



## EDUCATIONAL TECHNOLOGIES FOR INDIVIDUALS LIVING WITH CHRONIC KIDNEY DISEASE: A NARRATIVE REVIEW

### TECNOLOGIAS EDUCACIONAIS PARA PESSOAS QUE VIVEM COM DOENÇA RENAL CRÔNICA: REVISÃO NARRATIVA

Francielle Brum dos Santos Siqueira<sup>1\*</sup>, Camila Lovato de Figueiredo<sup>2</sup>, Ana Carolina Cunha Almeida<sup>2</sup>, Caren Bertoldo Kaiser<sup>3</sup>, Eliane Tatsch Neves<sup>4</sup>, Aline Cammarano Ribeiro<sup>4</sup>

<sup>1</sup>Master's degree in Nursing from the Graduate Program in Nursing, Universidade Federal de Santa Maria, Santa Maria (RS), Brazil. <sup>2</sup>Undergraduate Nursing student, Universidade Federal de Santa Maria, Santa Maria (RS), Brazil. <sup>3</sup>PhD in Nursing from the Graduate Program in Nursing, Universidade Federal de Santa Maria, Santa Maria (RS), Brazil. <sup>4</sup>Faculty member of the Graduate Program in Nursing, Universidade Federal de Santa Maria, Santa Maria (RS), Brazil.

\*Corresponding author:  
Francielle Brum dos Santos Siqueira - Email:  
[francisbrum@gmail.com](mailto:francisbrum@gmail.com)

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**ABSTRACT:** The objective of this study was to analyze the Brazilian production of theses and dissertations on educational technologies applied to individuals with chronic kidney disease. This was a narrative literature review, with data collected in May and June 2024 from the CAPES Theses and Dissertations Database and the Brazilian Digital Library of Theses and Dissertations, in which 556 records were identified and 16 scientific productions were included, all of them dissertations. The predominant area was Nursing, with an emphasis on methodological studies, and the most highlighted educational technologies were prototypes, booklets, and devices aimed at mobile applications. It is concluded that the trend of the studies is related to health promotion and self-care for individuals with chronic kidney disease, as well as support and assistance in hemodialysis treatment, with a notable predominance of research focused on digital-format educational technologies.

**KEYWORDS:** Chronic Disease. Kidney Diseases. Health Education. Renal Insufficiency, Chronic. Educational Technology.

**RESUMO:** O objetivo foi analisar a produção brasileira de teses e dissertações acerca das tecnologias educacionais aplicadas as pessoas com doença renal crônica. Trata-se de uma revisão narrativa da literatura. A busca dos dados foi realizada em maio e junho de 2024 no Banco de Teses e Dissertações da Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES) e na Biblioteca Digital Brasileira de Teses e Dissertações, com 556 registros, foram incluídas 16 produções científicas. Todos os estudos eram dissertações. A área predominante foi a Enfermagem, com ênfase em estudos metodológicos. As tecnologias educacionais mais destacadas foram protótipos, cartilhas e dispositivos voltados para aplicativos móveis. Conclui-se que a tendência dos estudos relaciona-se à promoção de saúde e autocuidado da pessoa com doença renal crônica e de apoio e suporte no tratamento hemodialítico. Observa-se um predomínio de pesquisas voltadas para tecnologias educacionais em formato digital.

**PALAVRAS-CHAVE:** Doença crônica. Doença renal. Educação em saúde. Insuficiência Renal Crônica. Tecnologia educacional.

## INTRODUCTION

Chronic Kidney Disease (CKD) represents a global health issue, affecting over 800 million individuals worldwide. It is estimated that by 2040, CKD will become the fifth leading cause of death globally<sup>1</sup>. CKD develops progressively and may lead to limitations, social and psychological conflicts due to treatment requirements and changes in patients' daily lives<sup>2</sup>. Hemodialysis constitutes the most frequent form of Renal Replacement Therapy (RRT) worldwide, accounting for approximately 69% of RRT cases and 89% of dialysis treatments<sup>3</sup>. In Brazil, hemodialysis is the predominant modality among renal patients (92.5%)<sup>4</sup>. In this context, Educational Technologies (ET) are tools developed based on scientific evidence, comprising a set of digital and non-digital devices that engage individuals creatively and proactively<sup>5</sup>. These technologies facilitate the creation of opportunities for teaching and learning across various fields<sup>6</sup>. Within healthcare, ET enable a participative education process that promotes patient protagonism and enhances knowledge and learning concerning health<sup>5</sup>.

Confronting this scenario, multiple countries have invested in ET development, such as mobile applications, digital platforms, and interactive materials, aiming to foster self-care and improve adherence to renal treatment. Initiatives include the United Kingdom's multimedia platforms, My Kidneys & Me, which target self-management for people in early non-dialytic CKD stages through personalized educational modules, videos, symptom monitoring, and therapeutic reminders<sup>7</sup> and Kidney BEAM, which supports physical activity and emotional well-being in CKD patients via videos and feedback<sup>8</sup>.

Furthermore, in the United States, the CKD mobile application was developed to aid CKD self-management, incorporating health data inputs such as blood pressure, weight, and glucose levels, alongside personalized goals and feedback mechanisms intended to enhance treatment adherence and clinical outcomes<sup>9</sup>. In Canada, a web-based self-management program, My Kidneys My Health, was designed for adults with CKD, offering information and interactive resources, including a personalized question list for healthcare professionals, designed to engage patients and expand their knowledge in CKD management<sup>10</sup>.

Nevertheless, studies indicate the necessity for subsequent research to assess the acceptability and usability of ET in diverse contexts and populations with CKD. Recent reviews reveal a scarcity of interventions targeting specific populations such as children, adolescents, and older adults, a lack of cultural validation, and an absence of robust studies evaluating sustained clinical impact<sup>7-11</sup>. Consequently, investigating these studies within the Brazilian context and identifying innovation opportunities is essential to strengthen educational practices and contribute to complication prevention in CKD and health promotion reinforcement.

Thus, ET can aid health education for Non-Communicable Chronic Diseases (NCDs), particularly CKD, which often develops following renal injury characterized by slow, progressive, and irreversible renal function loss. ET can also mediate health education actions via devices such as smartphones, recognized as one of the most significant information tools<sup>2,12-13</sup>. Various ET types assist in patient engagement with treatment, enabling disease control, preventing hospitalizations, and fostering knowledge and deeper understanding of necessary care<sup>14</sup>.

Accordingly, this study aimed to analyze Brazilian thesis and dissertation production addressing educational technologies applied to individuals with Chronic Kidney Disease.

## METHODS

This study is a narrative literature review aimed at synthesizing knowledge by providing a comprehensive analysis of the addressed topic<sup>15</sup>. The study was organized following these steps: topic

selection, formulation of the review question, inclusion criteria establishment, search strategy design, exhaustive testing of various search strategies to attain a representative sample corpus, data retrieval, data extraction, and thematic analysis and categorization of results. Based on the topic selection, the review question was: What are the trends in knowledge production regarding educational technologies directed at individuals living with Chronic Kidney Disease (CKD)? Theses and dissertations produced within Brazilian postgraduate programs on educational technologies for patients living with CKD were included, regardless of research line or knowledge area. Studies addressing educational technologies directed at healthcare professionals or transplant patients were excluded.

The decision to include exclusively Brazilian theses and dissertations in this review was based on the necessity to identify the highest volume of academic productions, as some remain unpublished in article form. Accordingly, these works constitute original data sources, evaluated by academic committees and enriched with expanded reflections on educational technologies aimed at the care and health promotion of individuals living with CKD. This choice enabled an analysis of the studies conducted on this subject in Brazil, which may support new research and future clinical practices.

No temporal restriction was applied to the selection. Data searches were performed in May and June 2024 in the Coordination for the Improvement of Higher Education Personnel (CAPES) Thesis and Dissertation Database and the Brazilian Digital Library of Theses and Dissertations (BDTD). Four search strategies were employed to encompass the largest possible number of studies responding to the review question (Chart 1). Selected studies underwent thematic content analysis<sup>16</sup>, following these steps: pre-analysis, material exploration, result treatment, and interpretation.

Chart 1. Thesis and Dissertation Databases and Search Strategy.

Thesis and Dissertation Database	Search strategy
Coordination for the Improvement of Higher Education Personnel (CAPES) Thesis and Dissertation Database	"tecnologia AND doença renal" "TECNOLOGIA EDUCA* AND DOENÇA RENAL" "aplicativo AND doença renal" "tecnologia AND insuficiência renal crônica"
Brazilian Digital Library of Theses and Dissertations (BDTD)	"tecnologia AND doença renal"

Source: The authors.

Figure 1 displays the flowchart for study selection, based on the PRISMA model<sup>17</sup>.

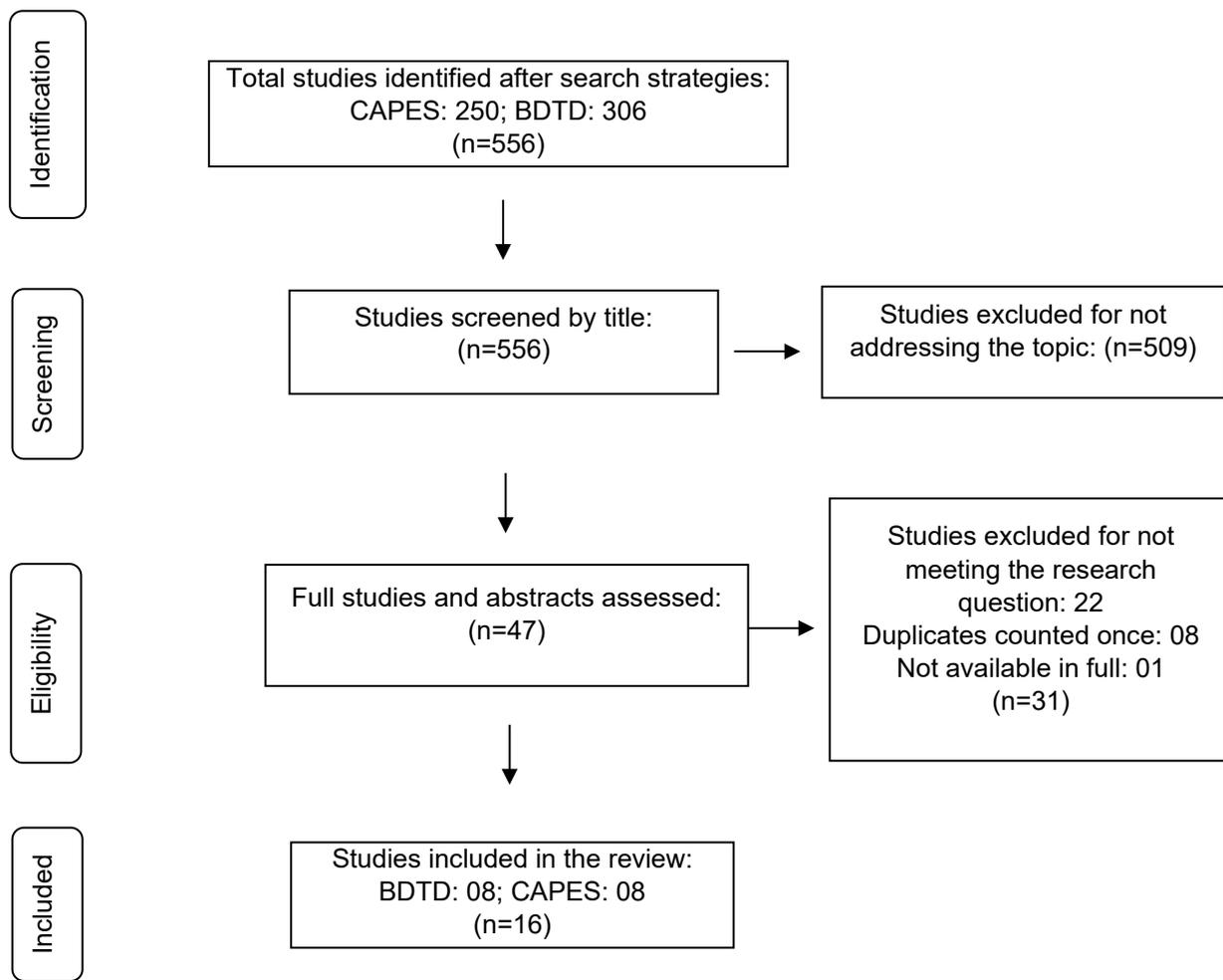


Figure 1. Flowchart of Study Selection Regarding Educational Technologies Directed at Patients with Chronic Kidney Disease. Source: The authors.

## RESULTS

The study included 16 productions characterized in Chart 2 regarding author and year of publication, postgraduate category, institution, field, objective, method, and main results.

Chart 2. Study Characterization

ID	Title	Author/Year	Category and Field	Institution	Objective	Method	Main results
01	Construction and validation of an educational technology for monitoring and guidance of individuals with chronic kidney disease	Barreira (2015) <sup>18</sup>	Dissertation/ Nursing	Universidade de Fortaleza (UNIFOR)	To present a tool (Renal Patient Booklet) for recording information about CKD treatment	Methodological	The Educational Technology Proposal (ETP) significantly contributes to professionals' work in preventing CKD-related complications. 83.3% of participants emphasized the ETP's importance for individuals with CKD in pursuing habit changes, adapting to treatment, and improving quality of life.

ID	Title	Author/ Year	Category and Field	Institution	Objective	Method	Main results
02	Renal Health: a new tool for managing chronic kidney disease	Oliveira (2016) <sup>19</sup>	Dissertation/ Nursing	Universidade de Fortaleza (UNIFOR)	To design a health technology tool about CKD incorporating information and support services for chronic kidney patients and the general public	Methodological	The tool was a mobile application called Renal Health, accepted in 89.6% of evaluations. The lowest scores concerned language appropriateness and font size adjustments. The app may become an important tool for the general population.
03	Construction and validation of an educational video for promoting self-care of patients with arteriovenous fistula	Pessoa (2017) <sup>20</sup>	Dissertation/ Nursing	Universidade Federal de Pernambuco	To validate an educational video to promote self-care with arteriovenous fistula among chronic kidney patients	Methodological	Negative evaluations for items such as "Illustrations motivate video message comprehension" (p=0.001), "Overall structure is creative" (p=0.001), "Scene rhythm is tiresome" (p=0.001/p=0.034), "Characters/images appeal to target audience" (p=0.006), "Illustrations reflect important thematic aspects" (p=0.006), and "Scenes reflect stereotypes or discrimination" (p=0.008). After thorough expert and communication professional review, the video was considered valid.
04	BIM Application: promoting self-care in pediatric chronic kidney disease	Pereira (2017) <sup>21</sup>	Dissertation/ Nursing	Universidade Federal de Goiás	To use a mobile application as a self-care promotion tool for pediatric CKD patients on hemodialysis	Methodological	The BIM game application motivated users due to its simple interface and ease of use. Identification with the clinical scenario supported children and adolescents in exercising care and reflecting on CKD determinants, though impact on self-care promotion was not demonstrated. The app is a feasible teaching tool.
05	ATIVEFAV: a technology for programmed exercises on the arteriovenous fistula	Coutinho (2018) <sup>22</sup>	Dissertation/ Nursing	Universidade de Fortaleza (UNIFOR)	To design a m-health (mobile health) technology-based approach to support passive	Methodological	The technology achieved content validity index (CVI) above 0.80 in all domains. ATIVEFAV may be an important tool for AVF maturation and maintenance in

ID	Title	Author/ Year	Category and Field	Institution	Objective	Method	Main results
					exercise assistance on AVF for patients on hemodialysis		collaboration with the nursing care team.
06	Construction and validation of an educational technology to support self-image for renal patients using vascular access devices	Freire (2019) <sup>23</sup>	Dissertation/ Nursing	Universidade de Fortaleza (UNIFOR)	To create an educational technology booklet supporting chronic renal patients using vascular devices	Methodological	The educational booklet was considered satisfactory with a concordance rate above 80%. Adjustments were made following suggestions from content experts, technical judges, and target users to enhance effectiveness.
07	Construction and validation of an educational technology to promote self-care in chronic kidney disease patients on hemodialysis	Mota (2019) <sup>24</sup>	Dissertation/ Nursing	Universidade de Fortaleza (UNIFOR)	To develop and validate an ET providing self-care guidelines for CKD patients on HD	Methodological	The global CVI of the ET was 0.94, confirming validation of appearance and content by specialists. Organization, writing style, appearance, and motivation items were validated by the target audience with agreement over 75%. The booklet proved a valid and reliable educational resource.
08	A gamified application architecture for monitoring and treating chronic kidney disease	Silva (2019) <sup>25</sup>	Dissertation / Computer Science	Universidade Federal de Alagoas	To assist in developing gamified applications supporting therapy and self-monitoring of CKD	Methodological	Presented a gamified application architecture focused on CKD monitoring and treatment across stages. Evaluated by health professionals and a software developer via scenario-based approach. Implemented a web technology prototype demonstrating architecture use.
09	Renalhealth: a new electronic device to assist chronic kidney disease patients	Freitas Filho (2020) <sup>26</sup>	Dissertation / Computer Engineering	Universidade de Fortaleza (UNIFOR)	To develop a system supporting CKD monitoring through a prototype with sensors collecting weight for automated daily activity tracking to improve fluid management	Participatory Interaction Design	The insole collects weight with some margin of error; further calibration and suitable materials are needed to approach true values. Renal Health is a promising computational tool to aid patients in better weight control.

ID	Title	Author/ Year	Category and Field	Institution	Objective	Method	Main results
10	Development of a digital educational booklet: an educational tool for CKD patients on hemodialysis	Aguiar (2021) <sup>27</sup>	Dissertation/ Nursing	Universidade Estadual do Ceará	To develop a digital educational technology regarding HD treatment for CKD patients	Methodological	Developed digital educational material following Falkembach's proposal: creation, modeling, implementation, distribution, and evaluation. Evaluation checked information accuracy, grammar errors, media-text correspondence, content and navigation errors, enabling self-instructional use of the digital booklet.
11	Prototype of an educational technology on appropriate diet for chronic kidney disease patients	Belle (2021) <sup>28</sup>	Dissertation/ Nursing	Universidade de São Paulo (Ribeirão Preto)	To develop a prototype educational technology for adult CKD patients	Methodological	Developed a booklet prototype for CKD patients and caregivers covering eight pages on suitable diets, aimed at stimulating health improvement through knowledge building followed by self-care.
12	Health promotion in hemodialysis chronic kidney disease patients through a multidisciplinary manual	Braga (2021) <sup>29</sup>	Dissertation / Medicine	Centro Universitário Dr. Leão Sampaio	To develop a manual promoting health in hemodialysis patients	Methodological	The educational product, titled "Manual for the Hemodialysis Patient: a Multidisciplinary Approach," guides CKD hemodialysis patients on disease, treatments, and self-care practices. Text is organized simply with non-technical language to be comprehensible for patients, families, and caregivers.
13	Development of m-health technology to assist the adaptation process in chronic kidney disease	Santos (2021) <sup>30</sup>	Dissertation/ Nursing	Universidade Vale do Rio dos Sinos	To create a mobile app enabling CKD patients to interact with disease-related information	Methodological	Results from four methodological steps fully addressed the research question. The CVI technique was used for prototype analysis, with navigation by the review committee yielding approval above 80%.
14	Development and validation of an educational video to promote self-care of vascular access in chronic	Cabral (2021) <sup>31</sup>	Dissertation/ Nursing	Universidade de Fortaleza (UNIFOR)	To develop and validate an educational video promoting self-care with arteriovenous fistula in chronic	Methodological	The technology achieved a CVI above 0.80 in all four domains both in individual item evaluations (I-CVI) and overall assessment (S-CVI/AVE). The video was developed and validated to promote patient self-care

ID	Title	Author/ Year	Category and Field	Institution	Objective	Method	Main results
	kidney disease patients				kidney patients		against access complications and improve understanding of AVF care.
15	Infographic for older adult hemodialysis patients: home care guidelines	Silva (2022) <sup>32</sup>	Dissertation/ Nursing	Universidade Federal da Paraíba	To analyze care performed by older adults at home during hemodialysis therapy intervals	Methodological	Developed a prototype infographic delivering home care guidelines for hemodialysis patients on how to manage between dialysis sessions.
16	Development of a mobile application prototype to assist self-care for pediatric and adolescent chronic kidney disease patients	Teixeira (2023) <sup>33</sup>	Dissertation/ Nursing	Universidade Federal do Rio Grande do Norte	To develop a mobile application prototype facilitating communication and supporting self-care for pediatric and adolescent CKD patients	Methodological	The proposed technology consists of 20 screens, with CVI equal to or exceeding the 70% cutoff and reaching maximum evaluation scores. The technology's appearance received maximum agreement. The constructed and validated tool represents a valuable instrument promoting health, enabling information sharing, enhancing communication, encouraging autonomy, and social inclusion for young CKD patients.

Source: The authors.

Regarding postgraduate program modality, all 16 selected studies are dissertations. Concerning authors' professional training fields: Nursing accounted for 81.2% (n=13), Computer Science 12.5% (n=2), and Medicine 6.2% (n=1).

Concerning institutions, Ceará state predominated with 56.2% (n=9). Methodological approach analysis showed a large majority (93.7%) of studies are methodological. Educational technologies found include prototypes (4), booklets (3), mobile device applications (3), videos (2), infographic (1), manual (1), patient booklet (1), and technological artifact (1).

## DISCUSSION

The studies included in this review present contributions concerning educational technologies for individuals living with CKD. Two categories were identified indicating the prevailing trends of the dissertations: educational technologies for health promotion and patient self-care, and educational technologies for support during hemodialysis treatment.

Among the educational technologies directed toward health promotion and self-care for individuals with CKD, one finds the printed booklet "*Conhecer para se cuidar*," which seeks to promote

self-care among patients undergoing hemodialysis, with content addressing the importance of the kidneys, hemodialysis, nutrition, fluid intake, and medication, based on Orem's self-care theory<sup>24</sup>. Similarly, Belle's study<sup>28</sup> constructed a prototype booklet on diet for dialysis patients and their caregivers as a means of health promotion. Also noteworthy is "*Manual ao paciente hemodialítico: uma abordagem multidisciplinar*," which provides guidance to chronic renal patients on hemodialysis regarding CKD, types of treatments, and self-care practices related to vascular access, as well as nutritional and psychological aspects. This manual is available in both print and digital formats<sup>29</sup>. The use of printed materials such as manuals and booklets offers advantages, such as low cost, ease of handling, and accessibility for later reading, in addition to being self-explanatory<sup>34</sup>.

A digital booklet, "*Preciso fazer hemodiálise, e agora?*", provides guidance to facilitate patient compliance with treatment, including information on types of vascular access, self-care, diet, medication, and fluid intake, as well as the rights of individuals with CKD<sup>27</sup>. The booklet, "*Cartilha de apoio a autoimagem do paciente renal em uso dos acessos vasculares: espelho, espelho meu?*", provides supportive information regarding the disease and self-image, with illustrations about the types of vascular accesses, possible discomfort caused by catheter use, and coping strategies<sup>23</sup>. Digital educational technologies can be used in diversified contexts, enhancing accessibility in a dynamic and attractive manner for the target audience. Moreover, such technologies expand knowledge, as in the case of CKD, and allow for constant availability of access<sup>35</sup>.

For younger populations, a serious game named "BIM application" was developed to promote self-care among children and adolescents with CKD<sup>21</sup>. The clinical scenario of the character Bim enables children and adolescents to exercise care and acquire knowledge about CKD. Games are designed to entertain, engage, and satisfy, and may be used on computers and mobile devices to enhance health knowledge and encourage desirable health behaviors in children and adolescents, involving users in the promotion of their own health through a motivating and enjoyable activity<sup>36</sup>.

It is important to emphasize that gamified health applications should be attractive and appropriate for children and adolescents, allowing easy navigation and engagement. Furthermore, gamified health interventions among children and adolescents can promote behavior change and improve health outcomes in this audience<sup>37</sup>.

A mobile application prototype, "*Cuidando dos Rins*," was developed to facilitate communication and assist self-care among children and adolescents undergoing CKD treatment. It comprises 20 screens including self-care menus with dietary and fluid intake tips, a CKD menu with disease signs and symptoms, types of treatment, prevention, medication management, and prevention of complications<sup>33</sup>. There is also a "Support Network" feature providing guidance concerning family, school, and friends in connection with CKD, serving as a space to record self-care information and other key details.

For those experiencing CKD during adolescence and youth, challenges arise from unique life changes, compounded by the impact of the disease and the new requirements imposed by treatment. Health education strategies, providing information on chronic condition and treatment, are necessary to enable these individuals to care for themselves in daily life<sup>2</sup>.

A prototype infographic, "*Orientações aos pacientes idosos que fazem hemodiálise, para serem cumpridas em casa*," provides guidance on treatment and home care for older adults undergoing hemodialysis, covering aspects such as vascular access, including catheters and arteriovenous fistulas, nutrition, and more<sup>32</sup>. One study indicated that older adults with CKD reported greater difficulties with daily activities and slower thinking, revealing intellectual decline resulting from both aging and hemodialysis<sup>38</sup>. Infographics serve as valuable educational technology strategies that allow the

presentation of various content in a more visually appealing way, carrying explanatory potential and capturing greater user attention<sup>39</sup>.

A prototype named "*Meu amigo Roy*," developed on Callista Roy's theory, was created for mobile devices to enable individuals with CKD to interact and practice self-care, with the objective of facilitating adaptation through health education<sup>30</sup>. The user enters information in a therapeutic diary, including data on dialysis losses, pre- and post-dialysis weight, medications, fluid and food intake, and may attach photos of significant events, all in an empathetic and communicative environment. Mobile applications are among the technological products that are distinguished in improving management and self-management among patients with chronic diseases, including CKD, showing positive impacts by supporting monitoring, care, and disease control<sup>40</sup>.

It is notable that CKD constitutes a public health problem, with major repercussions for morbidity, mortality, and quality of life. In this sense, educational technologies, including printed booklets, mobile applications, infographics, and serious games, represent tools for promoting self-care, strengthening therapeutic adherence, and preventing complications associated with dialysis treatment. These strategies, which are grounded in nursing theories and educational methodologies, broaden access to accurate information, facilitate patient and family autonomy, and contribute to constructing safer health practices.

Thus, the educational approach to CKD is directly aligned with health promotion and prevention of disease progression, highlighting the relevance of this topic for public knowledge, professional practice, and the management of challenges posed by chronic diseases.

Among educational technologies intended for support is the "Patient Renal Booklet," which was developed to document treatment information for individuals with CKD and support medical consultations, while also enabling the care team to monitor patient health<sup>18</sup>. Two studies validated educational videos for self-care in arteriovenous fistula, recognizing that vascular access is essential for the survival of these individuals<sup>20, 31</sup>.

Educational technologies based on video aim to provide information and support to this group. This aligns with a review that indicated video interventions in health are effective for improving patient outcomes and that this type of educational technology is promising for chronic disease management<sup>41</sup>. The use of educational technologies in CKD fosters autonomy in self-care and advances health promotion among individuals affected by the disease<sup>34</sup>.

One study developed the "Renal Health" application as a new tool for CKD care, focusing on awareness-raising and the dissemination of knowledge about CKD<sup>19</sup>. This educational technology brought together information and support services for individuals with chronic kidney disease, including dialysis patients, kidney transplant recipients, and the general public. The use of applications in healthcare allows for greater access to information, increased patient involvement, and improved adherence to treatment, and the portability and technical characteristics of mobile applications also enhance their usefulness for health education<sup>36</sup>.

Another study designed the technological tool "ATIVEFAV", an m-health educational technology implemented via software, to support the maturation and maintenance of the functioning of arteriovenous fistula, allowing the patient to synchronize and perform passive exercises with the AVF arm<sup>22</sup>. Vascular access is fundamental for the treatment of these patients, making possible the necessary blood circulation through an autogenous arteriovenous fistula or a non-autogenous arteriovenous graft<sup>42</sup>.

A prototype insole was developed to collect weight using sensors for automated recording of daily activities, thus improving liquid management in patients with CKD. The "smart insole" collects and transmits analog signals to an electronic circuit, where data are processed and transferred via Bluetooth to the "Renal Health" application. The user can enter their dry weight to facilitate proper fluid removal

during treatment as well as their current weight, receiving real-time feedback, alerts about weight gain variations, and support for the identification of possible complications<sup>26</sup>.

Similarly, the insole system "ShrewdShoe" makes use of barometric sensors for real-time monitoring, communicating wirelessly with computers or smartphones for applications such as gait analysis, activity assessment, sports performance optimization, and the study of gait disturbances<sup>43</sup>. Interdialytic weight gain is among the most challenging conditions to be managed by patients on hemodialysis, since fluid retention can cause serious complications<sup>2</sup>.

Another study developed a gamified application architecture for the monitoring and treatment of chronic kidney disease. The "CKD App" features an initial screen resembling a hospital setting, with missions following a progression path, allowing users to level up through achievements and receive rewards as badges<sup>25</sup>. The application includes articles for reading, educational videos, quizzes, and texts regarding studies about CKD, medications, and general guidance. Gamification is expanding as an educational strategy in health, involving the application of game mechanics, aesthetics, and concepts in order to increase user engagement. Its use in digital media increases motivation and interest in certain topics<sup>44-45</sup>.

The present research faces some limitations, since theses and dissertations often have lower visibility and reach, remaining largely restricted to institutional repositories, which hinders the dissemination of produced knowledge, particularly when not yet published in journals. Most of the studies belong to the nursing field, which may limit the applicability of conclusions to other professional groups. In addition, since most of the works are dissertations, the duration of this academic pathway may not allow for further study, such as the implementation of educational technologies, although these works do provide evidence and perspectives with significant potential for future research.

As practical implications, the findings reveal that educational technologies are an effective health education tool for people living with CKD and can and should be adopted. Their use enables the systematic delivery of information and guidance on the disease, daily care, strategies for treatment adherence, and also offers educational support. This contributes to an understanding of risks and self-care measures, strengthens the development of autonomy, and raises awareness about the importance of maintaining healthy lifestyles, even in the face of disease-imposed limitations. For health professionals, the incorporation of these technologies into care plans represents an opportunity to improve their practice, rendering it more accessible, interactive, and centered on patient needs.

## CONCLUSION

This review identified that educational technologies applied to CKD constitute potential strategies to expand knowledge, stimulate self-care, and strengthen treatment adherence, directly contributing to the health promotion of these individuals. It was observed that the trends in studies on educational technologies directed at people living with CKD are related to health promotion and self-care, as well as support during hemodialysis treatment. A predominance of studies on educational technologies targeting applications and other digital formats was noted, indicating the growth of digital technologies.

The developed educational technologies demonstrate the possibility of disease and treatment self-management by individuals with CKD through guidance and information about the disease. Some allow interaction with user data, including CKD support applications, and also employ gamification, thereby promoting motivation and engagement in treatment. Educational technologies do not replace clinical treatment; however, they are valuable tools that enable health education, assisting patients in their adaptation, treatment, and disease monitoring.

The findings of this review reinforce the importance of investing in educational technologies that can support preventive practices, reduce complications, and improve the quality of life of individuals living with CKD. By gathering and systematizing national production of theses and dissertations on the topic, this study offers an overview that highlights advances, innovations, and existing gaps. It is further expected that this work will provide a basis for planning new research initiatives and for integrating educational technologies as strategic tools in health promotion, tailored to the needs of the diverse profiles of patients with CKD.

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