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REVIEW PROTOCOL

Use of digital health technologies in nursing care for family caregivers: scoping review protocol

Utilização das tecnologias de saúde digital em cuidados de enfermagem no familiar cuidador: protocolo *scoping*

Uso de tecnologías sanitarias digitales en los cuidados de enfermería para cuidadores familiares: protocolo de revisión del alcance

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ABSTRACT

Objective: To map evidence on the use of digital health technologies in nursing care for family caregivers. **Inclusion criteria**: Studies that include adult family caregivers who provide unpaid care to dependent individuals, focusing on the use of digital health technologies in nursing care in community and hospital settings. No restrictions on language, time frame, or methodological design. **Method**: A scoping review will be carried out (Open Science Framework registration: https://osf.io/etrbw) according to the JBI methodology and PRISMA-ScR guidelines for identifying documents in the CINAHL Complete, Nursing & Allied Health Collection: Comprehensive, MedicLatina, Cochrane Central Register of Controlled Trials, Cochrane Database of Systematic Reviews (all via EBSCOhost), PubMed, Web of Science, OpenGrey, and RCAAP databases. Data were extracted using a dedicated tool, which allowed for the organization and presentation of the results in a structured and descriptive manner.

DESCRIPTORS: Digital Health; Nursing Care; Caregivers.

RESUMO

Objetivo: Mapear evidências sobre a utilização das tecnologias de saúde digitais em cuidados de enfermagem no familiar cuidador. **Critérios de inclusão**: Estudos que incluam familiares cuidadores adultos que prestam cuidados não remunerados a pessoas dependentes, focando na utilização de tecnologias de saúde digital nos

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cuidados de enfermagem em contextos comunitários e hospitalares. Sem restrição de línguas, corte temporal e delineamento metodológico. **Método**: Será realizada revisão de escopo (registro *Open Science Framework*: https://osf.io/etrbw) conforme a metodologia do JBI e diretrizes do PRISMA-ScR para identificação dos documentos nas bases de dados CINAHL *Complete*, *Nursing & Allied Health Collection: Comprehensive*, MedicLatina, *Cochrane Central Register of Controlled Trials*, *Cochrane Database of Systematic Reviews* (todas via EBSCOhost), PubMed, *Web of Science, OpenGrey* e RCAAP. A extração dos dados será com recurso a um instrumento próprio, que permitirá organizar e apresentar de forma estruturada e descritiva os resultados.

DESCRITORES: Saúde Digital; Cuidados de Enfermagem; Cuidadores.

RESUMEN

Objetivo: Mapear la evidencia sobre el uso de tecnologías sanitarias digitales en los cuidados de enfermería a cuidadores familiares. **Criterios de inclusión**: Estudios que incluyen cuidadores familiares adultos que brindan cuidados no remunerados a personas dependientes, centrándose en el uso de tecnologías de salud digital en la atención de enfermería en entornos comunitarios y hospitalarios. Sin restricciones de idioma, temporalidad ni diseño metodológico. **Método**: Se realizará una revisión de alcance (registro en *Open Science Framework*: https://osf.io/etrbw) de acuerdo con la metodología JBI y las pautas PRISMA-ScR para la identificación de documentos en las bases de datos CINAHL *Complete*, *Nursing & Allied Health Collection: Comprehensive*, MedicLatina, *Cochrane Central Register of Controlled Trials*, *Cochrane Database of Systematic Reviews* (todos a través de EBSCOhost), PubMed, *Web of Science, OpenGrey* y RCAAP. Los datos se extrajeron mediante una herramienta específica que permitió la organización y presentación de los resultados de forma estructurada y descriptiva.

DESCRIPTORES: Salud Digital; Atención de Enfermería; Cuidadores

INTRODUCTION

The use of digital health technologies has increased significantly in recent years, driven especially by the COVID-19 pandemic[1-3]. This growth is reflected in the increase in scientific publications on digital health, covering the research, development and application of these technologies in the health sector[2,4].

The evolution of digital technologies has transformed the delivery of nursing care, requiring nursing to become a digitally enabled profession to respond to the challenges of healthcare systems and society's needs[1-2,4]. These technologies include the Internet of Things, virtual care, remote monitoring, artificial intelligence, big data analytics, blockchains, smart wearables, and digital platforms [4-6]. Furthermore, tools that enable the collection, storage, sharing, and exchange of information promote continuity of care and have the potential to improve health outcomes[6].

Population aging and the increase in chronic diseases and dependence on self-care, combined with low birth rates and a shortage of healthcare professionals, pose significant challenges to healthcare systems, requiring interventions that include support for family caregivers[7-8]. Family caregivers are understood as informal caregivers, i.e., people who provide unpaid care to dependent people, and may be family members, friends, neighbors or volunteers[7-8]. Typically, an informal caregiver is a family

member who takes over as a caregiver[8], which implies a transition process towards exercising the role of family caregiver, whether voluntarily or not[9-10]. A transition process involves a set of factors (facilitating or hindering properties and conditions)[9] that must be identified and recognized as targets of nursing intervention for an effective transition process to occur. This process allows caregivers to play a fundamental role in providing quality care[11], making it essential that nurses direct their interventions toward empowering family caregivers to assist a dependent person [5,6]. These interventions include teaching, training, guiding, supporting, encouraging and valuing the role of a family caregiver[5-6,10], and can be framed within clinical supervision, considering its formative, normative and supportive (restorative) functions. Nurses, by directing care to the person/family caregiver dyad, can facilitate the transition process, promoting continuity of care and improving their quality of life and well-being[10].

Studies indicate that the use of digital health technologies can improve family caregivers' quality of life, promoting their mental health, social support, knowledge, skills, self-efficacy and reducing stress associated with caregiving[12-15], in addition to favoring the relationship with a dependent person [12]. However, the literature suggests that technology does not completely replace human advice[14-15]. Family caregivers value solutions that enable rapid communication with healthcare professionals[16], and the presence of a reference healthcare professional is significantly associated with increased caregiver confidence in obtaining health information through digital technologies[17].

Despite the clear benefits, there are still challenges in implementing these technologies, including resistance to use, inequality in access, limitations in digital literacy, and difficulties in integrating them with healthcare services[2-3,13-14,16]. Furthermore, there is little scientific evidence regarding its use in different populations and vulnerable groups, its long-term benefits, and its application in evidence-based clinical practice focused on nursing care focused on family caregivers.

Nurses play a fundamental role in empowering family caregivers to provide care to dependent individuals. For nursing to grow as a discipline and keep pace with technological developments, it is necessary to identify the digital technologies available to support family caregivers and explore solutions that make these tools more accessible, effective, and integrated into nursing practice. Although this is an area of growing interest, there is still a gap in the literature regarding the synthesis of evidence on the use of digital health technologies in nursing care.

Preliminary research conducted in the JBI, Database of Systematic Reviews and Implementation Reports, PROSPERO, Cochrane Central Register of Controlled Trials and Open Science Framework databases revealed that, at the time of the research, there were no scoping reviews or systematic reviews published or in progress on this topic.

Thus, systematizing this knowledge can significantly contribute to clinical nursing practice, enabling the identification of digital health technologies that can be incorporated into the implementation

of nursing interventions focused on family caregivers. This can result in greater efficiency in nursing care provision, increased satisfaction, and improved quality of care provided by family caregivers to dependent individuals.

OBJECTIVE

This scoping review aims to map the available scientific evidence on the use of digital health technologies in nursing care for family caregivers according to the PCC (Participant, Concept, and Context) methodology, and to identify potential benefits, challenges, and opportunities for improving nursing interventions.

METHODOLOGY

Study design

To conduct the proposed scoping review, the JBI scoping review methodology[18] and Preferred Reporting Items for Systematic Reviews and Meta-Analysis extension for Scoping Reviews (PRISMA-ScR) items will be applied[19]. As recommended, this protocol was prospectively registered in the Open Science Framework, identified with the DOI 10.17605/OSF.IO/ETRBW, and can be consulted through the link: https://osf.io/etrbw. Any deviation made in the scoping review will be explicitly justified by investigators and thoroughly detailed and documented in the same[18-19].

Review question

This scoping review will consider the main research question: what is the relationship between the use of digital health technologies and nursing care for family caregivers?

The subsequent questions will be considered as sub-questions: what are the characteristics of digital health technologies in terms of: i) type of digital health technology used; ii) nomenclature; iii) purpose; iv) duration; v) accessibility; vi) security and privacy; vii) costs and quality?

Inclusion criteria

Following the PCC mnemonic, we defined the inclusion criteria regarding participants, concept and context.

Participants: family caregivers. In this scoping review, participants are defined as family caregivers, who are informal caregivers and are usually family members [8]. However, all informal adult carers (family members, friends, neighbors or volunteers) [7] who provide unpaid care to dependent people will be included[8].

Concept: use of digital health technologies. This concept encompasses all digital technologies applied in the healthcare field, with the aim of improving the quality, efficiency, and continuity of care provided[6].

Context: nursing care. Community and hospital settings will be included, understanding nursing as a practice that unites art and science to protect, promote, and optimize health, prevent disease, and treat and alleviate suffering, involving the diagnosis and treatment of human responses[20].

This scoping review will include studies with quantitative (experimental and/or observational), qualitative, or mixed-methods designs. Systematic reviews that meet the inclusion criteria will also be considered, depending on the research question. Furthermore, gray literature, namely theses and dissertations as well as opinion articles will also be included in the research.

All languages will be included to reduce the risk of omitting relevant sources. Languages other than English, Portuguese, or Spanish will be translated by fluent colleagues or qualified speakers. If these are not available, digital tools such as DeepL will be used. No time constraints will be established. Any changes will be detailed in the full scoping review delineation analysis.

Research strategy

The search strategy encompasses a three-phase process: (i) identifying the Medical Subject Headings (MeSH) and key terms important for the search; (ii) developing the search strategy; and (iii) searching multiple databases using the previously defined search strategy, examining the reference lists of the studies selected to be part of the scoping review.

The first phase included an initial limited search of the National Library of Medicine (PubMed) to identify articles on the topic. The text words in the titles and abstracts of relevant articles, and the index terms used to describe the articles, were used to carry out the second phase (i.e., developing the search strategy), as described in Table 1.

Table 1 - Search strategy used in the PubMed database in 03/14/2025

Search ID	Search terms	Results
#1	("Caregivers"[MeSH Terms] OR "Caregiver*"[Title/Abstract] OR "Care Giver*"[Title/Abstract] OR "Carer*"[Title/Abstract] OR "Family Caregiver*"[Title/Abstract] OR "Spouse Caregiver*"[Title/Abstract] OR "Informal Caregiver*"[Title/Abstract])	142.193
#2	("Artificial Intelligence"[MeSH Terms] OR "Generative Artificial Intelligence"[MeSH Terms] OR "Expert Systems"[MeSH Terms] OR "Digital Health"[MeSH Terms] OR "Telemedicine"[MeSH Terms] OR "Artificial Intelligence*"[Title/Abstract] OR "AI"[Title/Abstract] OR "Comput*"[Title/Abstract] OR "Machine Intelligence"[Title/Abstract] OR "Chat*"[Title/Abstract] OR "Expert System*"[Title/Abstract] OR "Digital Health Technolog*"[Title/Abstract] OR "Telemedicine"[Title/Abstract] OR "Healthcare robotic*"[Title/Abstract] OR "Health Informatic*"[Title/Abstract] OR "Machine learning"[Title/Abstract] OR "Nursing informatic*"[Title/Abstract] OR "Technological machine*"[Title/Abstract] OR "Healthcare industry"[Title/Abstract] OR "Application"[Title/Abstract] OR "Virtual Medicine"[Title/Abstract] OR "Mobile Health"[Title/Abstract] OR "mHealth"[Title/Abstract] OR "Telehealth"[Title/Abstract] OR "eHealth"[Title/Abstract] OR "Telecare"[Title/Abstract] OR "Connected health"[Title/Abstract] OR "Teleservice*"[Title/Abstract] OR "Cyberhealth"[Title/Abstract])	2.677.695
#3	("Nursing Care"[MeSH Terms] OR "Nursing"[MeSH Terms] OR "Nurs*"[Title/Abstract])	719.595
#4	#1 AND #2 AND #3	1.550

All identified keywords and index terms will be adapted for each of the following databases: CINAHL Complete; Nursing & Allied Health Collection: Comprehensive; MedicLatina; Cochrane Central Register of Controlled Trials; Cochrane Database of Systematic Reviews (all via EBSCOhost); PubMed; and Web of Science Core Collection. Grey literature will also be searched in OpenGrey and the Portuguese Open Access Scientific Repository (RCAAP). At this stage, the reference lists of all selected sources will be reviewed to identify additional articles that meet the inclusion criteria.

Study selection

After the search, all identified studies will be collected and uploaded to the Rayyan Intelligent Systematic Review tool (Qatar Computing Research Institute, Doha, Qatar), where duplicates will first be removed. After a pilot test, two independent reviewers will assess the titles and abstracts according to eligibility criteria. The remaining studies will be selected for full-text review. The full text of potentially relevant articles will be retrieved and analyzed in detail against the inclusion criteria by two independent reviewers. At each stage of the selection process, disagreements among reviewers will be resolved through discussion or consultation with a third reviewer.

The research results will be reported in full in the final scoping review and presented through a PRISMA-ScR flow diagram[19]. The reasons for exclusion of full articles that do not meet the inclusion criteria will be documented and reported in the scoping review.

Data extraction

Data extraction from articles will provide a descriptive and structured summary of results that address the main objective, research question, and subquestions. This process will be carried out independently by two reviewers using a data extraction tool developed by the reviewers themselves for this scoping review.

The extracted data will include specific details regarding the inclusion criteria (i.e., participant types, concept and context, and types of evidence sources) and key findings relevant to the review questions, such as characteristics of digital health technologies in terms of type, nomenclature, purpose, duration, accessibility, security and privacy, costs, and quality, associated with nursing care for family caregivers. A draft extraction tool will be provided, as shown in Table 2.

Table 2 - Data extraction tool.

Domain	Extracted information
Study characteristics (If there is no data, write NA)	Author(s), first author. If there are more than two authors: XX et al. Full title Country / Year of publication Study design Study objective(s)
Participant characteristics (If no data is available, write NA)	Relationship of family caregivers with patients (family, friend, neighbor) Gender of family caregivers Age of family caregivers Literacy and digital literacy of family caregivers Length of experience as a caregiver Health condition of family caregivers Illness of patients of family caregivers Degree of dependence of patients on family caregivers
Concept characteristics (If there is no data, write NA)	Type of digital health technology used Nomenclature of digital health technology used Purpose of digital health technology used Duration of digital health technology use Accessibility to digital technologies Data security and privacy Costs and quality of digital health technology
Context characteristics	Nursing intervention area Benefits of nursing care for family caregivers (factors of adherence to the family caregiver role; resilience, burden, and exhaustion levels; decision-making; knowledge; support)
Additional results	Main findings from nurses' and family caregivers' perspectives
Other results	Other relevant results identified (e.g., barriers)

To promote familiarity with the data extraction tool, a pilot test will be conducted with the first five included studies. Throughout the extraction process, reviewers will make any necessary adjustments to the preliminary tool, duly describing all modifications in the scoping review. Disagreements among reviewers will be resolved by consensus or with the intervention of a third reviewer. When necessary, study authors will be contacted by email to obtain missing or additional data. Since this is a scoping review, the methodological quality of included studies will not be assessed. [21].

Data analysis and presentation

The inclusion criteria, defined by the participating elements, concept, context, and type of sources, will guide how the data will be mapped. The objective of the mapping is to identify, describe, and synthesize the available evidence on the topic under study. The results will be presented in an evidence table, accompanied by a narrative summary, as illustrated in Table 2, ensuring they are aligned with the objective and questions of the scoping review. Other formats may be considered if they prove more appropriate after data analysis.

Contributions to practice

The researchers hope that this protocol will encourage reflection within the scientific community on nursing practices centered on family caregivers, using digital technologies, contributing to improvements in care quality and safety, greater efficiency and satisfaction in caring for dependent individuals, and the well-being of both parties involved in the care process. Furthermore, the protocol aims to identify the potential benefits, challenges, and opportunities for improving nursing interventions.

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