

**Information and Communication Technologies for health education and continuing education in oncology:
systematic search protocol**

*Tecnologías de la Información y la Comunicación para la educación en salud y la educación continua en oncología:
protocolo de búsqueda sistemática*

*Tecnologias da Informação e Comunicação para a educação em saúde e educação permanente em oncologia:
protocolo de busca sistematizada*

Abstract

The aim is to outline a systematic review protocol on the evidence about the use of information and communication technology for health education in oncology aimed at patients, families and the education of health professionals. This exploratory study describes a six-step integrative review protocol integrated with two other systematic search phases and a final knowledge synthesis phase. We propose: 1) a search in PubMed, CINAHL, SCOPUS, LILACS and Web of Science with Medical Subject Headings (MeSH), CINAHL subjects and Health Science Descriptors (DeCS), in addition to alternative terms. The PRISMA 2020 guidelines will be used to check the integrative review report; 2) search for mobile apps on Google Play Store; 3) search for patent registrations at the National Institute of Industrial Property (INPI Brasil) and at PatentScope. Each step will have separate collection and descriptive analysis. The discussion and presentation will be mediated by the emergence and systematization of common themes and taking into account health education for the patient-caregiver binomial and continuing education for professionals. The results are expected to summarize the profile and functions of the technologies developed for patients, family members and for the education of health professionals.

Descriptors: Information Technology; Technology; Neoplasms; Professional Training; Health Education.

Resumen

El objetivo es delinear un protocolo de revisión sistemática sobre la evidencia sobre el uso de las tecnologías de la información y la comunicación para la educación en salud en oncología dirigida a pacientes, familias y la formación de profesionales de la salud. Este estudio exploratorio describe un protocolo de revisión integradora de seis pasos integrado con otras dos fases de búsqueda sistemática y una fase final de síntesis del conocimiento. Proponemos: 1) una búsqueda en PubMed, CINAHL, SCOPUS, LILACS y Web of Science con Medical Subject Headings (MeSH), CINAHL subject y Health Science Descriptors (DeCS), además de términos alternativos. Se utilizará la guía PRISMA 2020 para verificar el informe de revisión integradora; 2) buscar aplicaciones móviles en Google Play Store; 3) búsqueda de registros de patentes en el Instituto Nacional de Propiedad Industrial (INPI Brasil) y en PatentScope. Cada paso tendrá una recolección separada y un análisis descriptivo. La discusión y presentación estará mediada por el surgimiento y sistemización de temas comunes y teniendo en cuenta la educación en salud para el binomio paciente-cuidador y la educación continua para los profesionales. Se espera que los resultados resuman el perfil y funciones de las tecnologías desarrolladas para pacientes, familiares y para la formación de profesionales de la salud.

Descriptores: Tecnología de la Información; Tecnología; Neoplasias; Capacitación Profesional; Educación en Salud.

Resumo

Objetiva-se delinear protocolo de revisão sistematizada sobre as evidências acerca da utilização de tecnologia da informação e comunicação para a educação em saúde em oncologia voltada para a pacientes, familiares e para a educação de profissionais de saúde. Este estudo exploratório descreve um protocolo de revisão integrativa de seis etapas integrado a outras duas fases de busca sistematizada e uma fase final de síntese do conhecimento. Propõem-se: 1) uma busca nas bases PubMed, CINAHL, SCOPUS, LILACS e *Web of Science* com *Medical Subject Headings* (MeSH), assuntos CINAHL e Descritores em Ciências da Saúde (DeCS), além de termos alternativos. As diretrizes PRISMA 2020 serão usadas para checagem do relato da revisão integrativa; 2) busca de aplicativos móveis na *Google Play Store*; 3) busca de registros de patentes no Instituto Nacional da Propriedade Industrial (INPI Brasil) e no *PatentScope*. Cada etapa possuirá coleta e análise descritiva separadas. A discussão e apresentação serão mediadas pela emergência e sistematização de temas em comum e levando em conta educação em saúde para binômio paciente-cuidador e educação permanente para profissionais. Esperam-se como resultados a síntese do perfil e funções das tecnologias desenvolvidas destinadas a pacientes, familiares e para a educação de profissionais de saúde.

Descriptores: Tecnologia da Informação; Tecnologia; Neoplasias; Capacitação Profissional; Educação em Saúde.

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Introduction

Health Information and Communication Technologies (ICTs) mediate health learning systems, yet generate, integrate and process data from multiple sources. Even electronic records or systems with compiled government data on disease surveillance, patients and clinical research are considered TICS and more currently those to which every patient has access. The United Kingdom's experience in this regard with the advent of COVID-19, for example, has been successful in digitizing healthcare systems, developing applications to report on the spread of the virus, lists of protected patients and remote consultations¹.

However, it is still a priority to improve usability, interoperability, develop handling capabilities and ensure that user data is secure. Such possibilities are actually complex interventions that require loco-regional adaptation, this data integration is usually accompanied by the development of research in robotics and artificial intelligence¹.

For the scope of this review, considering only the section related to health education in oncology aimed at patients, family members and the continuing education of professionals, we will explain the components of E-Learning: 1) content developed based on pedagogical principles in the area, 2) management, 3) delivery, and 4) standardization. In this way, there is a wide range of tutorials, modules and hypermedia, with a synchronous method: E-learning in real time in digital rooms, chat and instant messaging forums; and asynchronous methods: email, online bulletin boards, listservs, newsgroups, and Weblogs. The E-learning perspective includes evaluation of medical education, its differentiation of use in outpatient, home and hospital internships, creation of methods to accept its usability and incorporation of E-learning as a learning strategy in conjunction with institutional medical instructions².

The insertion of ICTs generates positive impacts on permanent health education according to a literature review, democratizing it, however, it is conditioned to the monitoring of tutors and the availability of financial resources, another point is the importance that its impacts are measured outside the subjective scope regarding changes in the established processes. Currently, TICS support nursing care decisions, committed and considering elements of time management, time spent on patient care and documentation time, providing quality and access to information, quality of documentation, communication and coordination of care^{3,4}.

The need for appropriation of ICTs allied to Permanent Education in Health denotes a process of constant updating. The internet enables fast and sharp exchanges of experience, photos, clinical expertise, sharing of images, information and contact with the team. The literature already reports initiatives of daily monitoring systems via the internet for elderly people with chronic diseases in the home environment, to manage symptoms and physical changes, Wi-Fi self-monitoring to improve health behaviors and medication adherence of hypertensive patients and patients with arterial fibrillation through mobile

phone and online web portal used for social support, education, reminders and for tracking records⁵⁻⁸.

Self-care with such technological strategies helps in decision-making at home, satisfaction and medication adherence in the post-discharge period. As an example, the telephone counseling carried out by nurses aimed at puerperal women discussing breastfeeding, postpartum care for mother and child and focus adds to the Systematization of Nursing Care, remote monitoring systems, reducing the costs of monitoring patients and families by offering potential and scientific solutions for the development of competences and educational games in the teaching-learning process of caregivers of the elderly^{6,8-10}.

In the scope of professional training, according to the National Policy on Permanent Education in Health, the increase in ICT strategies and potentialities that envisage an interprofessional education permeating the stimulus to greater use of them for in-service education stands out. Therefore, in order to achieve both self-care and professional training, an important theoretical-practical anchorage most explored in nursing in research on teacher and student training is Teaching-Learning, making up sharing, dialogization, development of competences and learning, through joints¹¹⁻¹³.

It is believed that an educational innovation consists of learning guided by a method, a conceptual perspective and reflection. In oncology, such health education efforts have focused on actions for subjects considered vulnerable to the diagnosis of some neoplasm, generally based on the principle of life habits that can be modified through actions or health promotion regarding a specific type of cancer, such as breast, cervix or prostate. Another possible approach for teaching patients, already affected by the neoplasm, are instruments such as the "Patient's Diary" containing information about the user's state, post-chemotherapy changes, symptoms and doubts¹³⁻¹⁵.

However, it is believed that in the field of oncology regarding the needs of health education, transfer of information to patients and caregivers and even professional training, the potential of hard technological resources such as information technologies and instant communication should be better explored. It is based on the breadth of the concept of technologies, especially those that provide for the emancipation of subjects¹⁶.

Considering the above, the following question arose: What is the evidence on the use of information and communication technology for health education in oncology aimed at the self-care of patients, families and the training of health professionals? It is highlighted that, taking into account the difficulties and doubts faced by cancer patients and caregivers since diagnosis, as well as the health education process involved in this, the relevance of researching technological resources that facilitate the acquisition of knowledge. This study aims to outline a protocol for a systematic review of the evidence on the use of information and communication technology for health education in oncology aimed at patients, families and the education of health professionals.



Methodology

It will be a 4-phase segmented exploratory study, the protocol was registered in the English language on January 11, 2022 in the Open Science Framework (<https://osf.io/c3mdy/>). A remarkable and similar initiative that couples the primary phase of reviewing scientific articles to the systematic search of applications and patents, was previously developed by Brazilian researchers focusing on post-exposure prophylaxis for Human Immunodeficiency Virus infections¹⁷.

An Integrative Review (IR) is proposed as the first phase of the study, based on the steps: elaboration of the research question, literature search, categorization of studies, critical evaluation, interpretation of results and presentation of the integrative review¹⁸. The second and third phases will be searches in databases that house mobile applications and patents (a temporary title to an invention or utility model).

This research will dispense with the evaluation of the ethics committee because it does not involve human beings, as determined by Resolution No. 466/12, which deals with research in the Health Areas with human beings. As an ethical concern within the scope of scientific research, the final report will be submitted for originality analysis on the TURNITIN platform.

Phase 1: Search for articles in the databases

IR is conceptualized as a primary research report¹⁹, containing clear information and evidence, its procedures must be relevant and its limitations exposed. Methodological procedures vary, however the steps generally comprise: (a) formulating a question to be answered or hypotheses to be discussed or tested, (b) deciding provisional criteria for inclusion of studies, so that data are carefully collected but can be changed on a substantive or methodological basis, (c) make sampling decisions if the number of studies located is large, (d) develop a questionnaire to collect data, (e) determine rules of inference to be used in analyzing and interpreting the data, (f) revise the criteria for inclusion in the questionnaire as necessary, (g) analyze the studies using the questionnaire, (h) systematize what was collected, (i) discuss and interpret

the data, and (j) report the synthesis in the form clearer and more complete.

Research question

For the definition of the research, the PICO strategy was considered²⁰, represented by (P) patient or population - "patients/family members/professionals", (I) interest - "use of information and communication technology", (Co) context - "health education in oncology" which resulted in: Which the evidence on the use of information and communication technology for health education in oncology aimed at the self-care of patients, family members and the education of health professionals?

For selection, the following inclusion criteria will be applied: primary studies that address technological resources used in oncology from the perspective of health education; studies whose subjects are patients, caregivers or professionals, in English, Spanish and Portuguese, published in the last five years (2017 to 2021). To define the timeline, an IR reference was used²¹ which predicts the impossibility of synthesizing knowledge when the high number of primary studies makes the evaluation and interpretation stages unfeasible, so three prelude searches were carried out using different strategies for each base with the intention of indicating forms or search terms that would make IR was viable, therefore, in the third search, a reasonable number of publications was consolidated to be analyzed by the research group. Publications that touch the theme, theses, dissertations, experience reports and case studies will be excluded.

The search will be performed in PubMed, CINAHL, SCOPUS, LILACS and Web of Science databases. For this purpose, descriptors indexed in Medical Subject Headings (MeSH), CINAHL subjects, Health Sciences Descriptors (DeCS) will be selected, in addition to alternative terms indicated by the databases. For the composition of the search strategy, which will be unique and adapted for each selected base, Boolean operators AND and OR and the truncation feature will be used. Chart 1 presents the proposed search strategy. In most databases, an open strategy was chosen, since the conjunction of all elements of the research question. The search date was January 2, 2022.

Chart 1. Search strategy adapted to the selected databases. Ribeirão Preto, SP, Brazil, 2022

Data base	Search strategy
PubMed (N=448/05 anos)	((("Information Technology"[Mesh] OR "Information Technologies" OR "E-learning" OR "Information and Communication Technology") AND ("Neoplasms"[Mesh] OR "Tumor" OR "Neoplasm" OR "Tumors" OR "Neoplasia" OR "Neoplasias" OR "Cancer" OR "Malignant Neoplasm" OR "Malignant Neoplasms"))
CINAHL (N=215/05 anos)	((("Information Technology" OR "Copying Processes" OR "Digital Technology" OR "E-learning" OR "Systems Development") AND ("Neoplasms" OR "Neoplasm Metastasis" OR "Cancer Patients"))
Web of Science (N=305/05 anos)	((("Information Technology" OR "Copying Processes" OR "Digital Technology" OR "E-learning" OR "Systems Development") AND ("Neoplasms" OR "Neoplasm Metastasis" OR "Cancer" "Cancer Survivors" OR "Cancer Screening" OR "Cancer Patients"))
LILACS (N=68/05 anos)	((("Tecnologia da Informação" OR "ICT" OR "Tecnologia da Informação e Comunicação" OR "E-learning" OR "Tecnologia de Informação" OR "Tecnologias da Informação" OR "Tecnologias da Informação e Comunicação" OR "Tecnologias da Informação e Comunicações" OR "Tecnologias de Informação" OR "TIC em Saúde" OR "TIC na Saúde" OR "Tecnologia" OR "Sistema Tecnológico" OR "Sistemas Tecnológicos" OR "Tecnologia e Aplicativos de Software" OR "Tecnologias" OR "Tecnologias e Aplicativos de Software") AND ("Neoplasias" OR "Câncer" OR "Neoplasia" OR "Neoplasia Benigna" OR



(N=8/05 anos)	<p>"Neoplasia Maligna" OR "Neoplasias Malignas" OR "Neoplasmas" OR "Tumor" OR "Tumor Maligno" OR "Tumores" OR "Tumores Malignos")</p> <p>(("Tecnologia da Informação") AND ("Neoplasia"))</p>
SCOPUS (N=886/05 anos)	<p>("Information Technology" OR "E-learning" OR "Information and Communication Technology") AND ("Neoplasms" OR "Neoplasm" OR "Neoplasia" OR "Cancer")</p>

For the selection of studies, after implementing the search in the databases, the identified records will be exported to the reference manager EndNote version X5, where duplications will be organized and removed. Then the logs will be exported back to the Rayyan web app²², where new identified duplications will be removed and the reviewers who will carry out the selection of studies by reading the title and abstracts in a blinded way will be included. Disagreements between reviewers will be resolved through a consensus meeting, with the presence of a third reviewer. In the same way, the full texts will be read.

Categorization of studies

After the selection, the main information will be extracted with the aid of a validated and adapted script²³, with the following information being raised in the first instance: title, author, year, objective, methodological details, results and conclusions. This step will be carried out by a researcher and subsequently validated by a second researcher.

Evaluation of studies included in the review

One of the critical assessment tools that will be used to determine the methodological quality is the Guideline Critical Review Form for Quantitative Studies developed by the McMaster University Occupational Therapy Evidence-Based Practice Research Group. In this checklist, each step of the articles included in this review will be carefully evaluated using a quantitative method²⁴.

To complement the methodological analysis of the articles included in this review, for the evaluation of qualitative studies, the CASP - Critical Appraisal Skills Programme will be used, with the Qualitative Research Checklist²⁵.

Interpretation of results

At this stage, the main results of the research will be discussed, in which, based on the results of the critical evaluation of the included studies, they will carry out a comparison with the theoretical knowledge, as well as the identification of conclusions and implications from the integrative review¹⁸. The process review will be reported taking into account the recommendations of the Preferred

Reporting Items for Systematic Reviews and Meta-Analyses checklist²⁶.

The presentation of the discussion and interpretation will be carried out in a descriptive way and coming from the main highlights of the data emergence, such as education for the patient, for the family and professional training. Thus, this RI will follow an integrated convergent approach according to the JBI methodology for mixed methods reviews²⁷. The gathered data is categorized and grouped based on similarity in meaning to produce a set of integrated findings in the form of line-of-action statements.

Phase 2: Search Google Play Store (for Android apps)

This step will collect data from mobile apps available for free or not on virtual app stores. The stage will have an open timeline and the data collected will be the name of the application, characteristics, initials of the idealizer or company, functions and types of the operating system according to the Application name, characteristics, initials of the creators or company, roles and types of operating system. The following search strategy will be used with uncontrolled terms: "Oncology App" and "Cancer app" in the Google Play Store, with approximately 240 applications for Android phones being found. Application logs will be analyzed descriptively, with figures and tables.

Phase 3: Search for national and international patents

Aiming at covering national patents, the platforms selected were the National Institute of Industrial Property (INPI), being the Brazilian institution responsible for property rights in Brazil and the search for patents in the international scenario will be carried out via PatentScope, the Organization's database of Intellectual Property (WIPO or WIPO in English), giving free access to documents from several countries, including deposits via the Patent Cooperation Treaty (PCT)²⁸.

Chart 2 shows the strategies that will be used first, the temporal lines for capturing patents and the search filters, it is noteworthy that the research group tested them exhaustively together with other permutations that did not demonstrate adherence to the research topic, scattering the search.

Chart 2. Patent search strategy. Ribeirão Preto, SP, Brazil, 2022

	Search strategy	Timeline	Language	Field
INPI	tecnologia da informação; câncer AND aplicativo móvel; oncologia AND aplicativo móvel; câncer AND tecnologia; oncologia AND tecnologia;	Open	Portuguese	Abstract



PatentScope	oncologia AND ensino; câncer AND ensino; E-learning "health information technology" AND "cancer" "health information technology" AND "oncology" "Mobile Application" AND "oncology" "E-learning" AND "oncology"	05 years	English	All fields
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Data collected from patents will include title, inventors' main claims, location, application number, application date, publication number, publication date, publication type and inventors as per title and relevant information, key inventors' statements. Data analysis will be descriptive, similar to Phase 2, with figures and tables.

Phase 4: Presentation of the research

It should be noted that the synthesis of the studies will be carried out¹⁸, for the knowledge of the evidence available in the literature on the investigated theme. For the context of this review, the present stage will aim to produce a final report that synthesizes and systematizes the main results for later forwarding of scientific manuscripts to journals in the area of health and information technology.

The aim is to classify and present the modular functions of the ICTs found, based on another study on

software based on scientific evidence for health care, with navigation tabs, namely: tab for the Patient, Guide, Health care information, Tutorial about the use of the tool in question, Help and About the creators²⁹.

Expected Results

It is expected that the synthesis of the state of the art combined with the analysis of the research team about the use of information and communication technology for health education in oncology aimed at different subjects, point out the profile of technological innovations, especially in e-Health, delimiting the main needs of oncology users and the functions of these technologies according to the scientific literature and according to the applications and patents adhering to the theme, as well as implying the creation of a research agenda around the theme for further studies and creations.

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