustrations, layout, and design⁽¹²⁾.

Stage 4 – Evidence of face and content validity

The process for evidence of face and content validity was conducted using the Delphi technique, using the Google Forms® for data collection.

The criteria for judge selection were professionals who work in chemotherapy outpatient clinics (physicians, nurses, nursing technicians and pharmacists), specialists and researchers in the field of oncology, professionals with expertise in ET development and patient safety.

The judges were recruited using the “snowball” technique, a non-probabilistic approach, using a nurse specialized in oncology who had previously worked with the researcher. This method allowed access to a specific group of healthcare professionals with experience in caring for cancer patients.

For the panel of judges, 44 people were invited to the first round, of which 26 agreed to participate and 15 returned the completed form. Data collection took place in May and July 2023.

For the judges' responses, it was used the adapted script from the Educational Content Validation Instrument, developed and validated by Brazilian researchers⁽¹³⁾, with 18 items distributed across three domains: objectives; structure/presentation; and relevance. Each statement was assessed using a Likert-type scale, with the options: disagree (0), partially agree (1), and totally agree (2). Content and face validity were verified using the overall Content Validity Index (CVI), and the Item-Level Content Validity (I-CVI) was calculated for each item of the Educational Content Validation Instrument. The CVI was calculated from the sum of the “2” responses (totally agree) answered by each judge, divided by the total number of responses. The level of agreement considered relevant was equal to or greater than 0.80 (80%)⁽¹⁴⁾.

The overall Content Validity Ratio (CVR) was also used, and for each item, the results of the two indexes complement each other: the CVI assesses the percentage of agreement among the judges; and the CVR, based on the agreement among the judges, determines how much a given item can be “essential” (totally agree) or “non-essential” (partially agree and disagree). Considering that 15 judges participated in the validation in this study, the minimum CVR value is 0.49⁽¹⁵⁾. Therefore, if the CVR reaches this value, it is unlikely that the agreement occurred by chance.

The reliability of the ET was assessed through internal consistency estimated by Cronbach's alpha

coefficient, considering the value of 0.70 (70%) as the minimum acceptable⁽¹⁴⁾.

In the second round, forms were sent (via email) to the 15 judges who participated in the first round, and 11 responded. The form for the second round consisted of two sections: the first included instructions for completing the form; and the second included statements regarding the adjustments made (eight items) with the response options “agree” and “disagree”. In this round, only the percentage of judges who agreed with the changes made was calculated.

Stage 5 – Semantic agreement analysis of the educational technology

In this stage, the semantic validation of the ET was conducted with the target audience, considering the professionals' opinions on its use in daily practice.

The setting for this stage of the study was one of the hospitals in the study location, which was selected because it performs the largest number of intravenous chemotherapy treatments; both through the Unified Health System (*Sistema Único de Saúde*) and private health insurance.

For semantic validation with the target audience, the intentional non-probabilistic sample consisted of patients treated at the service (October 9 to 23, 2023), who met the eligibility criteria of the research, totaling 15 patients with different educational levels, being elementary level (4), high school level (5) and higher education (6).

Patients aged 18 years or older and undergoing outpatient intravenous chemotherapy were included, regardless of the chemotherapy cycle. Patients who had any clinical condition that prevented them from participating, cognitive alterations that prevented them from understanding the instructions, and those who did not attend school were excluded.

For the semantic validation of the ET, it was used a questionnaire adapted from the Suitability Assessment of Materials (SAM) by Oliveira, 2006⁽¹⁶⁾, with patient identification data and 25 questions that assessed objectives, organization, language, appearance and motivation. The assessment was made on a Likert-type scale: 1 - Totally adequate; 2 - Adequate; 3 - Partially adequate; 4 - Inadequate.

The Semantic Agreement Index (SAI) was assessed, which shows the proportion of participants in agreement on the aspects of the instrument, considering the minimum value of 0.70 (70%)⁽¹⁷⁾. Semantic validation with the target audience is a strategy to promote health education and should be validated by individuals at different educational backgrounds⁽¹⁸⁾.

Reliability was assessed through internal consistency estimated by Cronbach's alpha coefficient, considering a value of 0.70 (70%) as the minimum acceptable value⁽¹⁴⁾. The nonparametric Kruskal-Wallis test was used to assess significance between different levels of education, considering a significance of 5% ($p < 0.05$).

Regarding nursing professionals, those who agreed to participate in the study and who were not on vacation or medical leave were included.

To guide the use of ET, the professionals were personally invited by the researcher to participate in two meetings in which the methodological process in the construction and validation of ET and the guidelines for using it through TBM, were presented. After the meeting, six nurses and one licensed practical nurse agreed to participate in this stage of the study.

To assess the use of ET by professionals, a questionnaire was used containing socio-professional data and five questions to be answered: what difficulties did you encounter in applying the infographic and verification cards? How can the infographic and verification cards be used in the routine of an oncology outpatient clinic? Do you believe the infographic and verification cards can encourage patient participation in ensuring safety during chemotherapy administration? What is the best moment during care to use the infographic and verification cards? Leave your comments and/or suggestions.

For the analysis of qualitative data, the responses were categorized according to the theme of each question in the questionnaire.

The study was approved by the Research Ethics Committee Involving Human Beings of the *Universidade Federal de São Paulo*, in compliance with the recommendations of Brazilian legislation, Opinion No. 4,843,792,

dated July 13, 2021, and CAAE No. 42709020,5,0000,5505. The Informed Consent Form was provided at each stage of the study, which included the objectives of the study, a description of the benefits and risks involved in participation, as well as the guarantee of anonymity and the freedom to decline participation at any time.

RESULTS

Stage 1

A total of 2809 publications were identified, and the sample consisted of 12 articles, the access link for which is found at <https://acrobat.adobe.com/id/urn:aa-id:sc:VA6C2:5bf282fc-19e8-4fbb-a5ae-0ef7f2fc17a4>. The results highlighted were the 13 strategies found to promote patient participation during chemotherapy, which were grouped into four thematic categories: strategies related to good practices in the safe administration of medications; strategies related to the use of campaigns for patient participation; strategies involving the development of educational materials; and strategies that focused on exploring the patient experience. This review indicated the importance of the development of educational materials that could promote patient participation for safe care, as well as the TBM strategy for their use.

Stage 2

Regarding the patients, it was found that the majority were female (63%), over 65 years of age (36%) and had completed higher education (31%). Regarding the professionals, the majority were female (75%), aged between 36 and 50 years old (50%), had graduated for more than 20 years (37%), had worked at the institution for between 11 and 15 years (36%), and had worked in oncology services for six months to two years (38%).

Chart 1 presents the classification of the verbal reports of the patients and professionals interviewed, categorized according to the "5 Moments for Medication Safety"⁽¹⁰⁾, proposed by the WHO.

Chart 1. Verbal reports from patients/companions and professionals. Marília, SP, Brazil, 2024.

"5 Moments"	Questions	Verbal reports Patients/ companions	Verbal reports Professionals
Starting a medication	What is the name of your medication and what is it for?	"...I know one is an antihistamine; another is serum and the chemo that I don't remember the name or what it's for". (Pa* 22) "...he gave me kind of a little notebook, the doctor here gave it to me with everything that was going to be done, right"? (Pa*1) "...he explained what it was for, but we have so many things in our heads to think about" (Companion Pa* 23)	"...it's very important during the first chemotherapy session for the nursing staff to guide, explain, and tell the patient the name of the medication..." (P**4) "...explain the medications that will be administered in the pre-chemo, chemo, and post-chemo, I try to explain that part to them, what the medications are". (P**4)
Taking my medication	When and how much should I take my medication?	"...the medications that would be administered, how many cycles, how often, how long each cycle lasts..." (Pa*8) "...the medications that I was going to take that I take every 14 days. I do chemo and then I take the medications at home" (Pa*7)	"...you read the entire prescription to the patient and then you show them which medication you are administering because that is a way for them to look at the name and the dosage that is being administered again". (P**4) "...I can tell them how often it will be, it will be every 15 days, every 20 days". (P**1) "...we give a lot of guidance when we puncture the patient, we tell them if they feel any pain or burning" (P**3) "...warning signs of major acute infusion reactions, signs of extravasation". (P**10) "...we're constantly checking, we keep an eye on it, checking the access. It's a responsibility because if something leaks out". (P**2)

Chart 1. Cont.

"5 Moments"	Questions	Verbal reports Patients/ companions	Verbal reports Professionals
Adding a medication	Do I really need another medication?	No reports	No reports
Reviewing my medication	Do I have a full list of my medications?	"...they show it, there's a piece of paper here on the side, and besides the paper they also show the medication" (Pa*11) "...it was only presented the first time" (Pa*3)	"...each bag of medication that I'm going to install after I check it with the optical scanner, I also tell him, now it's the Nausedron, now it's the Dramim, before administering I show him the little bag" (P**8)
	Does a healthcare professional regularly check my medication?	"...the doctor is the one who accompanies me here, she's the one who guides me through everything" (Pa* 4)	"...it's very important in the first chemotherapy session for nursing to guide, explain, and tell the patient the name of the medication and the infusion time. Here we try to guide the patient as much as possible" (P**4)
Stopping my medication	If I have side effects and need to stop, where do I report it?	No reports	No reports

*Pa – patients **P – professionals
Source: prepared by the authors, 2024

The main information for the “Starting a medication” moment is that which concerns the names of the medications and their respective indications. Patients report that they receive this information, but have difficulty remembering the names, while professionals state that this information is always addressed and that they consider it important. In the context of the safe administration of ACA, two text boxes were created in the infographic (to list the medication names and their indications) and three verification cards. For this moment, aspects regarding allergies and other health conditions were also relevant. However, no patient or professional reports were found highlighting the importance of this information.

No reports from patients or professionals were found related to the moment “Taking my medication”. Patients report that they receive the necessary guidance, and professionals demonstrate concern for correctly explaining everything that occurs during the infusion. Reports were found related to signs of ACA extravasation and therefore a text box was created in the infographic with guidelines on the number of treatment cycles, interval between cycles, duration of the chemotherapy session and signs of extravasation, to be reviewed using three verification cards.

Considering the moment “Adding a medication”, in the context of ACA administration, no reports from patients or professionals were found. Since this is an important moment, since adjustments are made to the medications in each cycle, including changes in dosage, addition or removal of some medication, it was decided to add a text box in the infographic to list the new medication to be administered in that session and its indication. In addition, a verification card was used to confirm with the patient whether they received information about the inclusion of a new medication in the chemotherapy session.

At “Reviewing my medication”, patients report that a printed list with medication names is occasionally shown to them, while professionals are more consistent in communicating this information. However, in the context of chemotherapy, it was found to be important to include guidance on immediate and late

side effects related to ACA administration, since these effects represent warning signs for the need to change the way ACA is used. In the infographic, two text boxes were created with guidance on immediate and late side effects, along with a verification card to check with the patient which reactions they might experience during and after chemotherapy.

In the moment “Stopping my medication”, it was considered important to guide the patient on what to do in case of any complications during or in the days following chemotherapy, so they know where to seek care. For this stage, a text box was created containing guidance on the actions that the patient should take if experiencing any reactions during the ACA infusion or in the days following chemotherapy, as well as a verification card to confirm that the patient understood the measures to be taken in case of complications during or after chemotherapy.

Stage 3

Figures 1 and 2 show the content of the infographic and the verification cards, respectively, based on the reports of patients and professionals.

Stage 4

The content and face validation process were conducted by 15 judges, most of whom were nurses (66.6%), aged 32 to 51 years (average 40.5 years), the majority being female (80%), having graduated from five to 27 years (average 14.5 years), with a master's degree (40%), and experience in oncology care (80%).

Tables 1 and 2 show the I-CVI and CVR for each item on the form corresponding to the infographic and verification cards, respectively.

The overall CVI for the infographic was 82%, and the overall CVR was 0.63. In the structure/presentation domain, the item “the images portray the intended information” received a low score, as the judges reported that they did not portray the use of intravenous ACA. The negative score for the CVR (-0.87) and the low I-CVI (0.06) in the statement “there is excessive information in the infographic text” occurred due to the way this item was prepared, with the negative response indicating that there is no excess of information in the infographic.

Figure 1. Infographic Content

Source: prepared by the authors, 2023.

Starting a medication

- Your medications are: names and what they are for.

Taking my medication

- How your treatment will be: number of cycles, interval between cycles, and how long the chemotherapy session will last.
- Report any changes at the puncture site: pain, redness, swelling, or hardening.

Adding a medication

- There is a new medication today: name and what it is for.

Reviewing my medication

- Report your reactions during chemotherapy: nausea, itching, skin redness, dizziness, shortness of breath.
- Report your reactions after chemotherapy: nausea, vomiting, loss of appetite, mouth ulcers, diarrhea or constipation, fever.

Stopping my medication

- Know where to seek care: if you feel anything during the infusion, report it immediately; if you present any reaction in the days after chemotherapy, seek: _____

Figure 2. Verification Card Content

Source: prepared by the authors, 2023

Starting a medication

- What are the names of your chemotherapy medications and what are they for?
- Do you have any type of allergy?
- Are you being treated for any other condition?

Taking my medication

- How many cycles will your treatment have?
- What is the interval between chemotherapy cycles?
- What reactions might you experience during chemotherapy?

Adding a medication

- Was any medication changed today?

Reviewing my medication

- Did you have any reactions in the days following chemotherapy?

Stopping my medication

- Did you have any reaction that required you to go to the hospital in the days following chemotherapy?

Table 1. Judges' agreement on the infographic items. Marília, São Paulo, Brazil, 2023.

Domains	I-CVI	CVR
1. Objectives		
The infographic covers important topics for patient safety during chemotherapy administration.	80%	0.60
The guidelines are appropriate for the moment of chemotherapy administration.	86%	0.73
The infographic encourages patient participation during chemotherapy administration.	80%	0.60
The infographic can be implemented in daily practice in chemotherapy outpatient clinics.	86%	0.73
The infographic is useful at the first moment of TBM guidance.	93%	0.87
2. Structure/presentation		
The language is clear and objective.	80%	0.73
The information in the infographic follows a logical sequence.	93%	0.87
The information in the infographic is scientifically correct.	93%	0.87
The font type is appropriate.	86%	0.60
The font size is appropriate.	80%	0.60
The spelling and grammar are correct.	86%	0.73
The images portray the intended information.	73%	0.47
There is excessive information in the infographic text.	06%	-0.87
The text spacing is appropriate.	86%	0.73
The colors of the infographic draw attention to reading.	80%	0.60
3. Relevance		
The infographic is relevant for patient participation during chemotherapy administration.	93%	0.87
The infographic facilitates patient learning.	93%	0.87
The infographic contributes to the theme of patient participation for safety during chemotherapy administration.	93%	0.87

Source: prepared by the authors, 2023.

Table 2. Judges' agreement regarding the items on the verification cards. Marília, São Paulo, Brazil, 2023.

Domains	I-CVI	CVR
1. Objectives		
The verification cards address important topics for patient safety during chemotherapy administration.	33%	0.33
The questions are relevant to the moment of chemotherapy administration.	86%	0.73
The verification cards encourage patient participation during chemotherapy administration.	80%	0.60
The verification cards can be implemented in daily practice in chemotherapy outpatient clinics.	93%	0.87
The verification cards can be used to reinforce guidance through the infographic.	80%	0.60
2. Structure/presentation		
The language is clear and objective.	100%	1.0
The questions on the cards follow a logical sequence.	100%	1.0
The questions on the cards are consistent with the content of the infographic.	80%	0.60
The questions on the cards are easy for patients/family members to understand.	73%	0.47
The font type is appropriate.	86%	0.73
The font size is appropriate.	93%	0.87
The text's spelling and grammar are appropriate	93%	0.87
The font colors are appropriate.	86%	0.73
3. Relevance		
The verification cards are relevant to patient participation during chemotherapy administration.	86%	0.73
The verification cards facilitate patient learning.	80%	0.60
The verification cards contribute to the theme of patient participation for safety during chemotherapy administration.	93%	0.87

Source: prepared by the authors, 2023.

The overall CVI for the verification cards was 84% and the overall CVR was 0.75. In the objectives domain, there was disagreement regarding the statement “the verification cards address important topics for patient safety during chemotherapy administration”, as the judges pointed out that it would be difficult to answer the question on the card regarding “what are the names of your chemotherapy medications and what are they for?”

In the structure/presentation domain, there was disagreement regarding the statement “the questions on the cards are easy for patients/family members to understand”, as the judges highlighted the difficulty patients have in remembering “what are the names of your chemotherapy medications and what are they for?”, in addition to the difficulty in understanding the question on the card “how many cycles will your treatment have?”.

The qualitative data analysis generated adjustments to the infographic and verification cards, as shown in Charts 2 and 3, respectively.

Furthermore, it was also pointed out that patients may have difficulty stating the names of their medications and their respective indications. Due to the complex pronunciation of some names, patients may have difficulty remembering them and may even feel embarrassed for not knowing how to respond. In view of this, the text on the first card was changed to: “Check the medical prescription and medications labels with the nursing team”.

In the second round of validation, with an overall CVI of 0.95 (95%), the following suggestions were accepted: in the header, replace “chemotherapy administration” with “antineoplastic administration”; add a field for the stamp and signature of the professional who instructed the patient; and replace the image of the patient presenting vomiting.

The Cronbach’s alpha measure was 0.76 for the infographic and 0.80 for the verification cards, indicating good internal consistency.

Stage 5

Regarding the semantic validation conducted with patients, it was found that the majority were female (67%), aged between 28 and 76 years (average 52 years).

In the semantic analysis by the target audience, the overall CVI was 0.97. All domains (objective, organization, language, appearance and motivation) received a positive evaluation, and in all items, the CVI was above 80%.

In the reliability assessment, overall internal consistency was observed with Cronbach’s alpha of 0.70. When the Kruskal-Wallis test was applied, no difference in semantic agreement was found at the different education levels.

The professionals who participated in the opinion survey regarding the use of ET through TBM were all female, aged between 24 and 30 years (average 27 years), three of whom were nurses specialized in oncology and onco-hematology, two in intensive care, and one in palliative care. The time since graduation ranged from nine months to eight years, with time working at the institution and time working in oncology ranging from six months to seven years.

According to the theme of each question, the following aspects were reported: 1. Difficulty in applying ET (related to patient understanding, service demand and lack of information about the protocol); 2. Difficulty in routinely using ET (due to the outpatient clinic workload and interaction with the patient); 3. Application of the ET and encouraging patient participation (as it is understood that the patient is at the center of care and there is greater interaction between professionals and patients); and 4. Learning the appropriate time to use ET (based on service experience, it was at the beginning of the session).

The final version of the ET is fully available, with free access through the links: <https://drive.google.com/file/d/1QfAlqWsawt7Ki-pO896nSP8AFR4rbM4i/view?usp=sharing> (infographic) and <https://drive.google.com/file/d/1OKcTN74I9f4LZVY2XBskmjixxLBwaimV/view?usp=sharing> (verification cards).

Chart 2. Adjustments made to the infographic according to the judges' suggestions. Marília, São Paulo, Brazil, 2023.

Item	Suggestions	Adjustments
The infographic covers important topics for patient safety during chemotherapy administration.	"What will my medication be like" in yellow. Include some questions related to the multiprofessional team.	Keep the orange color, which is the original color of the "5 Moments for Safe Medication" tool. e information is specific to safety at the time of chemotherapy administration. Therefore, it is not appropriate to overload the patient with other information.
The language is clear and objective.	Include the value related to fever.	Describe "body temperature equal to or greater than 37.8°C"
The font type is appropriate.	Use Arial, Arial Narrow, Calibre or Times font.	Change the font to Arial throughout the instrument.
The font size is appropriate.	Alternate font sizes.	Appropriate sizes for title, subtitle and texts.
The spelling and grammar are correct.	"Your medications" would be better without "are".	It would be appropriate for "Your medications".
The images portray the intended information.	The images show pills, and it would be better if they were IV medication. In "communicate your reactions" a patient with an expression of discomfort and pain would be better.	Images changed.
There is excessive information in the infographic text.	The aesthetic aspect is overloaded.	Font types, sizes and colors have been reviewed.
The text spacing is appropriate.	If the font is to be changed, adjustments can be made.	Adjustments made.

Chart 2. Cont.

Item	Suggestions	Adjustments
The colors of the infographic draw attention to reading.	Colored background makes reading tiring.	Colored backgrounds in text boxes were removed.
The infographic contributes to the theme of patient participation for safety during chemotherapy administration.	Provide more details about signs and symptoms of extravasation.	Emphasized in the text box "How will your treatment be".
Criticism and/or suggestions	Add a subtitle under the main title explaining what the tool refers to. In "Report your reactions," clarify who should be notified Replace the word "thing" with "reaction" in "Know where to seek care". Include a field for the date and a blank field for the nurse to record important instructions. The term STOP in the image should be removed.	Inserted "Guidelines for patient/companion participation during chemotherapy administration". Adjusted to "Notify the nursing team if you experience any reaction". Replaced the word "thing" with reaction in the item "find out where to seek care". Added a field for date and important instructions on page 2 (back). The image was replaced.

Source: prepared by the authors, 2023.

Chart 3. Adjustments made to the verification cards according to the judges' suggestions. Marília, São Paulo, Brazil, 2023.

Item	Suggestions	Adjustments
The verification cards address important topics for patient safety during chemotherapy administration.	"Name of the medications, their purpose, and number of cycles" is difficult to understand.	Text on the first card was changed to: "Check the medical prescription and medication labels with the nursing team".
The verification cards encourage patient participation during chemotherapy administration.	It is difficult to clearly understand the name and purpose of the chemotherapy.	Text on the first card was changed to: "Check the medical prescription and medication labels with the nursing team".
The verification cards can be used to reinforce guidance through the infographic.	The cards contain information that is not present in the infographic, such as allergies and other conditions.	This information was added to the infographic.
The questions on the cards are consistent with the content of the infographic.	Except for the questions about cycles and medication names.	The questions regarding cycles and medication names were maintained, as they are essential for safety during ACA administration.
The questions on the cards are easy for patients/ family members to understand.	Adjust the first three questions.	Text on the first card was changed to: "Check the medical prescription and medication labels with the nursing team".
The font type is appropriate.	Standardize using Arial, Arial Narrow, Calibri, or Times.	All fonts standardized to Arial.
The font size is appropriate.	Medication reaction can be slightly larger.	Font size adjusted.
The text's spelling and grammar are appropriate	How many cycles will your chemotherapy treatment "HAVE".	Adjusted to: "How many cycles will your chemotherapy treatment have".
The verification cards facilitate patient learning.	Adjust cards 1, 2, and 3.	Card 1 was rewritten. Information about allergies and comorbidities was added to the infographic header to be reinforced on cards 1 and 2.
Criticism and/or suggestions	Patients may have difficulty saying the names of their medications.	Text on the first card was changed to: "Check the medical prescription and medication labels with the nursing team".

Source: prepared by the authors, 2023.

■ DISCUSSION

In the development of the methodological study, the integrative review provided data from theoretical and empirical literature, enabling the identification of the strategies used to promote patient participation in the safe administration of ACA. Among them is the TBM^(19,20), as it ensures clearer and more understandable information for patients and their families, thereby improving communication between patients and professionals. It is evident that MTB is a path that confirms the AHRQ recommendation⁽⁸⁾, as a strategy to engage patients in care safety.

The implementation of this strategy requires minimal resources, and it can be included in the daily routine of professionals, without increasing staffing and the time spent on care services⁽⁸⁾. It is essential that teams adapt to its use, to facilitate communication between patients and healthcare professionals⁽⁶⁾.

The approach to the reality of care was also a methodological strategy used to understand the specific conditions that involve patient participation in the safe administration of ACA, both for cancer patients and for professionals in chemotherapy outpatient clinics. Obtaining contributions from groups involved in the use of ET was important to ensure that it is appropriate for the target audience, as well as that it can be applicable to professional practice⁽²¹⁾.

From the patient's perspective, the research showed that despite the guidance, they do not remember the names of the medications, their purposes, duration and number of cycles. Generally, the list of medications for cancer treatment contains many medications with names and pronunciations that are difficult to remember, however, it is necessary for the patient to be familiar with the list of medications they use⁽²²⁾.

To ensure effective communication and patient participation, it is essential that the patient understands what is being communicated. Providing appropriate information to patients in contact with healthcare services is a must and ensures that they make decisions about their own care and treatment. It should also be noted that low health literacy makes it more difficult for patients to interact with professionals and impacts the experience of cancer patients regarding their safety⁽²³⁾.

Nurses play a key role in this communication process and must recognize the best time to convey the

message. Furthermore, it is crucial to consider the patient's conditions, both physically and emotionally, as barriers that may hinder their attention and retention of complex instructions⁽²⁴⁾. In this study, the chosen strategy was for professionals to read the medical prescription together with the patient, and check medications labels to be administered.

A study that investigated patient involvement in the prevention of medication errors during chemotherapy pointed out that patients try to learn about and improve the safety and quality of the care they receive, but they feel vulnerable because they are experiencing a moment of burden regarding their disease, anxiety, fear, and side effects of medications⁽²⁵⁾.

Additionally, the willingness of cancer patients to get involved in their care changes over time and throughout treatment, and safety is not their main concern, as they have difficulty imagining what they can do to improve it, since they are more concerned with the consequences of the treatment⁽²⁶⁾. Despite these barriers, involving cancer patients is a valid approach to ensure that they are properly informed and to reduce adverse events⁽²³⁾.

Professionals expressed concern and recognized the importance of communicating and guiding patients about aspects related to safety during the ACA administration. However, it is a delicate task to identify when cancer patients are prepared and willing to get involved in their treatment, to participate in actions to prevent errors during chemotherapy⁽²⁶⁾.

From both the patients' and professionals' perspectives, it was observed that, as patients received information about their treatment, they were more encouraged to participate in decision-making. In this context, nurses play a fundamental role in helping patients decide to participate in their treatment⁽²⁴⁾.

Regarding the construction of the ET, the infographic was considered an appropriate tool to promote closer relationship between professionals and patients, considering important points to transmit effective information. This information must be presented in a clear and objective manner, following a logical sequence to facilitate understanding of the process. It must contain titles and subtitles, with content divided by topics, short sentences and in the active voice, indicating what should be done. In addition, the language must be understandable and explanatory, directly targeting

the necessary information to achieve the objective, and the content presented should be scientifically proven. The selection of illustrations requires great sensitivity to avoid negative impact, as this is a sensitive time for patients undergoing cancer treatment⁽²⁴⁾.

The face and content validation of the ET presented a satisfactory CVI, with consistent results that confirm the adequacy and relevance of the material. The reliability of the ET, assessed through internal consistency using Cronbach's alpha, demonstrated positive results, indicating coherence of content and face.

The structure and presentation of the ET were considered validated, and the suggestions were accepted and considered relevant to improve patient understanding, allowing its use in chemotherapy outpatient settings. It was found that adapting texts and images was important to prove the ET's communication potential⁽²⁶⁾.

The selection of the multiprofessional team (nurses, physicians, and pharmacists) and patients for the validation process also enabled the integration of various specialized knowledge into the topic discussed, ensuring greater precision in the selection and evaluation of educational materials, while valuing opinions and different perspectives on the same subject⁽²⁷⁾. The results of this stage showed ET adequacy for the target audience.

Regarding the opinion of the professionals who used the ET through the TBM, they reported that difficulties in its application were the concern with the patient's understanding of the ET content, the service workload and the lack of information about the protocols.

When considering the professionals' concerns regarding the understanding of the ET content, it is important to highlight two points: the first is that the fact that there are less literate individuals does not mean that the written text cannot be used; on the contrary, the written text provides a more credible support and meets the expectations of people who want to be treated as capable, and those who cannot read create strategies to overcome this difficulty⁽¹³⁾, the other aspect is that the patient returns several times to receive medications. Thus, the professional will have opportunities to gradually reinforce this guidance and with each new patient procedure⁽²⁸⁾.

Regarding the high demand in oncology services and the lack of time for guidance, these issues are often highlighted as barriers. Studies indicate that the use of

TBM adds one minute to the care delivery, making its implementation and improvement in chemotherapy outpatient clinics feasible⁽⁸⁾. Moreover, to promote patient participation, it is essential to have an organizational culture that values transparency and the contribution of patients/family to health care and that is attentive to the risks that may result in harm to patients^(29,30).

Despite the barriers, in this study, professionals recognized that the use of ET through TBM in their daily routine promoted a positive interaction between them and patients, emphasizing the importance of patient-centered care and avoiding contradictory perceptions regarding their needs and concerns⁽²³⁾.

Studies that directly investigate patient participation in preventing errors during chemotherapy, along with effective communication with healthcare professionals to ensure the safety of oncological treatment, are of fundamental importance⁽⁶⁾.

Therefore, the present study becomes relevant by proposing the development of an ET that not only strengthens patients' knowledge about the safe administration of ACA but also promotes their autonomy and engagement in the therapeutic process. By facilitating communication between patients and healthcare professionals, this technology can contribute to the reduction of errors and, consequently, to the safety and quality of oncology care.

This study presents as a limitation the low variability of responses in semantic validation. Although the sample is sufficient, it may not reflect the diversity of perceptions and needs of a broader population, with different socioeconomic and educational backgrounds. Therefore, the possibility of increasing the sample to provide greater variability in responses should be considered. Therefore, the experience of professionals in using TBM was not considered, nor were external variables that could influence the application of the ET.

The implementation of ET requires continuous adaptation and evaluation to ensure their long-term effectiveness, considering the different realities of healthcare services and patient profiles. It is recommended that new longitudinal studies explore the impact of this intervention on the applicability and feasibility of using ET through TBM, assessing the influence of the care environment and aspects of health literacy on patient participation.

■ CONCLUSION

The educational technology developed was considered valid in terms of face, content, and semantics, and can be applied to promote patient participation during the administration of antineoplastic chemotherapy. The use of this technology through the Teach-Back Method improves communication between patients and healthcare professionals, making information clearer and more accessible, and can be integrated into the routine of chemotherapy outpatient clinics without requiring significant additional resources.

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■ Data and material availability

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