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Educational technologies for aged people undergoing cardiac catheterization: a scoping review

Tecnologias educativas para pessoas idosas submetidas ao cateterismo cardíaco: revisão de escopo

Tecnologías educativas para personas mayores sometidas a cateterismo cardíaco: revisión del alcance

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ABSTRACT

Objective: to map studies addressing the effects of using educational technologies for aged people undergoing cardiac catheterization. **Method: a** scoping review carried out during January 2024 in reference databases, information portals and Gray Literature following the methodological recommendations proposed by the Joanna Brigs Institute. **Results:** in all, 20 of the 1,210 studies found were included, with most of the publications from Iran, conducted in 2021 and performed by nurses. Video use predominated as an educational didactic resource, with implications synthesized in four aspects: psychological, physiological, knowledge level and care. **Conclusion:** this review allowed mapping the literature and knowing how educational strategies are implemented in various countries. Development of technologies resulting from technical-scientific advances enhances care provision directed at knowledge and expertise with a specific practical purpose.

Descriptors: Aged; Cardiac Catheterization; Health Education; Educational Technology; Quality of Health Care.

RESUMO

Objetivo: mapear estudos que abordam os efeitos do uso de tecnologias educativas para pessoas idosas submetidas ao cateterismo cardíaco. **Método:** revisão de escopo seguindo as recomendações metodológicas propostas pelo Instituto Joanna Brigs, em bases de dados referenciais, portais de informação e literatura cinzenta e realizada em janeiro de 2024. **Resultados:** dos 1.210 estudos encontrados, 20 foram incluídos, com maioria de publicações oriundas do Irã, realizadas em 2021 e executadas por enfermeiros. Predominou a utilização do vídeo como recurso didático educativo, com implicações sintetizadas em quatro aspectos: psicológicos, fisiológicos, nível de conhecimento e assistencial. **Conclusão:** a presente revisão permitiu mapear a literatura e conhecer a implementação de estratégias educativas em diversos países. O desenvolvimento de tecnologias advindas do avanço técnico-científico potencializa a prestação de cuidados direcionados para conhecimento e saberes com finalidade prática específica.

Descritores: Idoso; Cateterismo Cardíaco; Educação em Saúde; Tecnologia Educacional; Qualidade da Assistência à Saúde.

RESUMEN

Objetivo: identificar estudios que aborden los efectos del uso de tecnologías educativas para personas mayores sometidas a cateterismo cardíaco. **Método:** revisión de alcance siguiendo las recomendaciones metodológicas propuestas por el Instituto Joanna Briggs, en bases de datos de referencia, portales de información y literatura gris y realizada en enero de 2024. **Resultados:** de los 1.210 estudios encontrados, se incluyeron 20, siendo la mayoría de las publicaciones de Irán, realizadas en 2021 por enfermeros. Predominó el uso del vídeo como recurso didáctico educativo, con implicaciones resumidas en cuatro aspectos: psicológicos, fisiológicos, nivel de conocimiento y nivel asistencial. **Conclusión:** esta revisión nos permitió mapear la literatura y comprender la implementación de estrategias educativas en diferentes países. El desarrollo de tecnologías fruto de los avances técnico-científicos potencia la prestación de cuidados orientados al conocimiento y a la experiencia con una finalidad práctica específica.

Descriptores: Anciano; Cateterismo Cardíaco; Educación en Salud; Tecnología Educacional; Calidad de la Atención de Salud.

INTRODUCTION

Cardiovascular diseases (CVDs) are a group of health conditions that are added to the main causes of death in developing countries such as Brazil. Within the scope of CVDs, ischemic heart disease has been the main cause of mortality worldwide in the last 20 years[1], with the exception of 2020, when it was second to the new coronavirus[2]. It still ranks first in the projections for the coming years, a fact that is partly due to population aging and to accumulation of associated risk factors[1,3].

This study was conducted with support from the MSc Program in Gerontology at *Universidade Federal da Paraíba*, João Pessoa, Paraíba, Brazil.
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Widely used as a method for the diagnosis and definitive evaluation of coronary lesions, cardiac catheterization is an invasive procedure and, although well tolerated, deserves attention for presenting potential complications such as bleeding, ischemic events and contrast nephropathy[4-6], mainly found in more susceptible patients (aged individuals, women, patients with low body weight or with renal dysfunction)[7].

Given this reality, the patients oftentimes present physiological and psychological changes such as transient tachycardia, arterial hypertension, stress, anxiety and fear of death. These manifestations are attributed to the possibility of changes in health status, restlessness and expectations related to the outcome of the procedure, coronary angioplasty or myocardial revascularization surgery. Furthermore, low schooling, limited or no knowledge on the subject matter and lack of or reduced access to information are contributing factors for changes in physiological and emotional states[8,9].

In general, health care is interconnected with the education process, and the use of Educational Technologies (ETs) is included within this dyad (care-education). It is understood that the diverse knowledge provided by ETs exerts a positive impact on people's health, especially on aged individuals, as it has great potential to guide people in terms of health, self-care and well-being actions[10-12].

Nursing teams play a unique role in the care provided to patients that require interventional Cardiology assistance. Health education activities stand out among their responsibilities, with emphasis on the pre-procedure educational process, in which it is possible to obtain an assessment of the examination, including risks and benefits; physical preparation; discontinuation of medications; description of the types of anesthesia and side effects; and information on the post-procedure recovery period, thus intervening for effective, safe and comprehensive assistance.

The increasing use of ETs in the health area has demonstrated potential to improve the patients' knowledge, self-care and adherence to treatments, in addition to contributing to controlling hemodynamic and psychological conditions. These benefits are especially relevant for individuals with low schooling and unsatisfactory health literacy, as well as for those with specific needs such as visual, auditory and/or cognitive impairments resulting from senescence. However, there are still gaps in the literature regarding the effectiveness of these tools and their impact on the clinical practice. Therefore, this study is justified by the need to explore the existing scientific production, identifying the main benefits associated with using these technologies in health education for this population segment.

By mapping diverse evidence on the topic, this review offers support for developing educational interventions, promoting patient empowerment and assisting in qualifying the care provided. In addition, the findings can sustain and encourage adoption of these strategies by nurses working in hemodynamic centers, strengthening their role as health educators and favoring a holistic and humanized approach to care. Thus, this study seeks to contribute to improving the assistance provided to aged people, aligning with the guidelines for health promotion and qualification of the professional practice.

It is noted that a survey of the scientific literature was initially conducted to identify reviews with similar research scopes. However, no publications with similar objectives to this review were found in the databases consulted, in the Open Science Framework (OSF) study registration platform or in the Joanna Briggs Institute's own repository.

Given the above, the following review question arises: Which are the effects of using educational technologies for aged people undergoing cardiac catheterization? Thus, this study aimed at mapping the diverse evidence available in the literature on the effects of using educational technologies for aged people undergoing cardiac catheterization.

METHOD

This is a scoping review with its research protocol registered on the OSF platform (https://osf.io/3jmp2/) under Digital Object Identifier (DOI) 10.17605/OSF.IO/3JMP2, developed and structured based on the methodological recommendations set forth by the Joanna Briggs Institute (JBI)[12] providing transparency of the entire review process *and* in accordance with the theoretical framework[13]. A scoping review study (or simply scoping review) is conceptualized as a type of secondary study that proposes to map the relevant scientific production on a given topic in a systematic, rigorous, reliable and transparent way. It is described in five stages: Identification of the research question; Search for relevant studies; Selection of articles; Data extraction and analysis; and Synthesis and presentation of the results[13].

According to guidelines[12], the research question, the study objective and the descriptors were developed based on the PCC mnemonic combination where P (Population) - Aged people; C (Concept) - Educational technologies; C (Context) - Cardiac catheterization. The search strategies were developed by the authors in close collaboration with a librarian. In this way, it was sought to achieve proper use of the terms in each of the information sources defined. The three stages recommended by the JBI were followed for this purpose: initially, a search was made for controlled terms corresponding to the subject matters of the PCC mnemonic available in the Health Sciences Descriptors (*Descritores em Ciências da Saúde*, DeCs), in the Medical Subject Headings (MeSH) and in the Embase Subject Headings (EMTREE), and

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a preliminary search strategy was structured including synonyms in Portuguese, English and Spanish. A preliminary survey for articles was carried out in the Medical Literature Analysis and Retrieval System Online (Medline®) database via PubMed® in order to identify the most used keywords in published studies and validate the descriptors chosen. A floating reading of titles and abstracts was conducted to identify studies that contemplated the research proposed objective. In this stage, the strategy was also adapted for the other databases included, respecting the particularities of each one and combining Boolean operators *AND* for intersection of terms and *OR* for grouping synonyms; however, any and all similarities in the combinations of descriptors were maintained.

The search strategy used in the PubMed® database was as follows: *("Aged"[MeSH Terms] OR "Aged"[All Fields] OR "Elderly"[All Fields] OR "elderlies"[All Fields] OR "aged, 80 and over"[MeSH Terms] OR "80 and over"[All Fields] OR "Oldest Old"[All Fields] OR "Nonagenarian"[All Fields] OR "Nonagenarians"[All Fields] OR "Octogenarians"[All Fields] OR "Octogenarian"[All Fields] OR "Centenarians"[All Fields] OR "Centenarian"[All Fields] OR "geriatric"[All Fields]) AND ("Cardiac Catheterization"[MeSH Terms] OR "Cardiac Catheterization"[All Fields] OR "Cardiac Catheterizations"[All Fields] OR "Heart Catheterization"[All Fields] OR "Heart Catheterizations"[All Fields] OR "Coronary Angiography"[MeSH Terms] OR "Coronary Angiography"[All Fields] OR "Coronary Angiographies"[All Fields] OR "Cardiac Catheters"[MeSH Terms] OR "Cardiac Catheters"[All Fields] OR "Intracardiac Catheters"[All Fields] OR "Intracardiac Catheter"[All Fields] OR "Cardiac Catheter"[All Fields] OR "Heart Catheters"[All Fields] OR "Heart Catheter"[All Fields]) AND ("Health Education"[MeSH Terms] OR "Health Education"[All Fields] OR "Patient Education as Topic"[MeSH Terms] OR "Patient Education"[All Fields] OR "Health Literacy"[MeSH Terms] OR "Health Literacy"[Title/Abstract] OR "Educational Technology"[MeSH Terms] OR "Educational Technology"[All Fields] OR "Educational Technologies"[All Fields] OR "Instructional Technology"[All Fields] OR "Instructional Technologies"[All Fields] OR "Multimedia"[MeSH Terms] OR "Multimedia"[All Fields] OR "Multimedium"[All Fields] OR "Audiovisual Aids"[MeSH Terms] OR "Audiovisual Aids"[All Fields] OR "Audiovisual Aid"[All Fields] OR "audio visual aids"[All Fields] OR "audio visual aids"[All Fields] OR "Audio-Visual Aid"[All Fields] OR "Visual Aids"[All Fields] OR "Visual Aid"[All Fields] OR "Patient Education Handout"[All Fields] OR "Patient Education Handouts"[All Fields] OR "Health Promotion"[MeSH Terms] OR "Health Promotion"[Title/Abstract] OR "Promotion of Health"[All Fields] OR "Health Promotions"[All Fields] OR "Promotional Items"[All Fields] OR "Promotional Item"[All Fields] OR "Consumer Health Information"[MeSH Terms] OR "Consumer Health Information"[All Fields])*.

After selecting the descriptors and equivalences, an electronic mapping of the studies was carried out during January 2024 in the following databases: Medline® via PubMed®, Web of Science (Clarivate Analytics), Scopus (Elsevier), Excerpta Medica Database (Embase) and Latin American and Caribbean Literature on Health Sciences (*Literatura Latino-Americana e do Caribe em Ciências da Saúde*, LILACS). These sources were accessed through the Journals Portal belonging to the Coordination for the Improvement of Higher Education Personnel (*Coordenação de Aperfeiçoamento de Pessoal de Nível Superior*, CAPES) based on identification through the Federated Academic Community (*Comunidade Acadêmica Federada*, CAFe), as a way of standardizing the collection process in these databases. Google Scholar was used for the Gray Literature, retrieving the first 100 results[14] and the studies found in the Brazilian Digital Library of Theses and Dissertations (*Biblioteca Digital de Teses e Dissertações*, BDTD) from the Brazilian Institute of Information in Science and Technology and in the Catalog of Theses and Dissertations of the Coordination for the Improvement of Higher Education Personnel (CAPES).

The eligibility criteria were developed using the Population, Concept and Context (PCC) structure recommended by the Joanna Briggs Institute and considered the following: publications meeting the study objective, including as target audience Populations over 60 years old, of both genders, exclusively subjected to cardiac catheterization as Context and demonstrating some effect from using educational technologies in relation to the Concept.

Publications without restrictions regarding methodological design or country of origin were considered for inclusion, as well as dissertations and theses. The language clipping corresponded to Portuguese, English and Spanish, and no time frame was delimited. After an extensive analysis of the literature, scarcity of studies that specifically and restrictedly addressed aged people was verified. Therefore, it was decided to include publications that had this population group as target audience, excluding research studies that failed to make this information clear or that were conducted exclusively with children/young individuals.

The exclusion criteria were as follows: editorials, accounts, letters, notes, guidelines, protocols, conference papers, reviews, case studies, book chapters and undergraduate course completion papers, as well as materials including people previously subjected to cardiac catheterization or angioplasty simultaneously.

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The studies were imported into *Rayyan*®, which allowed blinding in the collaboration between both reviewers, removing duplicates and screening by reading titles and abstracts, identifying those that were relevant[15]. The sample was reached based on reading the materials in full. Finally, the snowball technique was also used through manual search (reverse citation) in the reference lists of the studies included with the objective of locating any relevant material not identified through the search in the databases. The authors of the studies that were unavailable in full were contacted via e-mail; however, no answer was obtained.

The data from the studies included were collected and entered into a form previously prepared by the authors, containing the following: identification and year of publication; country where the research was conducted; people over 60 years of age as target audience; study objective; methodological design; type of educational technology; professionals involved in conducting the study; and effects of using educational technologies for aged people that will undergo cardiac catheterization, to be presented through a narrative data synthesis.

RESULTS

From the analysis of the 1,210 studies initially identified and after removing duplicates (n=304) and publications not meeting the inclusion criteria through a thorough reading of titles and abstracts (n=858), and by subsequently analyzing the research studies read in full (n=28), it was found that 20 of them dealt with the theme and were selected to comprise the final sample. The process of searching and selecting the studies for this review was recorded in detail, enabling the identification of all decisions made, and was reported by completing a flowchart adapted from the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR), recommended by the JBI[12,16] and presented in Figure 1.

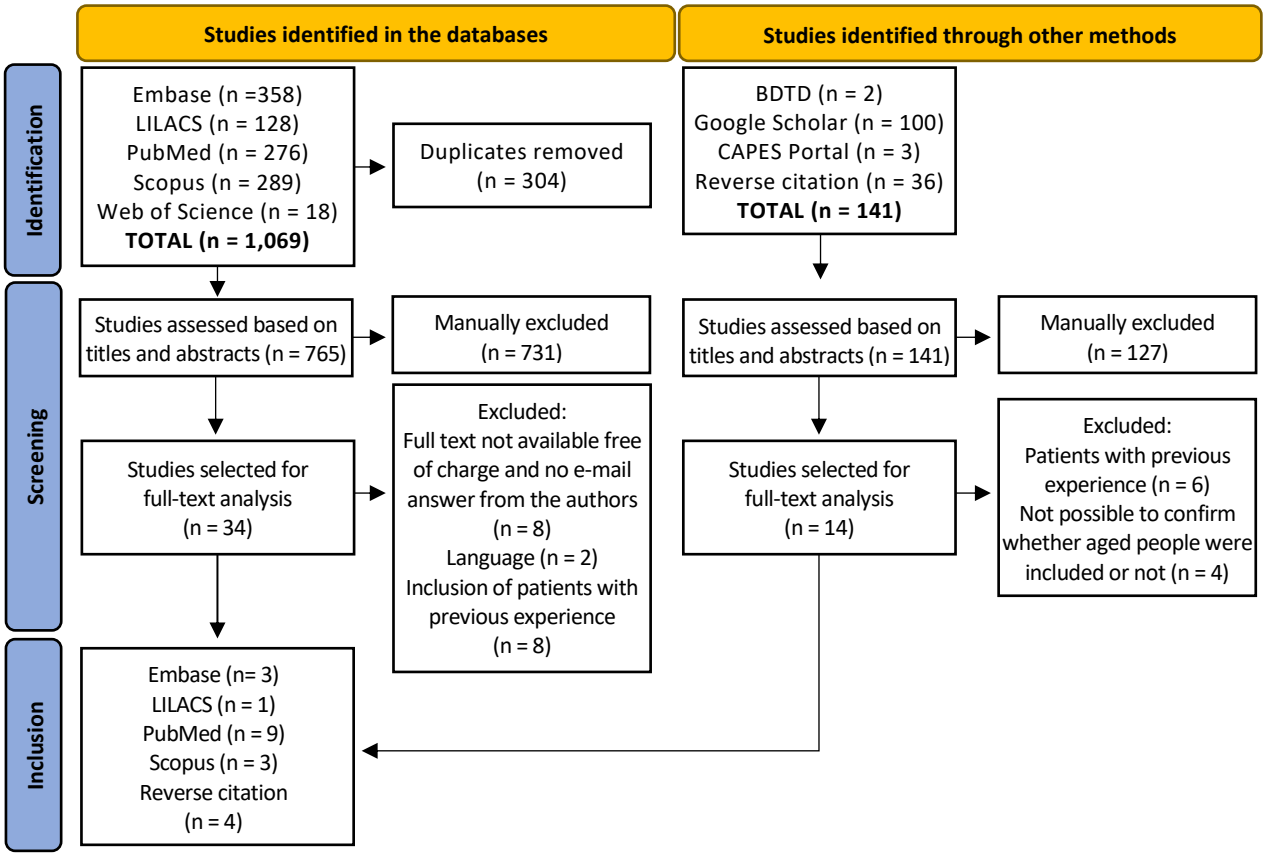

Figure 1: PRISMA-ScR® flowchart showing the literature search and selection process. João Pessoa, PB, Brazil, 2024.

It can be seen that nine articles were found in the PubMed® database[17,18,20,21,26,30,33,35,36], four by means of reverse citation[23-25,27], three in Scopus[19,32,34], three in Embase[22,28,29] and one in LILACS[31]. Figure 2 presents the qualitative synthesis corresponding to the studies, including country, year, objective and design used.

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Identifier, Country, Year	Objective	Study design
ID1[17] – Turkey, 2023	To compare the conventional method with the use of an AI-supported chatbot to obtain IC in patients facing CA	Randomized clinical trial
ID2[18] – Iran, 2021	To compare the effectiveness of patient education through two different electronic methods and a written method (pamphlet)	Randomized, longitudinal clinical trial
ID3[19] – Iran, 2021	To determine the effect of an educational program on satisfaction and comfort in patients subjected to transradial CA.	Randomized clinical trial
ID4[20] – United Kingdom, 2021	To evaluate the effects of using VR on peri-procedural anxiety, knowledge and overall satisfaction, as compared to employing an educational video	Randomized clinical trial
ID5[21] – Turkey, 2019	To investigate possible effects of video and written education on anxiety in patients undergoing CA	Quasi-experimental, longitudinal
ID6[22] – Iran, 2018	To investigate the effects of peer-facilitated, video-facilitated and combined peer-video training on patient anxiety.	Randomized clinical trial
ID7[23] – Brazil, 2017	To check whether there has been any improvement or change in knowledge and a reduction in insecurity.	Qualitative, single group, descriptive analytical
ID8[24] – Turkey, 2015	To evaluate the effectiveness of education provided to patients on psychosocial and physiological parameters.	Randomized clinical trial
ID9[25] – Iran, 2014	To investigate the effects of a multimodal preparation on the vital signs of patients undergoing CA.	Randomized clinical trial
ID10[26] – Iran, 2014	To evaluate the effect of native language-based video on the knowledge and satisfaction levels of hospitalized patients.	Quasi-experimental
ID11[27] – China, 2013	To evaluate the effectiveness of multimedia education in patients with CAD undergoing CA and to compare anxiety and satisfaction levels in 3 information delivery groups.	Randomized clinical trial
ID12[28] – Iran, 2013	To evaluate the effect of educational interventions on levels of comfort, satisfaction, tolerance and hemodynamic parameters.	Randomized clinical trial
ID13[29] – China, 2012	To measure the effectiveness of the intervention in reducing uncertainty and anxiety levels among Chinese patients undergoing CA.	Quasi-experimental, Pre-test/Post-test
ID14[30] – Brazil, 2011	To assess patients' knowledge prior to outpatient examinations at a reference Cardiology hospital.	Cross-sectional
ID15[31] – Iraq, 2010	To evaluate the effectiveness of health education on self-reported depression in patients facing CA.	Quasi-experimental, single group
ID16[32] – Canada, 2003	To examine the effect of a psychoeducational Nursing intervention on patient anxiety during the waiting time for elective CA.	Randomized, longitudinal clinical trial
ID17[33] – China, 2003	To examine the effects of education on anxiety in Chinese patients undergoing CA in Hong Kong.	Randomized clinical trial
ID18[34] – USA, 1999	To compare informational and modeling preparatory strategies in reducing anxiety.	Quasi-experimental
ID19[35] – USA, 1993	To investigate the effects of interactive preparation and dispositional desire for information among patients prior to CA.	Randomized clinical trial
ID20[36] – Germany, 1989	To report the effect of a video on anxiety before and after preparatory information in patients undergoing elective CA.	Randomized clinical trial

Key: CA: Coronary Angiography; CAD: Coronary Artery Disease; USA: United States of America.
Figure 2: Qualitative synthesis corresponding to the objectives and design of the studies included in the scoping review (n=20). João Pessoa, PB, Brazil, 2024.

Regarding the time dimension, the materials were published from 1989 to 2023. Among the other years, 2021 stood out with three publications. The studies were developed in the following countries: Iran (n=6), China (n=3), Turkey (n=3), Brazil (n=2), USA (n=2), Canada (n=1), Germany (n=1), United Kingdom (n=1) and Iraq (n=1).

The articles selected were predominantly performed by nurses[19,21-23,25-35] (n=15), followed by physicians[17,20,24,36] (n=4) and multi-professional teams[18] (psychologist and nurse – n=1); written in English[17-22,24-36] (n=19); available in the formats of scientific articles[17-22,24-36] (n=19) and dissertations[23] (n=1); and developed in single centers[17-21,23-36] (n=19) and in multiple centers[22] (n=1). The diverse evidence was summarized in figures 2 and 3 to organize all the information obtained.

Figure 3 shows the types of educational didactic resources employed in different groups and describes the effects of using these technologies.

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Type of educational teaching resource used in each group		Outcome (Effect)
Control	**Experimental**	
IC obtained through verbal and written guidelines	IC using an AI chatbot	Using AI chatbots provided accurate and comprehensive information to the patients, resulting in better understanding and empowering them to make better informed treatment decisions[17]
Pamphlets and verbal guidance - on the CA day	4 days before CA - I: DVD multimedia; II: Text messages	Better adjustment of psychological parameters (state anxiety, stress and depression) in the EG[18]
Standard: verbal and pamphlet	Standard + video education	Improved patient satisfaction and comfort[19]
Standard: leaflet, video and verbal guidance	Standard + immersive experience (VR video + headset)	Reduced anxiety, improved satisfaction and understanding of the procedure[20]
One day before CA: verbal guidelines	I: Leaflet II: Educational video	Reduction in state anxiety levels, improvement in physiological variables and satisfaction in GC II[21]
Verbal guidelines	I: Peer training; II: Educational video; III: I and II combined	Reduction in state anxiety[22]
Single group: educational video		Better interpretation of the examination led to better understanding the health situation[23]
Verbal guidelines	Educational video	Positive effect on psychosocial and physiological parameters[24]
Verbal guidelines	Verbal guidelines, pamphlet, educational video and photographs of the sector	Improvement in patients' vital signs[25]
Routine: verbal guidance and educational pamphlet	Educational video	A video in the patients' native language resulted in increased satisfaction and awareness[26]
17-page manual and verbal guidelines	I: Instructional DVD (12 minutes), verbal and manual guidance II: Instructional DVD	Significantly lower anxiety levels and greater satisfaction with the information and materials received, when compared to CG and EG II[27]
Verbal guidelines	Educational video	Significant reduction in HR and BP; increased satisfaction, tolerance and comfort[28]
Standard: pamphlet and brief verbal guidelines	Standard and 12-minute educational video	Significant decrease in the state anxiety and uncertainty mean values; greater satisfaction and slightly higher main in the acquired knowledge perception[29]
Answering the questionnaire to then watch the explanatory DVD	Watching an explanatory DVD to then answer the questionnaire	Improved patient knowledge about the examination and the hemodynamics unit[30]
Single group: educational teaching booklet		Self-reported reduction in depression[31]
Guidelines 1-10 days before CA with written material and video	Upon scheduling and 10 days before the exam: educational session with written material and video	Report of a significant reduction in anxiety by the patients during the waiting days[32]
Standard: verbal and written guidelines	Group class 1 hour before CA with diagrams and slides, emotional support and advice	Effective improvement in care quality, providing appropriate knowledge and possibly reducing anxiety[33]
Modeling (video narration of a patient's experience)* - informational (manual)	I: Sensory-procedural (psychological preparation with detailed information) - informational**; II: I + modeling*	Reduction in anxiety and unnecessary distress[34]
Audiotape (2-3 minutes), written text and limited sensory information	Audiotape (8 minutes), written text and detailed sensory information	Lower anxiety and greater cooperation (more positive self-assertions, less time to complete the exam); more problem-centered coping pattern, lower distress levels[35]
Standard: verbal and leaflet	Standard + video (14 minutes)	Significant reduction in anxiety[36]

Key: CA: Coronary Angiography; IC: Informed Consent; DVD: Digital Versatile Disc; HR: Heart Rate; CG: Control Group; EG: Experimental Group; AI: Artificial Intelligence; BP: Blood Pressure; VR: Virtual Reality.

Figure 3: Synthesis corresponding to the types of educational didactic resources used and outcomes (effects) of employing them in the studies included in this scoping review (n=20). João Pessoa, PB, Brazil, 2024.

The use of educational videos is observed (with virtual reality in one of the studies), as well as of pamphlets, manuals, AI chatbots, diagrams and slides, audiotapes, text messages, photographs of the unit and peer-facilitated training.

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The effects of using educational technologies were grouped into four main aspects, easing an overview of the literature, namely: psychological (reduction in anxiety, stress, depression, uncertainty and distress, as well as greater comfort, adjustment, tolerance and satisfaction); physiological (regularization of vital signs: blood pressure, heart and respiratory rates); knowledge level (improvement in patients' and family members' understanding, in awareness and in cooperation; active participation in learning and decision-making about treatment); and assistance (improvement in care quality; effective communication between teams and patients).

DISCUSSION

Over the years, a number of studies have shown the importance of educational interventions and of using new technological resources in various health areas and with different age groups, offering significant possibilities for their incorporation into health care and teaching practices[37-39]. Given the magnitude of CVDs, especially in the Coronary Angiography context, it becomes fundamental to map the educational technological resources available on the theme with a view to contributing as an incentive for using such instruments in specific work environments, as well as to influence the scientific community for conducting new research studies and developing other tools. However, when designing an ET, it is important to consider the characteristics of the target population (schooling level, for example) and the feasibility of applying the technology[40].

Given the diversity of technologies gathered in this review, prevalence of using educational videos as a technological instrument aimed at the educational process of aged people regarding health care conditions was found[18,19-22,23-30,32,34,36]. A number of research studies show that this instrument can help convey complex information in an audiovisual, didactic and interactive way, easing understanding regardless of schooling levels[31], and that it is relevant in the teaching-learning process, mainly if lasting up to ten minutes, as longer periods can distract attention and weaken the learning process[41,42].

By combining different elements such as images, text and sound in a single object, educational videos provide an interesting and applicable teaching-learning experience, especially for people with low schooling levels. In addition, repeatability is available if necessary, providing improved understanding and retention of information in the patients[9] and removing time and place restrictions, especially when the resource is made available on virtual network platforms[18]. The benefit of using audiovisual resources over standard health education (verbal and written guidelines) is known; however, the latter becomes widely accessible due to its low cost[43].

It is noted that in all studies with comparison groups (control x experimental), verbal and/or written explanations were offered as a standard procedure[17-22,24-29,32-36], showing the importance of adequate preparation and ensuring the patients' right to timely, reliable and science-based information, thus avoiding adverse exposures and complications[44].

This review was developed through a search for literature that was pertinent to the topic without any time limit, and its findings encompassed studies published between 1989 and 2023. It can be seen that educational tools have been used for a long time and are emerging with greater relevance today. It is also worth highlighting the significant diversity of countries of origin that comprise this research, thus showing that the subject matter is relevant within the scientific community.

The Nursing professional category was predominantly involved in conducting research studies directed at the topic of this review. Nurses play a managerial role in organizing the work process of their team and unit, in addition to being actively involved in the health education process with the patients; their professional practice is interconnected with the pedagogical line and facilitated by the use of didactic and technological resources[33,45,46]. However, current studies focus on the need for multi-professional teams to implement health education practices carried, providing greater knowledge diversity and with the involvement of patients and family members alike in the search for comprehensive care[37,47,48].

Regarding the language of the publications selected, English is prevalent. Its predominance is justified by the global trend towards establishing it as the international language of science and receiving more citations, therefore being more widely read, allowing researchers from all over the world to communicate, cooperate with each other and share knowledge[50].

Another relevant aspect points to the importance of investigating and recognizing the implications arising from using technologies within educational processes. Such processes provide patients with a range of possibilities to clarify doubts and concerns[17,20,23,24,29,30,33,35], enjoy a calmer and more comfortable experience[18,19-29,31-36] and a more effective recovery due to the reduction in the number of complications; finally, they encourage participation

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in therapeutic decision-making[17,23]. Also noteworthy is the promotion of effective communication between teams, patients and family members, resulting in better care quality and safety[9,18,33].

One study[17] found that using AI-based chatbots was as effective as the traditional method in obtaining informed consents from patients, providing accurate information tailored to their individual preferences, as the Experimental Group participants were able to freely ask questions and read the answers without feeling rushed or constrained by the presence of a professional. This may have eased understanding, especially about the potential risks, as well as aided in making informed health decisions.

Some studies have observed a significant reduction in the mean scores of anxiety, stress and unnecessary distress[21,22,31,34-36], as well as greater satisfaction and comfort among the EG patients; in addition, they have also noticed reductions in physiological variables[21,24,25,29]. The importance of adequate patient knowledge is emphasized, as low knowledge levels can lead to altered psychological parameters (insecurity, fear, anxiety), resulting in inadequate adherence to recommended care and in possible complications[18]. Furthermore, inadequate control of physiological parameters causes biochemical changes (affecting several metabolic systems and processes) and increased consumption of antihypertensive and sedative medications, in addition to extending procedure times[25].

The modeling experience used in some studies[22,34,36] suggests that patients trust and value the experiences of others who have undergone similar medical procedures. It is also emphasized that sensory-procedural information strategies with individualized psychological preparation should be incorporated as a routine practice in patient preparation[34]. In addition to that, the results of a previous study indicate that willingness to seek or avoid information is associated with greater cooperation and more positive self-assertions, even resulting in shorter times to complete the examination[35].

Regarding intervention and monitoring of the patients during the waiting period between scheduling and performing the procedure, only one article was found: it showed the positive impact of physical and psychosocial support on reducing patient anxiety[32]. This study fostered comprehensive patient care by promoting management from the waiting list and proposed encouraging future implementation of this care line.

Greater satisfaction, comfort and awareness were noticed as repercussions[19,26,27,35]. It is reasserted that, as well as nurses' attitudes in emotional support and in solving doubts, educational interventions appropriate to the sociocultural context[26] exert a positive impact on the aforementioned aspects[27]. In addition, it was shown that the patients' willingness to seek or avoid information is related to cooperation and to positive self-assertions, even resulting in less time to complete the examination[35].

A number of studies have shown that educational strategies are effective in improving knowledge. A significant difference was found between the intervention and control groups, with the IGs presenting a mean number of correct answers of 74.6 (±17.1), when compared with 31.6 (±18.8) in the CGs (p=0.000)[30]. Furthermore, it is highlighted that effective communication improves interpretation of the exam and exerts a positive influence on the patients' perception regarding their health situation[20,23,29]. Finally, both care quality and communication between teams and patients were significantly improved by offering appropriate knowledge and encouraging lifestyle adjustments to achieve optimal health outcomes[33].

Study limitations

By acknowledging the unavailability of some studies in full and strictly respecting the inclusion criteria and information sources, some important references such as relevant studies in other languages may have been excluded, and greater diversity of technologies might have been explored. Therefore, it is necessary to admit this limitation in the review, as it may affect comprehensiveness and representativeness of the results.

FINAL CONSIDERATIONS

Some studies indicate that patients subjected to cardiac catheterization frequently face physiological and psychological changes resulting from anxiety related to possible complications and unexpected clinical outcomes. Therefore, the use of educational technologies by health professionals (especially nurses) can enhance development and validation of new tools for qualifying care. It is believed that such technologies contribute to enriching the patients' experience by promoting better knowledge, empowerment, comfort and confidence levels throughout the cardiovascular procedure, in addition to representing valuable resources for optimizing the work process and improving health indicators.

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REFERENCES

1. World Health Organization. World health statistics 2023: monitoring health for the SDGs, Sustainable Development Goals. Geneva: World Health Organization; 2023 [cited 2024 Mar 8]. Available from: https://www.who.int/publications/i/item/9789240074323.
2. Mathieu E, Ritchie H, Rodés-Guirao L, Appel C, Giattino C, Hasell J, et al. Coronavirus Pandemic. Our world in data [site de internet]. 2023 [cited 2024 Mar 8]. Available from: https://ourworldindata.org/coronavirus.
3. Ramires FJA. Implementation of Healthcare Quality Improvement Programs. Arq Bras Cardiol. 2020 [cited 2024 Apr 1]; 115(1):100–1. DOI: https://doi.org/10.36660/abc.20200679.
4. Virani SS, Newby LK, Arnold SV, Bittner V, Brewer LC, Demeter SH, et al. 2023 AHA/ACC/ACCP/ASPC/NLA/PCNA guideline for the management of patients with chronic coronary disease: a report of the American Heart Association/American College of Cardiology Joint Committee on clinical practice guidelines. Circulation. 2023 [cited 2024 Apr 1]; 148(9):e9-119. DOI: https://doi.org/10.1161/CIR.0000000000001168.
5. Feres F, Costa R, Siqueira D, Costa Jr J, Chamié D, Staico R, et al. Diretriz da Sociedade Brasileira de Cardiologia e da Sociedade Brasileira de Hemodinâmica e Cardiologia Intervencionista sobre Intervenção Coronária Percutânea. Arq Bras Cardiol. 2017 [cited 2024 Apr 1]; 109(1):1-58. DOI: https://doi.org/10.5935/abc.20170111.
6. Santos ACP, Ambiel MLB, Ferreria EB, Rocha PRS. Complicações vasculares e fatores relacionados a sua ocorrência após procedimentos hemodinâmicos percutâneos. Rev. Enferm. UFSM. 2020 [cited 2024 Mar 18]; 10:e90. DOI: https://doi.org/10.5902/2179769241286.
7. Feitosa-Filho GS, Peixoto JM, Pinheiro JES, Afiune Neto A, Albuquerque ALT, Cattani C, Nussbacher A, et al. Atualização das Diretrizes em Cardiogeriatria da Sociedade Brasileira de Cardiologia – 2019. Arq. Bras. Cardiol. 2019 [cited 2024 Mar 18]; 112(5):649-705. Available from: https://www.scielo.br/j/abc/a/jtsBtVbfWGmr5fqbMfdfZyF/?format=pdf&lang=pt.
8. Yap J, Teo TY, Foong P, Binte Hussin N, Wang H, Shen T, et al. A randomized controlled trial on the effectiveness of a portable patient education video prior to coronary angiography and angioplasty. Catheter Cardiovasc Interv. 2020 [cited 2024 Apr 1]; 96(7):1409-14. DOI: https://doi.org/10.1002/ccd.28655.
9. Murakami L, Rua ES, Santos VB, Lopes JDL. Effectiveness of educational intervention with manual for anxiety and stress reduction: controlled clinical trial. Rev Bras Enferm. 2022 [cited 2024 Jan 2]; 75(suppl 3):e20210757. DOI: http://10.1590/0034-7167-2021-0757.
10. Lattuca B, Chamoux NB, Alos B, Sfaxi A, Mulliez A, Milton N, et al. Impact of video on the understanding and satisfaction of patients receiving informed consent before elective inpatient coronary angiography: a randomized trial. Am Heart J. 2018 [cited 2024 Mar 26]; 200:67-74. DOI: https://doi.org/10.1016/j.ahj.2018.03.006.
11. Mata ÁNS, Azevedo KPM, Braga LP, Medeiros GCBS, Oliveira Segundo VH, Bezerra INM, et al. Training in communication skills for self-efficacy of health professionals: a systematic review. Hum Resour Health. 2021 [cited 2024 Mar 8]; 19(1):30. DOI: https://doi.org/10.1186/s12960-021-00574-3.
12. Peters M, Godfrey C, McInerney P, Munn Z, Trico A, Khalil H. Chapter 11: Scoping Reviews. JBI Manual for Evidence Synthesis. 2020 [cited 2024 Mar 8]. Available from: https://jbi-global-wiki.refined.site/space/MANUAL/4687342/Chapter+11%3A+Scoping+reviews.
13. Arksey H, O'Malley L. Scoping studies: towards a methodological framework. Int J Social Res Methodol. 2005 [cited 2024 Mar 8]; 8(1):19–32. DOI: https://doi.org/10.1080/1364557032000119616.
14. Rethlefsen ML, Kirtley S, Waffenschmidt S, Ayala AP, Moher D, Page MJ, et al. PRISMA-S: an extension to the PRISMA Statement for Reporting Literature Searches in Systematic Reviews. Syst Rev. 2021 [cited 2024 Mar 8]; 10(1)39. DOI: https://doi.org/10.1186/s13643-020-01542-z.
15. Ouzzani M, Hammady H, Fedorowicz Z, Elmagarmid A. Rayyan - a web and mobile app for systematic reviews. Syst Rev. 2016 [cited 2024 Mar 8]; 5:210. DOI: https://doi.org/10.1186/s13643-016-0384-4.
16. Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA Extension for Scoping Reviews (PRISMA-ScR): Checklist and Explanation. Ann Intern Med. 2018 [cited 2024 Mar 8]; 169(7):467–73. DOI: https://doi.org/10.7326/M18-0850.
17. Aydin F, Yildirim ÖT, Aydin AH, Murat B, Basaran CH. Comparison of artificial intelligence-assisted informed consent obtained before coronary angiography with the conventional method: medical competence and ethical assessment. Digital Health. 2023 [cited 2024 Jan 2]; 9:20552076231218141. DOI: https://doi.org/10.1177/20552076231218141.
18. Torabizadeh C, Rousta S, Gholamzadeh S, Kojouri J, Jamali K, Parvizi MM. Efficacy of education delivery through multimedia and text messaging on the psychological parameters of patients scheduled for coronary angiography: a single-blind randomized controlled clinical trial. BMC Cardiovasc Disord. 2021 [cited 2024 Jan 2]; 21(1):3. DOI: https://doi.org/10.1186/s12872-020-01820-7.
19. Oshvandi K, Movaheditabar E, Naghshtabrizi B, Mohammadi Y, Shamsizadeh M. The effect of video-based educational program on satisfaction and comfort in patients undergoing transradial coronary angiography: a single-blinded, randomized controlled trial. J Vasc Nurs. 2021 Jun [cited 2024 Jan 2]; 39(2):27-32. DOI: https://doi.org/10.1016/j.jvn.2021.01.001.
20. Morgan H, Nana M, Phillips D, Gallagher S. The effect of a virtual reality immersive experience upon anxiety levels, procedural understanding, and satisfaction in patients undergoing cardiac catheterization: the virtual cath trial. J Invasive Cardiol. 2021 [cited 2024 Jan 2]; 33(9):E681-6. DOI: https://doi.org/10.25270/jic/20.00664.
21. Gökçe E, Arslan S. Possible effect of video and written education on anxiety of patients undergoing coronary angiography. J Perianesth Nurs. 2019 [cited 2024 Jan 2]; 34(2):281-8. DOI: https://doi.org/10.1016/j.jopan.2018.06.100.
22. Habibzadeh H, Milan ZD, Radfar M, Alilu L, Cund A. Effects of peer-facilitated, video-based and combined peer-and-video education on anxiety among patients undergoing coronary angiography: randomised controlled trial. Sultan Qaboos Univ Med J. 2018 [cited 2024 Jan 2]; 18(1):e61-7. DOI: https://doi.org/10.18295/squmj.2018.18.01.010.

Review Article
Artigo de Revisão
Artículo de Revisión

DOI: https://doi.org/10.12957/reuerj.2025.84574

23. Miwa DTK. A percepção de pacientes sobre o cateterismo cardíaco: a importância de um vídeo educativo [Dissertação de Mestrado]. Marília: Faculdade de Medicina de Marília; 2017 [cited 2024 Jan 2]. Available from: https://www.oasisbr.ibict.br/vufind/Record/BRCRIS_bf9b681d139eb465ca1796034ada4ea9.
24. Basar C, Beşli F, Keçebaş M, Kayapınar O, Turker Y. The effect of audio-visual education prior to coronary angiography on the state anxiety. Clin Case Rep Rev. 2015 [cited 2024 Jan 2]; 1(8):176-8. DOI: https://doi.org/10.15761/CCRR.1000159.
25. Adib Hajbaghery M, Moradi T, Mohseni R. Effects of a Multimodal Preparation Package on Vital Signs of Patients Waiting for Coronary Angiography. Nurs Midwifery Stud. 2014 [cited 2024 Jan 2]; 3(1):e17518. DOI: https://doi.org/10.17795/nmsjournal17518.
26. Abdollahzadeh F, Moghaddasian S, Rahmani A, Shahmari M. Effect of video education on knowledge and satisfaction of patients undergoing coronary angiography. Iran J Crit Care Nurs. 2014 [cited 2024 Jan 2]; 7(3):168-75. Available from: https://jccnursing.com/article-1-291-en.pdf.
27. Wu K, Chen S, Ko W, Kuo S, Chen P, Su H, et al. The effectiveness of an accessibility-enhanced multimedia informational educational programme in reducing anxiety and increasing satisfaction of patients undergoing cardiac catheterisation. J Clin Nurs. 2013 [cited 2024 Jan 2]; 23(13–14):2063–73. DOI: https://doi.org/10.1111/jocn.12469.
28. Jamshidi N, Abbaszadeh A, Kalyani MN, Sharif F. Effectiveness of video information on coronary angiography patients' outcomes. Collegian. 2013 [cited 2024 Jan 2]; 20(3):153-9. DOI: https://doi.org/10.1016/j.colegn.2012.06.001.
29. Chair SY, Chau MY, Hung Sit JW, Wong EML, Chan AWK. The psychological effects of a videotape educational intervention on cardiac catheterization patients. Contemp Nurse. 2012 [cited 2024 Jan 2]; 40(2):225–33. DOI: https://doi.org/10.5172/conu.2012.40.2.225.
30. Torrano SK, Veiga VB, Goldmeier S, Azzolin K. Explanatory digital video disc with patients undergoing diagnostic cardiac catheterization. Rev Latinoam Enferm. 2011 [cited 2024 Jan 2]; 19(4):888–93. DOI: https://doi.org/10.1590/S0104-11692011000400006.
31. Shweikh RS. Effect of Health education on depression of patients with cariadic catherization. Qad Med J. 2010 [cited 2024 Jan 2]; 6(10):60–6. DOI: https://doi.org/10.28922/qmj.2010.6.10.60-66.
32. Harkness K, Morrow L, Smith K, Kiczula M, Arthur HM. The effect of early education on patient anxiety while waiting for elective cardiac catheterization. Eur J Cardiovasc Nurs. 2003 [cited 2024 Jan 2]; 2(2):113-21. DOI: https://doi.org/10.1016/s1474-5151(03)00027-6.
33. Chan DSK, Cheung HW. The effects of education on anxiety among Chinese patients with heart disease undergoing cardiac catheterization in Hong Kong. Contemp Nurse. 2003 [cited 2024 Jan 2]; 15(3):310-20. DOI: https://doi.org/10.5172/conu.15.3.310.
34. Mott AM. Psychologic preparation to decrease anxiety associated with cardiac catheterization. J Vasc Nurs. 1999 [cited 2024 Jan 2]; 17(2):41-9. DOI: https://doi.org/10.1016/S1062-0303(99)90028-6.
35. Ludwick-Rosenthal R, Neufeld RWJ. Preparation for undergoing an invasive medical procedure: interacting effects of information and coping style. J Consult Clin Psychol. 1993 [cited 2024 Jan 2]; 61(1):156-64. DOI: https://doi.org/10.1037/0022-006X.61.1.156.
36. Herrmann KS, Kreuzer H. A randomized prospective study on anxiety reduction by preparatory disclosure with and without video film show about a planned heart catheterization. Eur Heart J. 1989 [cited 2024 Jan 2]; 10(8):753-7. DOI: https://doi.org/10.1093/oxfordjournals.eurheartj.a059560.
37. Avila MAG, Prata RA, Jacob FLDS, Nóbrega FMO, Barros GR, Sugiura BMG. Educational intervention through a comic book for preoperative anxiety in children, adolescents, and their parents: a randomized clinical trial. J Pediatr Nurs. 2022 [cited 2024 Apr 2]; 67:e208-14. DOI: https://doi.org/10.1016/j.pedn.2022.07.010.
38. Seeliger B, Kayser MZ, Drick N, Fuge J, Valtin C, Greer M, Gottlieb J. Graphic narrative based informed consent for bronchoscopy improves satisfaction in patients after lung-transplantation: a randomized controlled trial. Patient Educ Couns. 2022 [cited 2024 Apr 2]; 105(4):949-55. DOI: https://doi.org/10.1016/j.pec.2021.08.011.
39. Angeloni NLN, Silva MHN, Valle LAR, Sousa ÁFL, Valim MD, Andrade D, et al. Impact of an educational intervention on standard precautions during the COVID-19 pandemic. Rev Bras Enferm. 2023 [cited 2024 Mar 8]; 76(4):e20220750. Available from: https://www.scielo.br/j/reben/a/9ZWMKwqhg7C4pNcthj7TGBR/.
40. Seabra CAM, Xavier SPL, Sampaio YPCC, Oliveira MF, Quirino GS, Machado MFAS. Health education as a strategy for the promotion of the health of the elderly: an integrative review. Rev bras geriatr gerontol. 2019 [cited 2024 Apr 2]; 22(4):e190022. DOI: https://doi.org/10.1590/1981-22562019022.190022.
41. Hu J, Ren J, Zheng J, Li Z, Xiao X. A quasi-experimental study examining QR code-based video education program on anxiety, adherence, and satisfaction in coronary angiography patients. Contemp Nurse. 2020 [cited 2024 Apr 2]; 56(5-6):428-40. DOI: https://doi.org/10.1080/10376178.2020.1813043.
42. Fleming SE, Reynolds J, Wallace B. Lights... camera... action! a guide for creating a DVD/video. Nurse Educ. 2009 [cited 2024 Apr 2]; 34(3):118-21. DOI: https://doi.org/10.1097/NNE.0b013e3181a0270e.
43. Grilo AM, Ferreira AC, Ramos MP, Carolino E, Pires AF, Vieira L. Effectiveness of educational videos on patient's preparation for diagnostic procedures: systematic review and Meta-Analysis. Prev Med Rep. 2022 [cited 2024 Apr 2]; 28:101895. DOI: http://dx.doi.org/10.1016/j.pmedr.2022.101895.
44. Metelski FK, Engel FD, Mello ALSF, Meirelles BHS. Patient safety and error from the perspective of complex thinking: documentary research. Physis. 2023 [cited 2024 Apr 2]; 33:e33009. DOI: https://doi.org/10.1590/S0103-7331202333009.en.
45. Santos WP, Nóbrega BF, Sousa MM, Silva GNS, Torres VSF, Moraes CAC. Knowledge and feelings of people before cardiac catheterization procedure. Rev. Pesqui. 2024 [cited 2024 Apr 2]; 16:e-12263. DOI: https://doi.org/10.9789/2175-5361.rpcfo.v16.12263.

Review Article
Artigo de Revisão
Artículo de Revisión

DOI: https://doi.org/10.12957/reuerj.2025.84574

46. Palheta AMS, Cecagno D, Marques VA, Biana CB, Braga LR, Cecagno S, et al. Formação do enfermeiro por meio de metodologias ativas de ensino e aprendizado: influências no exercício profissional. Interface (Botucatu). 2020 [cited 2024 Apr 2]; 24:e190368. DOI: https://doi.org/10.1590/Interface.190368.
47. Costa DAC, Cabral KB, Teixeira CC, Rosa RR, Mendes JLL, Cabral FD. Enfermagem e a Educação em Saúde. Rev Cient Esc Estadual Saúde Pública Goiás "Candido Santiago". 2020 [cited 2024 Mar 8]; 6(3):e6000012. Available from: https://www.revista.esap.go.gov.br/index.php/resap/article/view/234.
48. Barreto ACO, Rebouças CBA, Aguiar MIF, Barbosa RB, Rocha SR, Cordeiro LM, et al. Perception of the Primary Care multiprofessional team on health education. Rev Bras Enferm. 2019 [cited 2024 Mar 26]; 72:266–73. DOI: https://doi.org/10.1590/0034-7167-2017-0702.
49. Miller CJ, Smith SN, Pugatch M. Experimental and quasi-experimental designs in implementation research. Psychiatry Res. 2020 [cited 2024 Mar 26]; 283:112452. DOI: http://dx.doi.org/10.1016/j.psychres.2019.06.027.
50. Cintra PR, Silva MDP, Furnival AC. Uso do inglês como estratégia de internacionalização da produção científica em Ciências Sociais Aplicadas: estudo de caso na SciELO Brasil. EQ. 2020 [cited 2024 Mar 8]; 26(1):17-41. DOI: https://doi.org/10.19132/1808-5245261.17-41.

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Use of artificial intelligence tools

The authors declare that no artificial intelligence tools were used in the composition of the manuscript "*Educational technologies for aged people undergoing cardiac catheterization: a scoping review*".