Original Article

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QUIMIO EM CASA: APPLICATION FOR FAMILY MEMBERS OF CHILDREN AND ADOLESCENTS USING ORAL ANTINEOPLASTIC AGENTS

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ABSTRACT

Objective: to develop and validate a mobile application for the guidance of family members of children and adolescents undergoing treatment with oral antineoplastic drugs.
Method: this is methodological research developed in seven steps: search for themes through interviews with twenty-three family members of children and adolescents undergoing oral chemotherapy; theoretical study; mobile application development; validation with thirteen expert judges; adequacy; validation with twelve family members of children and adolescents undergoing oral chemotherapy and mobile application final adaptation. The interviews were analyzed using the *Interface de R pour Analyses Multidimensionnelles de Textes et de Questionneires* software and validated with a Likert-type scale, considering validated items with a Concordance Index equal to or greater than 70%.
Results: the application "*Quimio em Casa*" was returned with two interfaces, a desktop version aimed at health professionals and the application for family members of children and adolescents undergoing treatment with oral chemotherapy. The contents that guided the application development were storage, handling, administration, specific care for each chemotherapy agent, adverse effects, when to go to the emergency room and daily checking of administrations. The application was designed and validated with an adequacy Concordance Index of 96.7% among judges, and 100% by family members.
Conclusion: the application proved to be valid as an educational technology in practical application with family members of children and adolescents undergoing oral chemotherapy.

DESCRIPTORS: Antineoplastic agents. Administration, oral. Educational technology. Mobile applications. Validation study. Oncology nursing.

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QUIMIO EM CASA: APLICATIVO PARA FAMILIARES DE CRIANÇAS E ADOLESCENTES EM USO DE ANTINEOPLÁSICOS ORAIS

RESUMO

Objetivo: elaborar e validar um aplicativo móvel para a orientação de familiares de crianças e adolescentes em tratamento com antineoplásicos orais.
Método: pesquisa metodológica desenvolvida em sete etapas: busca dos temas por meio de entrevistas com vinte e três familiares de crianças e adolescentes em quimioterapia oral; estudo teórico; desenvolvimento do aplicativo móvel; validação com treze juízes especialistas; adequação; validação com doze familiares de crianças e adolescentes em quimioterapia oral e adequação final do aplicativo móvel. As entrevistas foram analisadas pelo *software Interface de R pour Analyses Multidimensionnelles de Textes et de Questionneires* e validadas com a escala Likert, considerando-se validados itens com Índice de Concordância igual ou maior a 70%.
Resultados: o aplicativo "Quimio em Casa" foi devolvido com duas interfaces, uma versão *desktop* voltada para os profissionais de saúde e o aplicativo para os familiares de crianças e adolescentes em tratamento com quimioterápicos orais. Os conteúdos que direcionaram a elaboração do aplicativo foram: armazenamento; manipulação; administração; os cuidados específicos de cada quimioterápico; efeitos adversos; quando ir à emergência e checagem diária das administrações. O aplicativo foi elaborado e validado com Índice de Concordância de adequação de 96,7% entre os juízes, e de 100% pelos familiares.
Conclusão: o aplicativo mostrou-se válido como tecnologia educacional na aplicação prática junto aos familiares de crianças e adolescentes em quimioterapia oral.

DESCRITORES: Antineoplásicos. Administração oral. Tecnologia educacional. Aplicativos móveis. Estudo de validação. Enfermagem oncológica.

QUIMIO EN CASA: APLICACIÓN PARA FAMILIARES DE NIÑOS Y ADOLESCENTES QUE USAN ANTINEOPLÁSICOS ORALES

RESUMEN

Objetivo: desarrollar y validar una aplicación móvil para la orientación de familiares de niños y adolescentes en tratamiento con antineoplásicos orales.
Método: investigación metodológica desarrollada en siete etapas: búsqueda de temas a través de entrevistas con veintitrés familiares de niños y adolescentes en quimioterapia oral; estudio teórico; desarrollo de aplicaciones móviles; validación con trece jueces expertos; adecuación; validación con doce familiares de niños y adolescentes en quimioterapia oral y adaptación final de la aplicación móvil. Las entrevistas fueron analizadas mediante el software Interface de R pour Analyses Multidimensionnelles de Textes et de Questionneires y validadas con la escala de Likert, considerando ítems con Índice de Concordancia igual o superior al 70% validados.
Resultados: se devolvió la aplicación "Quimio em Casa" con dos interfaces, una versión de escritorio dirigida a profesionales de la salud y la aplicación para familiares de niños y adolescentes en tratamiento con quimioterapia oral. Los contenidos que orientaron el desarrollo de la aplicación fueron: almacenamiento; manipulación; administración; el cuidado específico de cada agente de quimioterapia; efectos adversos; cuándo acudir a urgencias y controles diarios de administración. La aplicación fue diseñada y validada con un Índice de Concordancia de Adecuación del 96,7% entre los jueces y del 100% por parte de los familiares.
Conclusión: la aplicación demostró ser válida como tecnología educativa en aplicación práctica con familiares de niños y adolescentes en quimioterapia oral.

DESCRIPTORES: Antineoplásicos. Administración oral. Tecnología educacional. Aplicaciones móviles. Estudo de validación. Enfermería oncológica.

INTRODUCTION

In the current context, the use of information technologies (ITs) and mobile applications (APPs) as tools to assist the educational process has proven effective in building knowledge and developing manual skills, in addition to contributing to the design of a new modality of health care. Nursing has contributed to the production of these technologies in the educational, care and management areas, enabling the dissemination, dissemination and updating of knowledge in the health area[1–2].

Thus, APPs contribute to the clinical decision making of professionals through the elaboration of reliable nursing diagnoses and qualified therapeutic guidelines/conducts for patients. It is also noteworthy that real-time and/or remote access to clear, objective and reasoned information cooperates to solve health problems/needs[3].

A systematic review published in 2020, with the objective of identifying the use of APP in oncology, identified 54 studies, most of them aimed at health professionals for the early detection of breast, melanoma, colon and rectal cancer; one for pediatric patients and one for caregivers of pediatric patients with information on preventing adverse effects in children undergoing chemotherapy[4]. Thus, although there are already several APPs focused on oncology, few focused on the care of pediatric patients and none of the studies exclusively addressed oral antineoplastic chemotherapy.

Oral antineoplastic therapy is an important component for the oncological treatment of children and adolescents with leukemias, central nervous system tumors and for solid tumors. The use of oral anticancer drugs at home requires family members and caregivers to face new challenges, as they become responsible for administration, self-management of symptoms and adverse effects, and adherence to treatment[5].

Using technology in the education of family members of children and adolescents undergoing treatment with oral antineoplastic drugs is an evolution in nursing care, with the APP being a resource capable of expanding access to information. At the time of administration of oral antineoplastic drugs, the family member can access the APP to clear up doubts about administration, dilution, adverse effects, home care with the drugs and disposal, controlling and favoring measures in continuity of care. Therefore, it enhances treatment reliability, reducing family members' insecurities and fears, as well as helping health professionals to be more effective and efficient in theoretical-practical guidelines[6].

Given the assumption that nurses play a fundamental role in the therapeutic regimen management of this clientele, effective participation in the family education process is recommended in the transition of oral chemotherapy administration from the hospital to the home context and its subsequent follow-up. Therefore, we seek to develop the self-management capacity of family members to ensure safety of treatment for children or adolescent and reduce, as little as possible, the unnecessary risks and damages associated with health care[7–8].

In this sense, it is possible to infer that mobile health technologies have the potential to improve the management of health conditions, provide access to the main evidence-based guidelines and support families in care. It is noteworthy that, often, family members feel intimidated by the complex treatment regimen, with the responsibility of quickly learning the "language" of childhood cancer and navigating through the complicated chemotherapy protocols[8–9], which can be minimized with an APP available at all times.

The construction and validation of an APP as a technological solution in health, developed from the family's real needs, can serve as a guide in situations of doubts, therefore, as a useful and easily accessible alternative for monitoring the therapy from reliable and safe guidelines regarding the use of oral chemotherapy. Given the aspects presented, the objective of this study was to develop and validate a mobile APP for guidance of family members of children and adolescents undergoing treatment with oral antineoplastic agents.

METHOD

This is a methodological study, developed in seven steps, from August 2019 to July 2021. The steps were: 1st - search for themes through interviews with family members of children and adolescents in oral chemotherapy; 2nd - theoretical study; 3rd - mobile APP development; 4th - validation with expert judges; 5th - adequacy; 6th - validation with family members of children and adolescents undergoing oral chemotherapy; and 7th - mobile APP final adaptation.

The first step was the search for topics to be addressed in the mobile APP, based on semi-structured interviews with 23 family members of children and adolescents undergoing treatment with oral antineoplastic agents. Patients with previous experience in chemotherapy administration and over 18 years of age were included. Family members of children and adolescents who were hospitalized during the data collection period were excluded.

The interviews took place in a federal hospital located in the city of Rio de Janeiro, from July to September 2020, and were conducted with the following questions: how do you care for children/adolescents being treated with oral chemotherapy? What precautions do you consider important to place on a mobile app for home care of children/adolescents using oral chemotherapy?

Participant recruitment and the interviews were conducted personally by a nurse holding a master's degree, first author. During the data collection period, 45 children/adolescents undergoing treatment with oral chemotherapy were registered at the service. Twenty-four family members were approached, however, one refused to participate. The delimitation of the number of participants was carried out during a fieldwork through the theoretical saturation of the data identified in the testimony organization[10].

The interviews lasted an average of twenty minutes and were held in a place reserved by the researcher: the pediatric chemotherapy nursing office. They were recorded with the aid of a voice recorder to fully record participants' speech and duly stored for later analysis.

The textual content resulting from the interviews was submitted to lexicographical analysis. The *Interface de R pour Analyses Multidimensionnelles de Texte set de Questionneires* (IRAMUTEQ) and the Descending Hierarchical Classification (DHC) method were used. This analysis aims to obtain classes of text segments that, at the same time, have similar vocabulary to each other and vocabulary different from the text segments of other classes. After processing and grouping as to word occurrence, the DHC creates a figure called class dendogram that, in addition to presenting the classes, demonstrates the connection between them, as they are associated with each other[11].

The second step took place after the content reported by family members had been analyzed, performing a search in the national and international scientific literature in the following information resources: Scientific Electronic Library Online (SciELO); Medical Literature Analysis and Retrieval System Online (MEDLINE), via PubMed; Cumulative Index to Nursing and Allied Health Literature (CINAHL) and Evidence-Based Medication (EMBASE). The controlled descriptors "Health Education", "Chemotherap", "Oral Drug Administration" and "Antineoplastic Agents" were associated with the Boolean operators "OR" AND "AND", respecting the variations of each base and some changes in search strategies. Evidence was also searched in chemotherapy books and leaflets, since they guide the care and specificities of each oral antineoplastic agent, in order to identify the scientific evidence for the topics mentioned by families and support the APP content.

In the third step, there was the technical collaboration of a PhD in computer science and two undergraduate students in computer science from Universidade Federal Fluminense. For the APP development, a server was used to distribute the website content (JS, HTML, CSS and images) and deal with the requests that operate the business logic (backend). The entire system was designed using JavaScript to facilitate development. To create the figures, a designer was hired to create exclusive images for this research, making them closer and more understandable to family members.

The fourth step consisted in the APP validation with expert judges, who were gathered in the study scenario, as it is a national reference hospital for oncological treatment and due to the high flow of care for the children and youth population. Nurses and pharmacists with expertise in pediatric chemotherapy, pediatric oncologists and computer professionals were selected to be judges. The objective was to achieve at least five points in the classification system adapted from the Fehring criteria[12], being: doctoral degree (four points); master's degree (three points); publication in an indexed journal on the topic of interest to the study (two points); specialization in the area of interest of the study (two points); clinical practice of at least five years in the area of interest of the study (two points) and participation in a scientific event in the last two years on the topic of interest of the study (one point)[12].

After selecting the expert judges, a letter was delivered inviting them to participate in the APP validation process, stating the reason for choosing that participant as a judge and the relevance of the concepts involved and the instrument as a whole. Upon acceptance of invitation, a kit was delivered containing an Informed Consent Form (ICF), an assessment instrument with questions related to proposal adequacy and an APP download link was sent via WhatsApp (messaging APP).

Two different assessment tools have been developed. Expert judges in the health area responded to a Likert scale instrument, consisting of 21 items, divided into two blocks: APP usability, based on the ten items contained in the System Usability Scale[13] (SUS) related to effectiveness, efficiency and satisfaction and content. Computer expert judges assessed the APP regarding the methods of usability engineering, based on the ten Nielsen Heuristics[14], through an instrument composed of 26 items of a Likert-type scale. Both instruments had spaces for observations and cursive suggestions.

The APP adequacy was the fifth step and took place after validation with the expert judges, modifying and correcting the items that did not reach Concordance Index (CI) of at least 70% among the evaluators.

In the sixth step, validation by the target audience occurred. In accordance with the criteria recommended by literature, a sample of nine to 12 participants was considered, with different levels of education[15]. Thus, in this research step, 12 relatives of children and adolescents who were undergoing treatment with oral chemotherapy were approached. Family members who participated in the first step of the research were excluded, in an attempt to minimize the risk of bias, since the participants in the first step suggested the themes to compose the APP.

These caregivers were personally approached by the first author in the study setting and invited to voluntarily participate in the research after clarifying the objectives, data collection procedure, ethical aspects and ICF delivery. Upon agreeing to participate, family members were individually introduced to the APP via smartphone and, after interacting and browsing the APP, they were instructed to complete the validation instrument. The validation instrument was structured according to Likert-type scale parameters and consisted of 14 items, divided into blocks of objective, organization, style and motivation.

The seventh step of final APP adequacy, was performed after validation with family members, modifying and correcting the items that did not reach the CI of at least 70% among the evaluators. As family members did not make suggestions for changes in the APP, consequently, it was not necessary to adapt the educational technology in the seventh step.

The quantitative analysis of expert judges' and target audience's responses was carried out according to different assessments: total of Totally Adequate (TA) responses; Adequate (A); Partially Adequate (PA); and Inadequate (I). The analysis was performed by calculating the percentage of positive response options, adding TA and A in relation to the maximum possible score if all evaluators judged all items positively. For this, the number of items in the assessment instrument is multiplied by the number of raters, obtaining the maximum possible score. Items that obtained, in the responses, CI between the evaluators greater than or equal to 70% were considered validated[15].

RESULTS

The research results are described according to each step that supported the final construction of an APP entitled "*Quimio em Casa*".

Step 1 - DHC analysis divided the textual corpus into two subcorpus and their respective five classes. The text segments were read exhaustively, thus, it was possible to extract the following topics to be addressed in the APP: storage of chemotherapy; handling of oral chemotherapy; chemotherapy administration; doubts about the treatment and other topics requested by family members as guidelines regarding adverse effects and signs and symptoms that indicate the need to take the child and adolescent to the hospital emergency.

Step 2 - A theoretical study was carried out in national and international scientific literature, as well as books and leaflets of each chemotherapeutic agent, in order to identify the scientific evidence for the interviews' emerging themes. The contents that guided the APP development were: storage; handling; administration and specific care of each chemotherapy agent; adverse effects; when to go to the emergency room; daily checking of administrations and symptoms reported by family members.

Step 3 - Its development took place in a hybrid way, that is, using HTML, CSS and JavaScript languages in order to be compiled for Android and iOS platforms and any operating system that can be accessed via a browser (mobile and desktop). It was returned with two interfaces: a desktop version aimed at health professionals and the APP for family members of children and adolescents undergoing treatment with oral chemotherapy.

The professional interface was built so that it can feed the system with the registration of oral chemotherapy, the specific guidelines for each one and the symptoms menu, in addition to registering patients and transporting the medical prescription to the system so that family members receive, in the APP, a "chemotherapy prescription" with type, dose and time. A calendar was also created to visualize the entire chemotherapy cycle with the information that the family member feeds into the APP, such as checking the chemotherapy agent, symptoms and complications, represented in Figure 1.

The family members' interface is a web system (APP) containing the chemotherapy treatment cycle (days, dose and time) so that there can be interaction with the system. In this interface, it is possible to inform if children took or did not take the chemotherapy, felt any symptoms and if they took any other medication. In addition, a notice is issued with the aim of reminding the patient about the time to administer chemotherapy and providing the opportunity for the family member to contact the pediatric emergency department of the treatment hospital and children's chemotherapy outpatient clinic. The interface also informs and guides family members about treatment with oral chemotherapy and home care for children and adolescents based on texts and images, represented in Figure 2.

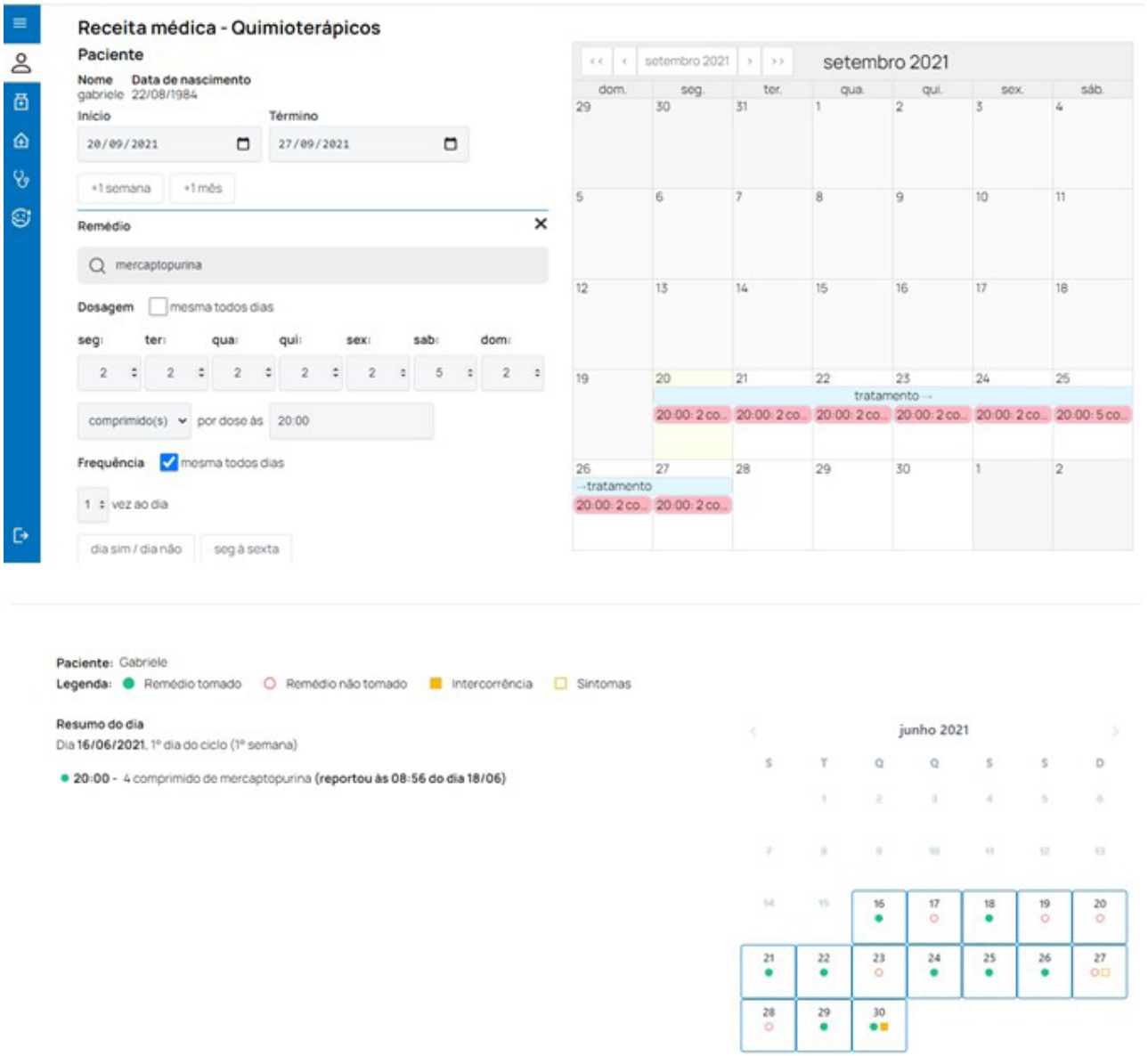

Figure 1 – Professional interface - screens for transporting the prescription and calendar with the chemotherapeutic agents administered. Niterói, RJ, Brazil, 2021.

"*Quimio em Casa*" consists of the initial screen "My medications", containing the prescribed chemotherapy drug, dose and time, also having a button that corresponds to the main menu, with five options: My account; My medications; Felt a symptom; About the drug and Help. The Help button is also fixed to the home screen as a question mark which, when clicked, opens six more options: emergency contacts; drug information; how to take the medication; symptoms; took an over-the-counter medication; and food. the drug button opens another screen with the name of the prescribed chemotherapy drug, with six more guiding options: storage; guidelines; adverse reactions; overdose; indicated in case of and how to take the drug.

Figure 2 – Family interface - Login Screens, My Medications, Report Symptoms, Administration and Guidance. Niterói, RJ, Brazil, 2021.

Step 4 – The final sample had 13 expert judges, five oncology nurses with expertise in pediatric chemotherapy, two pharmacists with expertise in chemotherapy and two pediatric oncology physicians. Regarding the four judges in the computing area, all professionals worked in an oncology hospital, being two IT analysts, an information technology supervisor and a full Helpdesk analyst.

The age ranged from 29 years to 55 years. In terms of sex, 61.6% (n=8) were female and 38.4% (n=5) were male. As for professionals' academic degree, 30.8% had a doctorate; 53.9% had a master's degree; 15.3% had specialization; 23.2% reported working in their area of expertise for more than 21 years; 38.4 worked between 11 and 20 years; and 38.4% had between six and ten years of experience.

As the instrument used to assess the APP by the health judges had a total of 21 items and considering the final number of nine participants, the maximum score for validation would be 189. Therefore, of the 189 response options (100%), 184 (97.3%) went to Totally Adequate and Adequate (Table 1).

In turn, the instrument used to assess the APP by the computing judges had a total of 26 items and the final sample of participants was composed of four judges, therefore, the maximum score for validation would be 104. Thus, of the 104 response options (100%), 100 (96.1%) were for Totally Adequate and Adequate (Table 2).

Step 5 - The contributions and observations described in the field free of opinions were read exhaustively in order to select the adaptations to the APP that would contribute to complement and qualify the contents, seeking better educational coherence. Judges' suggestions were assessed as to their relevance and relevance in making modifications, as long as they did not contrast with the objectives and results of the interviews and did not excessively change APP interface and usability.

Table 1 – Answers obtained from health expert judges according to usability and content criteria. Niterói, RJ, 2021. (n=9)

Chunk 1: Usability (SUS Instrument)	**TA***	**A†**	**PA‡**	**CI**
1- I would like to use this app often	07	02	-	100%
2- I considered that the APP has the necessary complexity	06	03	-	100%
3- I found the app easy to use	07	02	-	100%
4- I think I can use the app without technical support	07	01	01	88.9%
5- I thought the various functions in this APP were well integrated	08	01	-	100%
6- I thought the app was pretty consistent	07	02	-	100%
7- I imagine most people will learn how to use this app quickly	05	03	01	88.9%
8- I found the app lightweight and uncomplicated to use	08	-	01	88.9%
9- I felt very confident using this app	08	01	-	100%
10- With the knowledge I already have, I can continue to use this app	08	01	-	100%
Total Chunk 1	**71**	**16**	**03**	**96.7%**
Chunk 2: Content	**TA**	**A**	**PA**	**CI**
11- Information is adequate for guiding oral chemotherapy administration as well as clarifying family doubts	08	-	01	88.9%
12- The proposal of access to personalized information, such as chemotherapeutic agent name, indication, storage, adverse effects, guidelines, drug interactions and overdose, presents itself as a valid strategy	06	02	01	88.9%
13- There is a logical sequence of the proposed content	07	02	-	100%
14- The amount of information contained in the APP is adequate	05	04	-	100%
15- Provides help in a non-weary way and in a clear way	08	01	-	100%
16- Language used in the APP is compatible with the target audience	03	06	-	100%
17- Ilustrations (images) are pertinent to the content	08	01	-	100%
18- Size and font, as well as the colors applied, help family members to understand and use the APP	07	02	-	100%
19- Content is interesting and can generate interest for the family member to keep the APP installed on the mobile phone	09	-	-	100%
20- Invites/instigates changes in behavior and attitude	06	03	-	100%
21- The APP is relevant for health promotion and is suitable for use by any professional who works advising family members of children undergoing treatment with oral chemotherapy	09	-	-	100%
Total Chunk 2	**76**	**21**	**02**	**98%**

*TA: Totally Adequate; †A: Adequate; ‡PA: Partially Adequate; ||CI: Concordance Index; ** Inadequate column removed from the table, as there was no such score.

Table 2 – Answers obtained from expert computer judges according to the criteria based on the ten Nielsen Heuristics. Niterói, RJ, 2021. (n=4)

Nielsen Heuristics	TA*	A†	PA‡	I§	CI
1 - System status visibility					
1.1 Are users informed about the APP progress with the appropriate response in an acceptable time?	03	01	-	-	100%
1.2 Do the messages about the APP status have a clear and concise language?	03	01	-	-	100%
1.3 Do all screens maintain accessible menus and common functions of the APP?	02	02	-	-	100%
2 - Match between APP interface and real world					
2.1 Does the APP use concepts and language familiar to users rather than technical terms?	04	-	-	-	100%
2.2 Does the APP use real-world conventions and present information in a natural and logical order?	03	01	-	-	100%
3 - User control and freedom					
3.1 Do users have the freedom to make changes, such as changing their password, reporting symptoms and calling through the app?	03	01	-	-	100%
3.2 Is relevant information such as text, buttons and commands visible when the keyboard is opened?	03	-	01	-	75%
3.3 Does the APP make clear what the next step is to accomplish the task?	03	01	-	-	100%
4 - Consistencies and standards					
4.1 Do design elements, such as objectives and actions, have the same meaning or effects in different situations?	03	01	-	-	100%
4.2 Do controls and buttons distinguish themselves from the rest of layout, making it clear that they are clickable?	03	-	-	01	75%
4.3 Is textual information presented in a standardized way? (font size, color)	04	-	-	-	100%
5 - Error prevention					
5.1 Would users make mistakes they would make on better interfaces?	02	02	-	-	100%
6 - Recognition instead of remembrance					
6.1 Are project elements, such as objects, actions and options, visible?	03	01	-	-	100%
6.2 Is the option back presented according to the APP standard for this platform?	03	01	-	-	100%
6.3 Are the most important data and messages findin the default APP position for this platform?	02	02	-	-	100%
6.4 In fields where there is a need to insert data, is this evident?	03	01	-	-	100%
6.5 Do the screen titles adequately describe their content?	04	-	-	-	100%
7- Flexibility and efficiency of use					
7.1 Are task methods efficient? Can users customize frequent actions or shortcuts?	01	02	01	-	75%
7.2 Does the APP have problems during interaction (hangs, buttons do not work on first click, etc.)?	03	01	-	-	100%
7.3 Are tasks relatively simple to perform?	02	02	-	-	100%
7.4 Are the most commonly used functions easily accessed?	04	-	-	-	100%

Table 2 – Cont.

Nielsen Heuristics	TA*	A†	PA‡	I§	CI
8 - Esthetics and minimalist design					
8.1 Is the menu aesthetically simple and clear?	03	01	-	-	100%
8.2 Is only information related to the task being performed displayed?	03	01	-	-	100%
8.3 Does it have buttons with adequate size to click?	03	01	-	-	100%
9 - Helps users recognize, diagnose and retrieve data					
9.1 Are error messages expressed in language (no code)? Do they describe the problem exactly and suggest the solution? Is help easy to understand?	04	-	-	-	100%
10 - Help and documentation					
10.1 Is appropriate help provided? Is this information easy to find and focused on users' task?	01	02	01	-	75%
Total Chunk 3	**75**	**25**	**03**	**01**	**96.1%**

*TA: Totally Adequate; †A: Adequate; ‡PA: Partially Adequate; §I: Inadequate; ||CI: Concordance Index.

In order to meet the adaptations considered appropriate, new meetings were held with the team of technical collaborators, in order to adjust the two interfaces. Thus, some changes suggested and made in the APP were: 1) Regarding the content: describe, in a less technical way, the adverse effects and add diarrhea in the criteria for going to the emergency room; 2) As for usability: adjust so that the cursor changes the "faces" and the chemotherapy agent name.

Step 6 - After adjustments in the APP were made, it was submitted to legitimation by 12 family members: 91.7% (n=11) were women and 8.3% (n=1) were men. Regarding level of education, 8.3% had completed elementary school; 25% did not incomplete high school; 50% completes high school; and 16.7% completed higher education.

Since the instrument used to assess the APP by family members had a total of 14 items and the final sample of participants was 12 family members, of the 168 response options, 100% were for TA and A, as seen in Table 3.

In the space for cursive notes, 75% of participants in the target audience wrote praise for the APP's objectives, organization, style and motivation. According to them, the APP enabled different types of guidance necessary for families to safely administer oral chemotherapy at home. Consequently, the family members did not make suggestions for changes in the APP, so it was not necessary to adapt the material described in the seventh step.

DISCUSSION

The "*Quimio em Casa*" content was based on doubts and difficulties reported by family members related to the appropriate form of administration, storage and handling of oral chemotherapy. Individual care planning and health education performed by professionals increase the ability of people and caregivers to self-manage their health conditions. In this regard, follow-ups and the idea of knowing patients more and being closer aim to assist the effectiveness of self-care practices[16].

Table 3 – Answers obtained from family members according to objectives, organization, APP style and motivation. Niterói, RJ, 2021. (n=12)

Items	TA*	A†	PA‡	I§	CI
1 APP Objective					
1.1 The app provides knowledge for family members	12	-	-	-	100%
1.2 Helps during families' daily lives	12	-	-	-	100%
1.3 Is suitable for use by any family member of a child undergoing oral chemotherapy	09	03	-	-	100%
2 Organization					
2.1 The APP has logical sequence	12	-	-	-	100%
2.2 The app is attractive and easy to handle	12	-	-	-	100%
2.3 The themes/topics depict important aspects of treatment	12	-	-	-	100%
3 APP style					
3.1 Title and content size is adequate	12	-	-	-	100%
3.2 Vocabulary is accessible	12	-	-	-	100%
3.3 Images serve to complement the texts	12	-	-	-	100%
3.4 Images are simple, expressive and sufficient	12	-	-	-	100%
3.5 Is easy to access the app on the mobile phone on the Android system	10	02	-	-	100%
4 Motivation					
4.1 The app can help family members to change their behavior and attitude	11	01	-	-	100%
4.2 It is in the family's interest to keep the APP installed on the mobile phone	12	-	-	-	100%
4.3 The APP addresses the issues necessary for everyday life	12	-	-	-	100%
Total	**162**	**06**	**-**	**-**	**100%**

*TA: Totally Adequate; †A: Adequate; ‡PA: Partially Adequate; §I: Inadequate; ||CI: Concordance Index.

The use of APPs in clinical environments contributes and enables continuity of treatment and improves quality of care. The use of nursing care APPs, such as computerized care planning, speeds up the activities of guidance, storage, handling and administration of oral antineoplastic drugs, in addition to contributing to the registration and data recovery of children and adolescents who are undergoing chemotherapy treatment at home[17].

In this perspective, a validated educational technology becomes a facilitating tool in nurses' work in their educational practices with children, adolescents and family members. It should be noted that it is important to seek the participation of a number of evaluators that allows the technology analysis according to the proposed methodology. Likewise, the heterogeneity of the group of experts is advised to support the results validity, since multidisciplinarity makes it possible to obtain more valid predictive consensuses[15,18]. Accordingly, the validation process with expert judges and the target audience was fundamental, as it allowed the gathering of different knowledge and enabled the APP recognition as a technological solution in health adequate to what it proposes[19].

Conceptually, usability is the ability of software to be understood, learned and operated by an individual when used for specific purposes. In the usability assessment, with the SUS instrument, it was shown that "*Quimio em Casa*" complies with usability principles in the criteria of effectiveness, efficiency and user satisfaction, obtaining an average of 96.7%[20].

In the same assessment, regarding content, there was a consensus and a request from several judges to describe the adverse effects and toxicities with more popular and easily understood words. This change was made and the guidelines that were confusing or poorly understood were adjusted so that all the content was compatible with popular understanding, since the clarity of the information transmitted to family members is an important factor in the construction of an educational technology[21].

The computer science expert judges were fundamental for a technical analysis of the APP and not just the content and usability analysis proposed by the health judges. The advantage of heuristic assessment is that expert evaluators can suggest solutions to problems of effectiveness and user experience, highlight strengths and weaknesses, and therefore suggestions to be considered for the final version of the prototype[22].

The data from the heuristic assessment showed that the APP is in line with the principles of usability, with no serious problems being found in it. These parameters assess the system suitability both from users' point of view and the quality of results, as well as from the point of view of its construction engineering. These assessments contribute to the achievement of positive and relevant results in order to make the use of technologies increasingly inclusive and interactive in the health orientation and information process[20,23].

Validation by the target audience made it possible to verify the understanding of the content, representing a link between the APP empirical and theoretical correspondence. "*Quimio em Casa*" was considered useful and easy to understand, portraying the reality experienced by family members, clarified doubts and presented quality information, in addition to leaving them motivated to use it. Motivation is one of the key determinants of success, quality of learning, device usability, and behavior change[24].

In this context, it is important to emphasize the importance of developing an educational technology validated together with the target audience. A similar assessment was used in a recent study in the United States of America, exploring the feasibility and acceptability of using a reminder app to promote compliance with oral anticancer drugs among adolescents with cancer. It was concluded that this is a promising strategy to facilitate adherence to treatment and, consequently, increase the quality and survival of adolescents with cancer[25].

As limitations of this study, it is pointed out that the APP development was based on the daily reality of only one institution, which may not represent the totality of people who experience this universe, making it relevant to measure the impact of this technology on the lives of other family members.

CONCLUSION

The developed APP "*Quimio em Casa*" proved to be valid by the multidisciplinary team of judges regarding usability, content and methods of usability engineering, with the potential to mediate guidance to family members of children and adolescents undergoing treatment with oral antineoplastic drugs. It proved to be valid by the target audience as to the objective, organization, style and motivation, confirming the product acceptability.

In view of this, it can serve as a guide to resolve the doubts and difficulties arising from the therapy so that chemotherapy treatment is performed properly and that the family feels able to take care of children and adolescents, thus ensuring that the use of the drug is administered safely and effectively.

"*Quimio em Casa*" is a technological innovation in health, since it was developed based on users' real needs. The research valued these participants, as they had the opportunity to contribute to the study before and after the APP elaboration. It contributes and assists the multidisciplinary team active in treatment with oral antineoplastic drugs, whose attributions are to promote necessary guidelines that encourage comprehensive and resolute care.

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NOTES

ORIGIN OF THE ARTICLE

This study is part of a dissertation entitled "*Aplicativo móvel para orientações de familiares de crianças e adolescentes em tratamento com quimioterapia antineoplásica oral*", presented to the Professional Master's Degree Program in Assistance Nursing, at Universidade Federal Fluminense, in 2021.

CONTRIBUTION OF AUTHORITY

Study design: Franco GAS.
Data collection: Franco GAS.
Data analysis and interpretation: Franco GAS, Silva LF, Góes FGB.
Discussion of results: Franco GAS, Silva LF.
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CONFLICT OF INTEREST

There is no conflict of interest.

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