

MOBILE APPLICATIONS FOR NURSES IN THE CARE OF ELDERLY PEOPLE AFTER A STROKE: SCOPE REVIEW

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Highlights:

(1) There is a lack of research on the subject. (2) Mobile technologies are important tools in supporting aging. (3) Nurses play an essential role in caring for elderly stroke survivors. (4) The development of mobile applications for nurses in Brazil is still scarce.

PRE-PROOF

(as accepted)

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ABSTRACT

Objective: to map the available scientific evidence on mobile applications to assist nurses in caring for elderly people after a stroke. **Method:** This is a scoping review, conducted in accordance with JBI recommendations, where searches were conducted from December 2023 to April 2024 in the listed information sources. The eligibility criteria adopted were: studies on mobile applications to assist nurses as intervention technology, guidance, rehabilitation, or other forms of care for elderly people after stroke. The selection and screening of studies were based on the use of the EndNote web reference manager and Rayyan software. Regarding the analysis of evidence, a data extraction tool developed for the review was used, which was organized in a Microsoft Excel spreadsheet. **Results:** a total of 346 studies were identified, and only five were selected for the final sample of the review. The results were grouped into five categories: nursing care in the functional rehabilitation of elderly people after stroke; control and self-monitoring of hypertension in elderly people after stroke; benefits of the mobile application for self-management of nursing care for elderly people in the post-stroke phase; and a mobile application for evaluating the effectiveness of care provided by nurses. **Conclusion:** The findings clarified that the content included in mobile applications to support nursing care was mainly associated with the rehabilitation of elderly people's functionality.

Keywords: Stroke; Mobile applications; Nurses; Nursing care; Elderly.

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INTRODUCTION

Stroke is considered the second leading cause of death and the third leading cause of death and disability worldwide⁽¹⁾. Regarding stroke prevalence, 67% of people affected by the disease were under 70 years of age, as were 34% of individuals who died⁽²⁾.

In Brazil, a study showed that between 2018 and 2021, death from stroke was 66.38% among individuals aged 70 years, demonstrating that age, associated with metabolic and behavioral factors, can contribute to the onset of this condition⁽³⁾.

Stroke is characterized as a sudden neurological deficit in which vascular damage involving the central nervous system occurs. The causes related to this comorbidity can be ischemic (ischemic stroke) or hemorrhagic (hemorrhagic stroke) in nature, both of which are associated with multiple disorders of the human system and aggravations, especially in the health of the elderly population⁽⁴⁻⁵⁾.

Older adults affected by stroke may experience sequelae that can influence their ability to perform daily activities. Given the magnitude of the complications of the disease, these individuals may have limitations in their self-care and develop mild to severe dependence, making them more fragile and in need of help⁽⁶⁾.

Dependence on care is mainly related to physical and cognitive dysfunctions, nutritional problems, and emotional factors that can be caused by stroke. Therefore, healthcare professionals have a responsibility to plan the rehabilitation of older adults systematically and continuously, aiming to implement interventions that can accelerate the recovery process⁽⁷⁾.

Among these professionals, nurses are challenged to provide care focused on meeting the specific needs of individuals after a stroke. Nursing care must be comprehensive and integrated, including activities that can support the elderly throughout the recovery process⁽⁸⁾.

To avoid complications from the disease and base their care on understanding the patient's clinical condition and the changes caused by the stroke, it is emphasized that nurses need to develop skills that are consistent and based on techniques, tools, and technologies that can assist in the care of the elderly at home⁽⁹⁾.

Mobile technologies can provide support for post-stroke healthcare, given their potential to significantly impact rehabilitation outcomes and patients' quality of life through structured and systemic interventions⁽¹⁰⁾.

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Mobile applications ensure agility, optimization, and ease of access. When incorporated into healthcare practices, these characteristics can complement standard rehabilitation by providing guidance and support for interventions aimed at individuals affected by stroke⁽¹¹⁾.

The development of a mobile application is linked to many clinical purposes and contexts. An example of this is mobile applications designed to prevent post-stroke complications and/or focused on home care. The use of this resource can be geared toward assisting in the rehabilitation of elderly individuals through the range of features offered by the mobile system⁽¹²⁾.

In this context, it is important to investigate, through a scoping review, the mobile applications developed and used to support the nursing care process, highlighting the relevance of investing in these tools that can contribute to the quality of care provided. As provided for in the protocol of this review, we expect not only to map existing solutions but also to highlight areas that are still under-explored, offering relevant insights to guide future research in this field⁽¹³⁾.

Therefore, the present review aimed to map the available scientific evidence in the literature on the use of mobile applications to assist nurses in caring for elderly people after a stroke.

METHODS

Type of Study

This is a scoping review, a study that focuses on mapping and identifying evidence on a specific topic, field of study, or concept⁽¹⁴⁾. This review is part of a dissertation entitled: Development of a prototype mobile application for primary care nurses on home care for the elderly after stroke in the Amazonian context.

Thus, the study followed the JBI recommendations for scoping reviews, guided by the following six steps: definition of the research question, eligibility criteria, search strategy and sources of evidence, screening and selection of studies, data extraction and analysis, and presentation of results⁽¹⁵⁾. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses: extension for Scoping Reviews (PRISMA-ScR) guidelines were followed to report this review⁽¹⁶⁾.

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Methodological procedure

For the development of this study, preliminary research was conducted in the Medical Literature Analysis and Retrieval System Online (MEDLINE/via pubmed), the Cochrane Database of Systematic Reviews, PROSPERO, JBI Evidence Synthesis, Open Science Framework (OSF), and Figshare, where no systematic reviews or scoping reviews on the topic were identified. The protocol for this review was developed and published in the Open Science Framework (OSF) in December 2023 with the identifier DOI 10.17605/OSF.IO/Q8RUF.

During the course of the review, some changes were made to the title, study objective, review question, study context, sources of evidence, inclusion criteria, and data extraction tool, in accordance with the JBI methodology, which highlights adjustments to the study protocol, if necessary.

To formulate the research question and include the studies, the acronym PCC was adopted: (P=Population; C=Concept and C=Context) according to Table 1 below.

Population	Elderly people after stroke
Concept	Mobile applications to assist nurses
Context	Any geographic and clinical contexts

Table 1 – PCC Strategy. Brazil, 2024.

Source: Prepared by the authors.

Therefore, the following research question was established for the review: What scientific evidence is available on the use of mobile applications to assist nurses in caring for elderly people after a stroke?

Inclusion and Exclusion Criteria

The studies were selected according to the PCC strategy. Regarding participants, evidence was considered that included elderly people of both sexes after hemorrhagic and/or ischemic stroke, regardless of the time after stroke. Regarding the concept, studies were selected

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that reported and involved mobile applications to assist nurses as intervention technology, guidance, rehabilitation, or other forms of care for elderly people after stroke.

The context was not limited to any geographical locations, conceptual fields, healthcare, or levels of healthcare, so scientific studies addressing the presented topic were included.

The following inclusion criteria were established for the selection of evidence: qualitative studies; quantitative studies, randomized clinical trials, pragmatic clinical trials, controlled trials, non-randomized clinical trials, before-and-after studies, prospective and retrospective cohort studies, case-control studies, analytical cross-sectional studies, descriptive observational studies, mixed-method studies, and systematic reviews, scoping reviews, integrative reviews, narrative reviews, and study protocols were also considered, as well as studies from the gray literature, such as theses, dissertations, guides, guidelines, preprint and post print manuscript reports, and book chapters. There were no language restrictions, and no time frame was applied.

Studies that were not specific to mobile applications for nurses in elderly care, internet texts, event proceedings, opinion articles, and advertisements were adopted as exclusion criteria.

Search strategy and Sources of evidence

The evidence was mapped between December 2023 and April 2024, using the following sources of information: CAPES journal portal via CAFE: Medical Literature Analysis and Retrieval System Online (Medline) via PubMed, Scopus (Elsevier), Web of Science - Main Collection (Clarivate Analytics), Science Direct (Elsevier), Cumulative Index to Nursing and Allied Health Literature (CINAHL), and Embase. Through the regional portal of the Virtual Health Library (VHL), the Latin American and Caribbean Health Sciences Literature (LILACS) and the *Banco de Dados em Enfermagem – Bibliografia Brasileira* (Nursing Database – Brazilian Bibliography - BDENF) were accessed, as well as the Scientific Electronic Library (SciELO).

The sources of gray literature studies were: Theses Canada Portal, Open Access Theses and Dissertations (OATD), Theses and Dissertations Catalog of the *Coordenação de*

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Aperfeiçoamento de Pessoal de Nível Superior (Coordination for the Improvement of Higher Education Personnel - CAPES), *Biblioteca Digital Brasileira de Teses e Dissertações* (Brazilian Digital Library of Theses and Dissertations - BDTD), and *Repositórios Científicos de Acesso Aberto de Portugal* (Open Access Scientific Repositories of Portugal - RCAAP).

The search strategy followed the PCC acronym, using the Health Sciences Descriptors (DeCS) from the Virtual Health Library (VHL), Medical Subject Headings (MeSH) from PubMed, Embase Subject Headings (Emtree), Subject Headings (CINAHL), and entry terms vocabulary. The combination of controlled descriptors and keywords was achieved using the Boolean operators AND (intersection) and OR (union). In addition, parentheses were used to establish an order in the search pattern and quotation marks to search for compound terms.

As established by the JBI collaboration, the search for evidence sources took place in three stages and was carried out by two independent reviewers. The first stage consisted of an initial search in MEDLINE/PubMed (via the National Library of Medicine) and Web of Science (Clarivate Analytics) to identify keywords and terms potentially relevant to the development of a final search strategy from reading the titles and abstracts of the studies, which was adapted according to each source of information accessed.

A secondary search was applied to all sources of information included in the review, using the previously developed syntax (strings), using a combination of controlled descriptors and previously established keywords, as shown in Table 2.

Scope review search strategy (syntax)
(Aged OR "Aged, 80 and over" OR Elderly OR "Oldest old" OR "Older people" OR "Very Elderly") AND (Stroke OR "Cerebrovascular accident" OR "Brain vascular accident" OR "Cerebral stroke" OR "Acute stroke" OR "Acute cerebrovascular accident" OR "Hemorrhagic stroke" OR "Ischemic stroke" OR "Brain infarction" OR "Brain hemorrhage") AND ("Mobile applications" OR "Mobile application" OR Mobile app OR "Mobile phone application" OR "Smartphone application" OR "Cellular Phone" OR "Portable software application" OR "Portable electronic application") AND (Nurses OR Nurse OR Nursing OR "Nursing care")

Table 2 - Scope review search strategy. Brazil, 2024.
Source: Prepared by the authors.

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The third step consisted of analyzing the list of references from all selected studies to identify additional articles according to the inclusion criteria. In addition, forward citation searching was used in Google Scholar.

Study selection

The identified studies were exported and grouped in the EndNote web reference manager (Clarivate Analytics, PA, USA) to identify and exclude duplicates⁽¹⁷⁾. After that, the evidence was imported into the Rayyan software, developed by the Qatar Computing Research Institute, where the records were screened by reading the titles and abstracts⁽¹⁸⁾. Pre-selection was performed blindly, according to the inclusion criteria, by two independent reviewers.

After this first phase, the full texts of the records were retrieved in their entirety for detailed evaluation in relation to the inclusion criteria, again by two independent reviewers for selection of the studies that comprised this review. In addition, the reference list and citations of each of the included studies were checked. Disagreements between reviewers during the review stages were resolved with the opinion of a third reviewer.

Data Analysis and Processing

The data were extracted using a data extraction tool developed in accordance with JBI recommendations and organized in a Microsoft Excel spreadsheet according to the following variables: author, country of origin, year of publication, language, objectives, country of origin, clinical context, duration of intervention, purpose of the application, type of study, characteristics of the application, focus of care, and study outcome (main results related to the research question).

Data analysis was performed by summarizing similar studies, with a brief descriptive summary of the categories listed and subsequently discussed, relating them to the objective and research question of the review. The extracted data were presented graphically using tables and flowcharts.

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Ethical aspects

This study does not require review by the Research Ethics Committee as it is a scoping review.

RESULTS

A total of 346 studies were identified, of which 58 were excluded due to duplication in EndNote web (Clarivate Analytics, PA, USA), and 288 records proceeded to title and abstract screening. After this initial screening, 240 pieces of evidence were excluded according to eligibility criteria.

After this pre-selection, 48 studies were considered for detailed evaluation. However, two articles were not freely accessible, so 46 reports were read in full. After evaluation of the full text of each article by two independent reviewers, 41 studies did not meet the inclusion criteria for the following reasons: ineligible participants and ineligible concept. Thus, five studies were included to compose the final sample of the research.

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Figure 1 shows a summary of the study selection process, based on the PRISMA flow diagram.

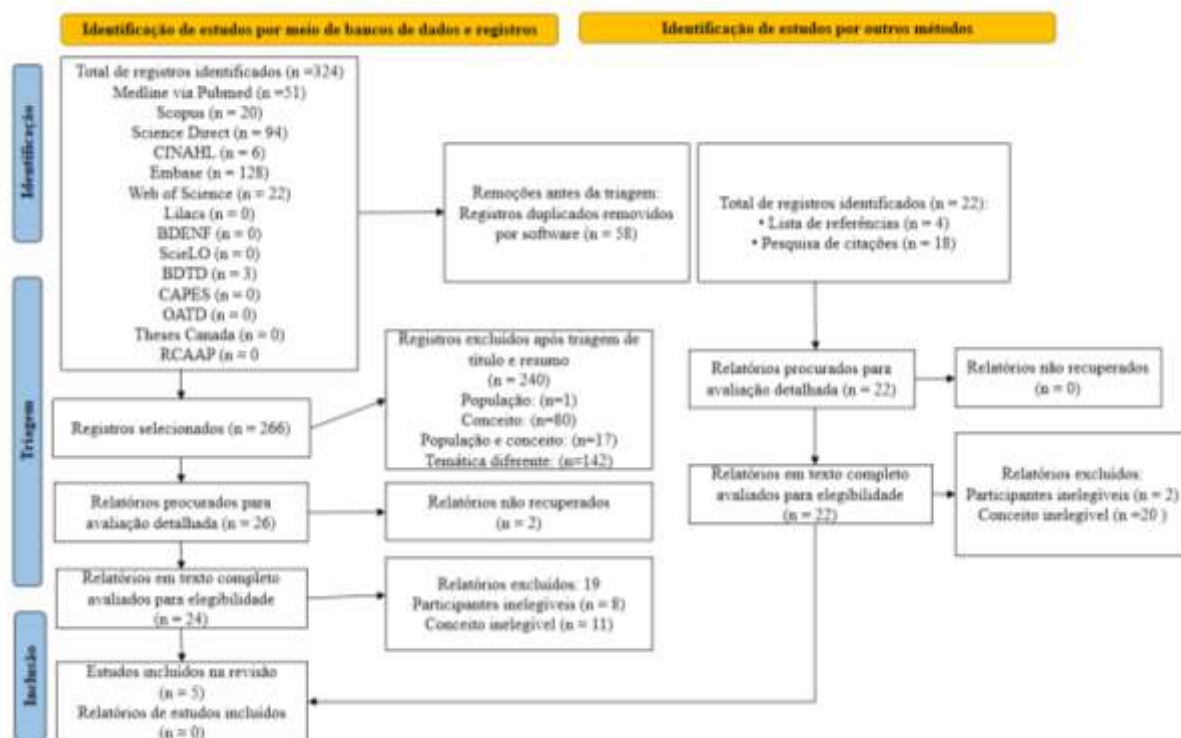


Figure 1- Flow diagram of the article selection process for the review, PRISMA-ScR (adapted). Brazil, 2024.

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The studies were analyzed according to the following information: author, year of publication, country of origin, study objectives, clinical context, duration of intervention, purpose of the application, type of study, characteristics of the application, focus of care, and clinical outcome.

Table 3 presents a summary of the information from the selected studies. Four articles were found in MEDLINE/via PubMed and one in Embase, all published in English. Regarding the year of publication, two articles were published in 2019, one in 2016, one in 2020, and one in 2023.

Regarding the location of the research, most (n=4) were from China and one from South Africa. Regarding the type of study, randomized clinical trials predominated, and most study participants were male.

Regarding the clinical context of applicability of mobile technologies, the hospital and home settings predominated (n=2), followed by the home setting alone (n=1), hospital setting (n=1), and community setting (n=1). The intervention period with the use of mobile applications was six months (n=3) and three months (n=2).

Table 4 summarizes the main information related to the characteristics of mobile applications and the main outcomes (results) of the studies. The categories developed after data extraction and analysis dealt with the types of care included in mobile applications that are performed by nurses, as described below:

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Article	Authors, Year, and Country of Origin	Objective	Clinical context/Duration of intervention	Purpose of the application	Study Type
A1 ⁽¹⁹⁾	Xu et al., 2023 China	To explore the effects of continuous nursing care based on mobile applications on self-efficacy, quality of life, and motor function in stroke patients in the community	Community 3 months	To improve nursing interventions for stroke patients in the community. It enables patients to receive assistance with rehabilitation exercises.	Comparative study
A2 ⁽²⁰⁾	Chu et al., 2020 China	To evaluate the feasibility of a new model of rehabilitation administered by family members, trained by nurses, for disabled stroke patients in rural southwestern China	In-hospital and Post-hospital 6 months	To assist with in-hospital intervention, assessment of patient status, setting discharge goals, training in rehabilitation intervention, and post-hospital follow-up guidance.	Parallel randomized clinical trial
A3 ⁽²¹⁾	Nichols et al., 2019 South Africa	To explore post-intervention perspectives and gather in-depth information about the experiences of stroke survivors and their caregivers after participating in a larger intervention arm of an mHealth blood pressure management study.	Home-based 3 months	Aimed at improving blood pressure control after stroke in Ghana	Randomized controlled clinical trial
A4 ⁽²²⁾	Zhou, et al. 2019 China	To determine the effectiveness of a new nurse-led, caregiver-administered stroke rehabilitation model in rural China	Hospital-based 6 months	To improve basic self-care physical function (activities of daily living)	Multicenter, prospective, randomized, open-label, blinded study
A5 ⁽²³⁾	Yan et al., 2016 China	To develop and implement a simplified stroke rehabilitation program that utilizes nurses and family caregivers to deliver services, and to evaluate its feasibility and effectiveness in rural China.	Hospital and Home-based Care 6 months	Intended to improve physical function	Randomized clinical trial

Table 3 - Summary of key information from the included studies. Brazil, 2024.
Source: Prepared by the authors.

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Article	Application features	Outcome
A1 ⁽¹⁹⁾	The software consists of four functional modules, namely health reminder, consultation, health information, and patient diary, which are available at the medical team login or patient login. Once registered and logged in, patients can upload their exercises, conditions, and rehabilitation questions to the platform.	Patients showed significantly higher self-efficacy scores. Scores for emotional health, emotional function, social function, energy, general health, bodily pain, physiological function, and physiological characteristics were significantly higher after the intervention. In this study, after the intervention, it was suggested that the use of mobile app-based continuing nursing care improves the physical function of stroke patients.
A2 ⁽²⁰⁾	NI	It improved physical recovery as indicated by BI scores without increasing caregiver burden, compared to usual care, for rural patients. However, the study did not find a significant improvement in patients' health-related quality of life.
A3 ⁽²¹⁾	Multilevel, nurse-guided mHealth technology. The app is used for self-monitoring and automatic transfer of encrypted blood pressure measurements and medication intake.	Four main themes emerged that highlight: the ability to self-monitor BP, the use of technology as an intervention tool, training and support, and post-intervention adherence.
A4 ⁽²²⁾	NI	The new nurse-led, digitally supported stroke rehabilitation program delivered by caregivers did not improve physical functioning in stroke patients in rural China.
A5 ⁽²³⁾	Secure, centralized, password-protected, Internet-based computerized system for randomization, for nurses to collect data, randomize individuals, and guide the intervention. Regarding intervention guidelines, the intervention training guidelines, follow-up guidelines, and intervention procedures were installed in the application. Reminders are sent to nurses before the follow-up call time.	According to initial feedback from nurses, the RECOVER app substantially reduces their workload and increases their efficiency in managing patients and conducting interventions. This program has the potential to increase access to early rehabilitation, improve the quality of home-based rehabilitation, reduce the incidence and severity of physical disability caused by stroke, and improve individuals' psychological conditions.

Table 4 - Summary of studies included in the review. Brazil, 2024.

Source: Prepared by the authors.

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Category 1 - Nursing care in the functional rehabilitation of elderly people after stroke

This category highlighted a compilation of four scientific studies that addressed nursing care based on mobile applications to assist in the rehabilitation of elderly people after stroke^(19-20,21-22).

One study mapped in this review presented information on a mobile application to support nurses in the functional rehabilitation of individuals after stroke, which included exercises aimed at guiding the correct position, functional training of the fingers, exercises for sitting, turning in bed, and balance in a sitting position. Requirements for training in daily living skills for wheelchair use, changing position, using the bathroom, hygiene, eating, dressing, and combing hair were also incorporated⁽¹⁹⁾. In addition, mobile technology highlighted the function of recording the frequency and duration of exercises and any questions or problems that arose during the activities.

The studies^(20,21-22) highlighted the nurse's care focused on the recovery of motor function/mobility skills, which included: transferring from bed to chair, walking on flat ground, going up and down stairs, moving in bed, sitting and standing balance, walking, and focusing on self-care regarding eating, dressing, bathing, hygiene, grooming, and combing hair; and continence/toilet: bowel control, bladder control, and toilet use.

Category 2 - Control and self-management of hypertension in elderly people after stroke

Two articles were included in this axis, which discussed nurses' interventions using mobile applications for the management and monitoring of hypertension in elderly people after stroke^(19,21).

The mobile intervention described in the study⁽¹⁹⁾ sought to support nurses in blood pressure care through daily blood pressure recording and description of the name, use, dosage, and frequency of medications prescribed to the patient, in addition to using health reminders to facilitate hypertension management and drug treatment.

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Category 3 - Benefits of the mobile application for self-management of nursing care for elderly people in the post-stroke phase

In this topic, we chose to highlight the importance and benefits of mobile applications to assist nurses, selecting two studies^(19,23).

The research proposed the use of mobile applications to improve continuous nursing care in terms of self-efficacy and quality of life for elderly people in the community. Therefore, these interventions were aimed at recording alcohol use, smoking control, implementation of a low-fat and low-salt diet, information on causes, risk factors, symptoms, and prevention of stroke, sleep, emergency treatment, and management of emotions and complications of the disease⁽¹⁹⁾.

The mobile app allows patients to convey their condition through voice recordings, words, or images, which healthcare professionals use to clarify their questions and provide solutions.

The benefits of the mobile app described in the article⁽²³⁾ are related to identifying stroke risks, managing mood swings, and the importance of repeatedly practicing specific activities, setting joint goals centered on the patient, caregiver, and nurse, and planning discharge with a focus on rehabilitation.

Category 4 - Mobile application for evaluating the effectiveness of care provided by nurses

Two studies examined the use of mobile applications for evaluating nursing care^(20,23).

DISCUSSION

This research has shown that there are gaps in mobile applications designed for nurses caring for elderly people after a stroke, highlighting the need for further exploration of this field of nursing research.

The results of this study reveal that technological resources, in the form of applications, can be long-term solutions for nursing professionals in caring for elderly people after stroke, in managing physical sequelae, encouraging self-care activities, controlling chronic diseases such as hypertension, and setting goals for the recovery of the elderly⁽²⁴⁾.

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From different perspectives involving the theme, a systematic review with meta-analysis found seven studies that reported measures to ensure adherence to mobile-based interventions, in which mobile applications for stroke survivors mainly covered three areas: rehabilitation, education, and self-care⁽¹¹⁾.

In this regard, recent findings from a scoping review that evaluated the performance of nurses in the development and implementation of mobile health applications postulate this. The analysis was based on 157 articles that converge on the limited and incipient performance of these professionals, contrasting with the profound and broad knowledge of the class in different health spaces⁽²⁵⁾.

In analyzing the studies selected for this review, it was found that the research predominantly addressed nursing care based on mobile applications for the functional rehabilitation of elderly people affected by stroke, with an emphasis on mobility, motor function, and activities focused on self-care.

A review study presented in its results that continuous nursing care using mobile health technology can promote more satisfactory functional recovery of the upper limbs in people who have had a stroke, compared to usual rehabilitation care, in addition to improving the performance of these individuals in performing daily activities and self-care⁽²⁶⁾.

The analysis of the evidence allowed us to point out, regarding the use of a mobile application focused on the motor function of the studied population, that care consisted of guidance through videos on rehabilitation exercises with an emphasis on functional training for proper posture, changing position, sitting and turning in bed, correct mobility of the upper limbs, as well as exercises for balance in a sitting position.

A randomized study conducted with Irish patients showed that interventions based on an exercise program made available through mobile platforms can be effective in helping the physical progression of individuals affected by stroke⁽²⁷⁾.

Mobile apps focused on healthcare aimed at restoring posture and balance at home have shown positive results in increasing, especially, the balance capacity of elderly people after a stroke⁽²⁸⁻²⁹⁾.

In this context, despite the relevance of mobile applications as a tool to assist the functional system, a study in this review showed that the use of this technology did not provide

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support for nurses in improving the physical conditions of patients. This finding corroborates data from a study that, despite the innovation proposed by mHealth technology, the results related to the improvement in functional mobility of subjects who received the intervention were not statistically significant⁽³⁰⁾.

Evidence identified in this study also addressed that the main content included in mobile applications was designed to support nurses in mobility assistance, focusing on transfer activities, going up and down stairs, and self-care activities, as a way to minimize dysfunctions resulting from stroke.

An intervention study on the applicability of mobile technology revealed that 97% of participants considered smartphone-enabled educational technology to be relevant and effective in the stroke rehabilitation process and in providing information related to self-care⁽³¹⁾.

Category two elucidated in this review showed that mobile applications are favorable for nurses who applied mobile technology for home care in monitoring elderly hypertensive patients, since they allow for more effective control of this disease. The results demonstrated the potential for self-monitoring of BP and adherence to pharmacological treatment^(19,21).

The results of a post-technological intervention described as “PINGS” discussed the quality of the mobile application to assist nurses in controlling and self-monitoring Blood Pressure (BP) after stroke. The data presented showed that the use of such technology resulted in better adherence to disease treatment among individuals in the intervention group⁽³²⁾.

This information converges with the result⁽¹⁹⁾, which proved that daily BP recording and noting medication times and dosages using mHealth positively influence disease management.

The feasibility and signs of improvement in BP control among stroke survivors through mHealth intervention can be seen⁽³³⁾. It is also noteworthy that there were changes in the level of adherence to drug treatment, improvement in dietary care, stress management, awareness of the disease, and greater self-perception of health in relation to hypertension monitoring.

Similarities were found in smartphone technology as an intervention proposal for medication adherence, lifestyle and behavioral changes, and control of vascular risk factors⁽³⁴⁾. Text messages, such as health reminders, are also incorporated into the functional requirements of the applications to optimize the assistance of health professionals for daily monitoring of blood pressure and drug dosage for blood pressure control.

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Systematically compiled data have shown that mobile applications can integrate multiple functions related to hypertension care, such as health education, medication adherence, BP records, and alerts to remind patients of medication schedules and dosages⁽³⁵⁻³⁶⁾.

Regarding category three of this review, it was found that there are numerous benefits of mobile applications for self-management of nursing care for elderly people after stroke. One study mapped in this review stood out, focusing on quality of life and self-efficacy. In the context of this category, positive implications were identified for the self-management of emotional, social, and physiological functions and general health conditions.

In line with the results presented in this study, a mobile application developed for primary care aimed to improve the health status of patients after stroke. The technology was designed to monitor the individual's clinical condition, record health history, and send voice messages with guidance on lifestyle changes and behaviors that are inappropriate for health⁽³⁷⁾.

The functional composition of the mobile application for self-management found in the results of this research contained a module described as health information, which in turn consisted of aspects related to stroke, in addition to signs and symptoms, risk factors, rest, diet, smoking, alcoholism, prevention, and causes of the disease.

From this perspective, an intervention program using a mobile app included specific content such as information on diet and health, risk factors for stroke, balanced daily life, adoption of healthy habits, relaxation activities, and self-management sessions to achieve new goals, self-knowledge, and social relationships⁽³⁸⁾.

The mobile app was developed with a version that records daily activities and events related to health, such as physical activity, duration, and types of physical exercise, tobacco and alcohol consumption, and eating habits⁽³⁸⁾.

A qualitative study found that the main functional requirements identified in a mobile app for self-management of stroke patients were related to quality of life⁽³⁹⁾.

As discussed in the third category of this review, another study also looked at the use of mobile apps based on promoting good nutrition, reducing foods high in sodium and fat, focusing on minimizing risk factors, paying attention to sleep quality and rest, practicing physical and leisure activities, preventing depressive symptoms, reducing stress, understanding the patient's

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physical and emotional symptoms, defining and explaining the disease, explaining rehabilitation, and encouraging participation in treatment⁽³⁹⁾.

Communication between the professional team and patients can be established through voice messages, text messages, and videos, in which individuals are able to report questions and express their perceptions of the application and the provision of care.

Among the positive results involving mobile devices, the fourth category of this study highlighted a finding that used a mobile application to assess the effectiveness of nursing care in the intra-hospital and post-hospital rehabilitation process of patients disabled by stroke.

Another noteworthy finding refers to a study conducted in China, which aimed to investigate the feasibility and accuracy of functional monitoring using videoconferencing embedded in an application. The tests concluded that mobile technology is effective in guiding patients' functional outcomes after hospital discharge⁽⁴⁰⁾.

Although the topic investigated is important, the incipient nature of research in the area did not allow for more in-depth comparisons, as the number of studies is still superficial, especially in the national context. Therefore, it is necessary to develop more research on the topic, seeking a broader overview of evidence that can contribute to the field of nursing.

CONCLUSION

The development of mobile applications for healthcare assistance to individuals who have suffered a stroke has grown exponentially in different areas and clinical contexts. However, there is a gap in publications developed for nursing care, especially interventions aimed at the elderly population after a stroke.

This review verified the significance of mobile applications for nursing professionals, both for providing care in a hospital and home setting. It also concluded that the interventions proposed by these technologies are not limited to a single purpose, as they are capable of assisting nurses throughout the rehabilitation process of the elderly and offering support to family caregivers.

Furthermore, with the aging of the population, it is important to conduct more studies involving mobile applications for nursing professionals in the care of elderly stroke survivors.

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Given these findings, it is recommended that future research advance the development and validation of specific mobile applications for nursing practice, focused on the rehabilitation and monitoring of the elderly population after stroke. In addition, it is suggested that these technologies be incorporated into clinical guidelines and public health policies to foster innovation in care and improve health outcomes for this growing population.

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Deyvylan Araujo Reis: Data analysis; writing and critical review of content; approval of the final version of the manuscript.

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