

Recommendations for home blood pressure self-monitoring: a scoping review protocol

Recomendações para o automonitoramento domiciliar da pressão arterial: protocolo de revisão de escopo

Recomendaciones para el autocontrol domiciliario de la presión arterial: protocolo de revisión del alcance

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ABSTRACT

Objective: to map available recommendations on home blood pressure self-monitoring by people with hypertension. **Method:** a scoping review protocol, following the JBI methodology and the PRISMA-ScR checklist. Searches will be conducted in the PubMed/MEDLINE, Scopus, Web of Science, Embase, Cochrane, Science Direct, CINAHL, SciELO, LILACS, and BDNF databases. Primary studies, reviews, consensus statements, and expert guidelines addressing the topic of interest, with full text available, published from 2020 onwards, in any language, will be included. Two independent researchers will carry out the study search, screening, selection, and analysis. **Results:** mapping recommendations on home blood pressure self-monitoring will make it possible to provide relevant information to assist healthcare professionals and patients in the correct and accurate implementation of this hypertension management strategy. Furthermore, it can support the development of protocols, interventions, and educational technologies that train clients on the necessary care in operationalizing this method. **Conclusion:** the mapped scientific evidence may benefit healthcare professionals and patients, encouraging greater adherence to blood pressure self-monitoring in daily care and prompting rigorous adherence to recommended best practices for this procedure.

Keywords: Hypertension; Arterial Pressure; Blood Pressure Determination; Self-Management; Guideline.

RESUMO

Objetivo: mapear as recomendações disponíveis sobre o automonitoramento domiciliar da pressão arterial pela pessoa com hipertensão. **Método:** protocolo de revisão de escopo, que seguirá a metodologia do JBI e o *checklist* PRISMA-ScR. As buscas serão realizadas nas bases de dados PubMed/MEDLINE, Scopus, Web of Science, Embase, Cochrane, Science Direct, CINAHL, SciELO, LILACS e BDNF. Serão incluídos estudos primários, revisões, consensos e guias de especialistas que tratem do tema de interesse, com texto integral disponível na íntegra, publicados a partir de 2020, em qualquer idioma. Dois pesquisadores independentes realizarão o processo de busca, triagem, seleção e análise dos estudos. **Resultados:** o mapeamento das recomendações sobre o automonitoramento domiciliar da pressão arterial possibilitará disponibilizar informações relevantes que auxiliem os profissionais de saúde e pacientes na realização correta e acurada desta estratégia de gerenciamento da hipertensão. Ademais, poderão subsidiar a construção de protocolos, intervenções e tecnologias educacionais que capacitem a clientela quanto aos cuidados necessários na operacionalização desse método. **Conclusão:** as evidências científicas mapeadas poderão beneficiar profissionais de saúde e pacientes, estimulando maior adesão ao automonitoramento da pressão arterial no cotidiano de cuidados e instigando o seguimento rigoroso das boas práticas recomendadas para esse procedimento.

Descritores: Hipertensão; Pressão Arterial; Determinação da Pressão Arterial; Autogestão; Guia de Prática Clínica.

RESUMEN

Objetivo: identificar las recomendaciones disponibles sobre el autocontrol domiciliario de la presión arterial en personas con hipertensión. **Método:** protocolo de revisión exploratoria, siguiendo la metodología del JBI y la lista de verificación PRISMA-ScR. Se realizarán búsquedas en las bases de datos PubMed/MEDLINE, Scopus, Web of Science, Embase, Cochrane, Science Direct, CINAHL, SciELO, LILACS y BDNF. Se incluirán estudios primarios, revisiones, declaraciones de consenso y guías de expertos que aborden el tema de interés, con texto completo disponible, publicados a partir de 2020, en cualquier idioma. Dos investigadores independientes realizarán la búsqueda, el cribado, la selección y el análisis de los estudios. **Resultados:** el mapeo de recomendaciones sobre el autocontrol de la presión arterial en el hogar permitirá proporcionar información relevante para ayudar a los profesionales de la salud y a los pacientes a implementar de forma correcta y precisa esta estrategia de manejo de la hipertensión. Además, puede respaldar el desarrollo de protocolos, intervenciones y tecnologías educativas que capaciten a los pacientes sobre los cuidados necesarios para implementar este método. **Conclusión:** la evidencia científica mapeada puede beneficiar a los profesionales de la salud y a los pacientes, fomentando una mayor adherencia al autocontrol de la presión arterial en el cuidado diario y promoviendo una adherencia rigurosa a las mejores prácticas recomendadas para este procedimiento.

Descriptores: Hipertensión; Presión Arterial; Determinación da Pressão Arterial; Automanejo; Guía de Práctica Clínica.

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Introduction

Home blood pressure (BP) monitoring, also known as home BP self-monitoring or self-measured blood pressure (SMBP), is an increasingly popular practice. It is a relevant and viable strategy for screening, diagnosing, managing, and monitoring hypertension, especially when patients are properly instructed and monitored by the healthcare team, provide feedback to professionals, and adhere adequately to treatment¹⁻³.

National and international guidelines have recommended the adoption of home BP self-monitoring as a comprehensive part of hypertension diagnosis. This procedure has proven more effective in predicting cardiovascular events than measuring BP in the doctor's office^{2,4-6}.

Furthermore, there is evidence that this approach contributes to improved adherence to antihypertensive treatment and better control of hypertension. This is justified because such a strategy allows for patients' active participation and engagement in the healthcare process, encouraging the adoption of self-care behaviors^{2,5,7}.

This procedure offers several advantages, such as better diagnostic definition of hypertension, aiding in the identification of conditions like masked hypertension and white coat hypertension. Furthermore, it contributes to patient monitoring and can be combined with telemonitoring. Other key benefits include the potential for reducing the number of appointments and the use of antihypertensive medications, digital data storage, the ability to take several BP measurements outside the doctor's office, a decrease in the alert response associated with clinical BP measurement (since it takes place in the comfort of patients' homes), and good patient acceptance^{5,8}.

However, it can present disadvantages that require continuous professional supervision. Among these, we can mention the use of uncalibrated devices, the use of an inappropriately sized cuff, incorrect measurement technique, the induction of anxiety in patients, the risk of unsupervised changes in treatment, and self-medication^{3,5,8-9}. Nevertheless, it generally does not follow a specific pre-established protocol, often being performed randomly, according to patients' own decisions or after a doctor's request².

Therefore, it is important to emphasize the importance of patients being properly trained and continuously monitored by healthcare professionals. When properly trained and supported, patients can take accurate BP measurements, provide feedback to professionals, and achieve better control of their hypertension^{2,10}.

Therefore, in order for healthcare professionals to provide personalized training to patients on performing SMBP, it is necessary to understand the recommendations for carrying out this self-management procedure for hypertension. Furthermore, they must be

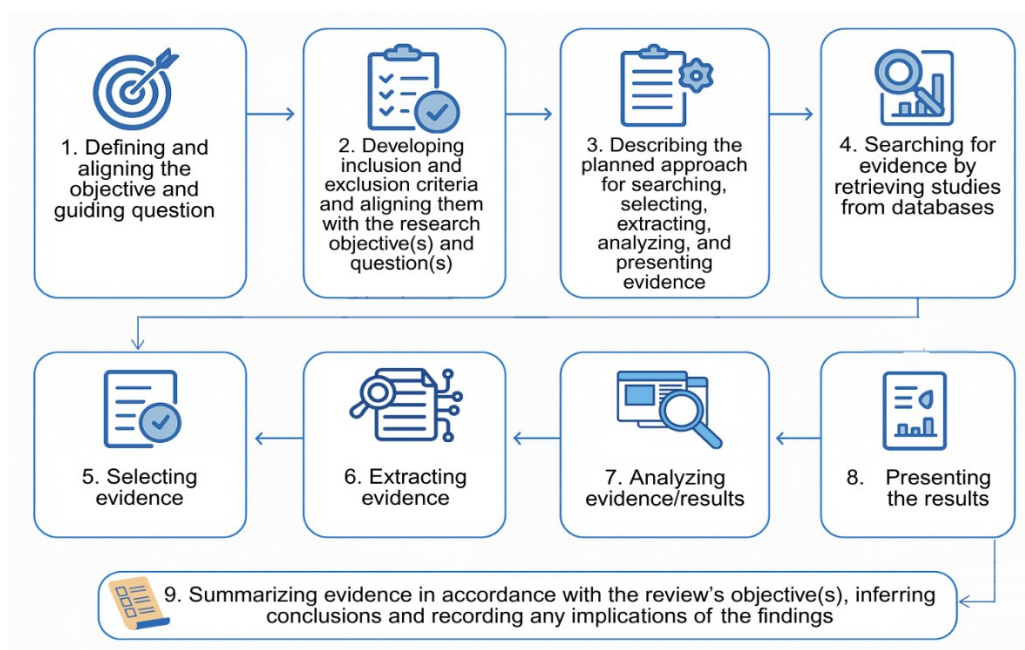
aware of and understand SMBP's relevance as a strategic component in the diagnosis, management, and long-term follow-up of this disease, supporting patients in performing this procedure.

There are several international recommendations, adapted to different contexts, for carrying out this procedure. However, it is necessary to synthesize and integrate these materials to facilitate their interpretation and use by healthcare professionals. Thus, mapping studies, guidelines, and consensus statements on home BP self-monitoring can provide support to these professionals in decision-making and in providing health education actions for people with hypertension regarding the implementation of this self-care strategy.

It is important to highlight the scarcity of review studies addressing this topic. After preliminary searches on platforms, libraries, and online journals such as Open Science Framework (OSF), PubMed/MEDLINE, and JBI Evidence Synthesis, no reviews of similar scope or study protocols were identified. Thus, the objective is to map available recommendations on home BP self-monitoring by people with hypertension.

Method

This is a scoping review protocol duly registered on the OSF platform (<https://osf.io/8m2ye/>; DOI 10.17605/OSF.IO/8M2YE). The development of this review will follow the JBI recommendations¹¹⁻¹². The Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews (PRISMA-ScR) checklist will also be used to assist in reporting the study¹³. Thus, the nine stages described in Figure 1 will be followed:



Source: adapted from Peters *et al.* (2020)¹¹.

Figure 1 – Scoping review stages according to JBI recommendations. Redenção (CE), Brazil, 2025.

In accordance with recommendations for conducting scoping reviews, a team was assembled with researchers experienced in developing this type of review, as well as in the topic of hypertension¹⁴⁻¹⁵. The research team will conduct the process of searching, selecting, analyzing, interpreting, and discussing the identified evidence.

The following describes the first three stages of conducting this review, with the third stage presenting the planned approaches for the activities that comprise the remaining stages.

Stage 1 - Defining and aligning the objective and guiding question

The objective was defined as mapping, in the scientific literature, the recommendations for home BP self-monitoring by people with hypertension. Therefore, the research question was developed according to the Population, Concept, and Context (PCC) strategy¹¹, considering: Population (P): people with hypertension; Concept (C): recommendations for home BP self-monitoring; and Context (C): patients' homes.

Thus, the following research question was defined: what recommendations are available regarding home BP self-monitoring by people with hypertension?

Stage 2 - Developing inclusion and exclusion criteria

In this stage, according to the research question, the review's objective, and the PCC strategy, the following eligibility criteria were defined:

- Inclusion criteria: studies addressing the "Concept" related to recommendations for BP self-monitoring in the "Context" at home, with the "Population" being people with hypertension. Primary studies, reviews, consensus statements, and expert guidelines with full text available and published in any language will be included. It is worth noting that attempts will be made to retrieve studies with unavailable full text by contacting the original authors. The year 2020 will be adopted as the time frame, considering the last statement from the American Heart Association regarding BP self-monitoring at home published in 2020.⁴ This will make it possible to map the most recent recommendations regarding this procedure.
- Exclusion criteria: theses, dissertations, monographs, reflection studies, proceedings of scientific events, study protocols, and duplicate publications. Studies dealing with populations such as pregnant women, children, and adolescents will be excluded.

Stage 3 - Describing the planned approach for searching, selecting, extracting, analyzing, and presenting evidence

Databases and search strategies

The search for studies will be conducted in the following databases: Medical Literature Analysis and Retrieval System Online (PubMed/MEDLINE), Scopus, Web of Science (WoS), Embase, Cochrane Library, Science Direct, Cumulative Index to Nursing and Allied Health Literature (CINAHL), Scientific Electronic Library Online (SciELO), *Literatura Latino-Americana e do Caribe em Ciências da Saúde* (LILACS), and *the Base de Dados em Enfermagem* (BDENF). Access to these databases will be through the Federated Academic Community of the Coordination for the Improvement of Higher Education Personnel's Journals Portal platform.

To retrieve studies from the literature, search strategies will be defined using controlled and alternative terms from the Health Sciences Descriptors, Medical Heading Subjects, Emtree Headings (Embase Headings), and CINAHL Headings, as well as keywords identified through prior reading of studies on the topic, in order to compose comprehensive search strategies¹⁶⁻¹⁷.

It is pertinent to mention that descriptors related to the home context were not used, aiming not to restrict the search. Furthermore, this is justified because the alternative terms related to self-monitoring/SMBP encompass home environments. Thus, the search strategies described in Chart 1 were defined.

Chart 1 – Databases and search strategies. Redenção (CE), Brazil, 2025.

Database	Search strategies
PubMed/ MEDLINE, WoS, and Cochrane	(Hypertensives OR "Hypertensive Patient" OR "Hypertensive Patients" OR Hypertension OR "High Blood Pressure" OR "High Blood Pressures" OR "Blood Pressure" OR "Arterial Pressure" OR "Arterial Pressures" OR "Arterial Tension" OR "Arterial Tensions" OR "Arterial Blood Pressure" OR "Arterial Blood Pressures") AND ("Health Planning Guidelines" OR "Health Planning Guideline" OR "Guidelines for Health Planning" OR "Health Planning Recommendation" OR "Health Planning Recommendations" OR Recommendations OR Guidelines OR "Guidelines as Topic" OR "Practice Guideline") AND ("Self-measurement of Blood Pressure" OR "Home Blood Pressure Self-Measurement" OR "Home Blood Pressure Measurement" OR "Home BP Measurement" OR "Home BP Monitoring" OR "Home Blood Pressure" OR "Home Blood Pressure Monitoring" OR "Blood Pressure Monitoring, Home" OR "Blood Pressure Monitoring, Self" OR "Self Blood Pressure Monitoring" OR "Blood Pressure Self-Measurement" OR "Home Blood Pressure Self-Monitoring" OR "Out-of-Office Blood Pressure Measurement")
Embase and Scopus	(Hypertensives OR "Hypertensive Patient" OR "Hypertensive Patients" OR Hypertension OR "Arterial Hypertension" OR "HTN (hypertension)" OR "Systemic Hypertension" OR "High Blood Pressure" OR "High Blood Pressures" OR "Blood Pressure" OR "Arterial Pressure" OR "Arterial Pressures" OR "Arterial Tension" OR "Arterial Tensions" OR "Arterial Blood Pressure" OR "Arterial Blood Pressures" OR "Artery Blood Pressure" OR "Systemic Arterial Pressure") AND ("Health Planning Guidelines" OR "Health Planning Guideline" OR "Health Care Planning" OR "Guidelines for Health Planning" OR "Health Planning Recommendation" OR "Health Planning Recommendations" OR Recommendations OR Guidelines OR "Guidelines as Topic" OR "Practice Guideline" OR "Clinical Practice Guideline" OR "Clinical Practice Guideline" OR "Medical Guideline") AND ("Self-measurement of Blood Pressure" OR "Home Blood Pressure Self-Measurement" OR "Home Blood Pressure Measurement" OR "Home BP Measurement" OR "Home BP Monitoring" OR "Home Blood Pressure" OR "Home Blood Pressure Monitoring" OR "Blood Pressure Monitoring, Home" OR "Blood Pressure Monitoring, Self" OR "Self Blood Pressure Monitoring" OR "Blood Pressure Self-Measurement" OR "Home Blood Pressure Self-Monitoring" OR "Out-of-Office Blood Pressure Measurement")
Science Direct	("Hypertensive Patients" OR Hypertension OR "Arterial Pressure") AND ("Health Planning Guidelines" OR "Health Planning Recommendations" OR Guidelines) AND ("Home Blood Pressure Self-Measurement" OR "Self Blood Pressure Monitoring" OR "Home Blood Pressure Monitoring")
SciELO, LILACS, and BDENF	(Hypertensives OR "Hypertensive Patient" OR "Hypertensive Patients" OR Hypertension OR "High Blood Pressure" OR "Blood Pressure" OR "Arterial Pressure" OR "Arterial Tension" OR "Arterial Blood Pressure") AND ("Health Planning Guidelines" OR "Health Planning Guideline" OR "Guidelines for Health Planning" OR "Health Planning Recommendation" OR "Health Planning Recommendations" OR Recommendations OR Guidelines OR "Practice Guideline") AND ("Self-measurement of Blood Pressure" OR "Home Blood Pressure Self-Measurement" OR "Home Blood Pressure Measurement" OR "Home Blood Pressure" OR "Home blood Pressure Monitoring" OR "Blood Pressure Monitoring, Home" OR "Blood Pressure Monitoring, Self" OR "Self Blood Pressure Monitoring" OR "Blood Pressure Self-Measurement" OR "Home Blood Pressure Self-Monitoring" OR "Out-of-Office Blood Pressure Measurement")

CINAHL	(Hypertensives OR "Hypertensive Patient" OR "Hypertensive Patients" OR Hypertension OR "High Blood Pressure" OR "Blood Pressure" OR "Arterial Pressure" OR "Arterial Blood Pressure") AND ("Practice Guideline" OR "Clinical Practice Guidelines" OR "Practice Guideline" OR "Health Planning Guidelines" OR "Health Planning Guideline" OR "Guidelines for Health Planning" OR "Health Planning Recommendation" OR "Health Planning Recommendations" OR Guidelines) AND ("Self-measurement of Blood Pressure" OR "Home Blood Pressure Self-Measurement" OR "Home Blood Pressure Measurement" OR "Home Blood Pressure" OR "Home blood Pressure Monitoring" OR "Blood Pressure Monitoring, Home" OR "Blood Pressure Monitoring, Self" OR "Self Blood Pressure Monitoring" OR "Blood Pressure Self-Measurement" OR "Home Blood Pressure Self-Monitoring" OR "Out-of-Office Blood Pressure Measurement")
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A planned approach for the search, selection, and extraction of evidence

The process of searching, screening, selecting, and analyzing studies will be operationalized with the aid of Rayyan software. It is important to highlight that the search and selection process will be conducted by two independent researchers. Any disagreements will be resolved by a third researcher. A PRISMA-ScR flowchart will be constructed containing the search results, as well as the justifications for the exclusion of studies.

The studies identified in the databases will initially be exported to Rayyan, which will identify and exclude duplicates. Subsequently, the two independent researchers will perform an initial screening of articles by reading titles and abstracts, considering the eligibility criteria.

After this stage, the identified eligible studies will be read and analyzed in full. From these, those that meet the inclusion criteria and answer the research question will be selected, thus forming the final sample for the review. These will then undergo a further reading and complete analysis.

Two independent reviewers will extract data using a semi-structured instrument (Chart 2), composed of the following variables: title; author(s); journal; country of origin; year of publication; objective(s); study design; and the main results regarding recommendations for home BP self-monitoring (information will be gathered on the indications for this procedure, the step-by-step process for a hypertensive patient to perform it, and the precautions they should take after self-medicating their BP; professionals' responsibilities in monitoring/assessing patients during the procedure). It is important to highlight that the semi-structured instrument will be previously tested on a sample of the different types of sources included, aiming to verify its ability to adequately capture the methodological specificities and evidence from each type of source. If necessary, adjustments will be made before the final data extraction.

After the data is extracted by the two researchers, the results will be compared to verify the consistency of the information gathered. In cases of disagreement, a third reviewer will reach a final consensus.

Chart 2 - Semi-structured instrument for data extraction from studies included in the scoping review. Redenção (CE), Brazil, 2025.

Descriptive data from the studies	
Title	
Author(s)	
Year of publication	
Country of origin	
Journal	
Objective(s)	
Reference	
Study design	
Main findings of the review on recommendations for home blood pressure self-monitoring	
Indications for blood pressure self-monitoring	
Recommendations on the step-by-step process for self-monitoring blood pressure	
Post-procedure care	
Responsibilities of healthcare professionals	

Analysis, synthesis, and presentation of evidence

The evidence gathered from study analysis will be analyzed descriptively, providing a narrative summary of the main findings. It will also be synthesized and organized into tables (Charts 3 and 4) and illustrative figures, aiming to aid in understanding the findings and making inferences¹⁸. Based on data analysis, interpretations of results will be provided, highlighting their implications and recommendations for practice, as well as suggestions for future studies, which may be conducted using different research methods.

Chart 3 – Chart for presenting descriptive data from the studies. Redenção (CE), Brazil, 2025.

n	Author(s)/year	Title	Objectives	Periodical/country	Study design
A1					
A2					

Chart 4 – Table presenting recommendations for self-monitoring of blood pressure at home identified in the studies. Redenção (CE), Brazil, 2025.

Articles	Recommendations
	Indications for blood pressure self-monitoring
A1, A2...	
	Step-by-step guide to self-monitoring blood pressure
A1, A2...	
	Post-procedure care
A1, A2...	
	Healthcare professionals' responsibilities
A1, A2...	

Results

It is expected that the results of this scoping review will contribute to the availability of relevant and reliable information to assist healthcare professionals and patients with hypertension in performing home BP self-monitoring. It is also expected to raise awareness among these individuals regarding this procedure and encourage adherence to best practices in home BP self-monitoring, aiming to follow the correct technique, obtain reliable measurements, and achieve better health outcomes, such as rigorous control of hypertension and prevention of health complications.

Furthermore, it is believed that the mapped evidence may support the development of protocols for home BP self-monitoring and provide a basis for the development of educational strategies and technologies that can be implemented in various healthcare settings for people with hypertension, especially in Primary Health Care. In Primary Health Care, healthcare professionals have closer therapeutic relationships and perform continuous, longitudinal, and comprehensive care practices for clients affected by this chronic condition.

Discussion

Although home BP self-monitoring is recognized as useful and valuable in screening, managing, and continuously monitoring people with hypertension, many healthcare professionals still do not recommend it, do not use it in clinical practice, or do not provide guidance to patients¹⁹⁻²⁰. In this context, errors are common and frequent when patients perform this procedure, which can, worryingly, lead to inaccurate measurements, ineffective hypertension control, and the occurrence of adverse cardiovascular outcomes²¹⁻²².

In this regard, research conducted in Poland identified significant discrepancies in the values obtained in patients' SMBP, compared to those obtained by researchers²¹. Furthermore, the literature points to several recurring errors in the operationalization of the procedure. Among these errors, the following stand out: inadequate interval between meals;

exercises and BP measurements; incorrect placement of the cuff; not supporting the back; measurement on the wrong upper limb; keeping legs crossed; conversations during measurement; use of uncalibrated equipment; and failure to record the BP values obtained^{21,23-24}. A Brazilian study also showed an association between BP self-monitoring and problems such as uncontrolled hypertension, anxiety, and self-medication²⁵.

Therefore, strategies based on current protocols, aimed at empowering patients to perform home BP self-monitoring, are urgent and necessary, especially considering the increasing incorporation of this practice into the daily lives of people with hypertension, particularly with the use of digital oscillometric devices. Thus, considering that BP measurement accuracy is essential for decision-making and effective hypertension management, care and procedures similar to those adopted in the clinical setting should be implemented in the home context for BP self-monitoring².

Given the numerous guidelines existing globally, it is emphasized that understanding, gathering, and integrating current recommendations regarding this procedure and carefully implementing them in clinical practice can help obtain accurate BP readings at home. From this perspective, scoping review was the method chosen to answer the objective proposed in this study, considering that this type of evidence synthesis has been increasingly incorporated as a comprehensive part of clinical practice guideline development processes, contributing to evidence-based practice^{11,14}.

Therefore, scoping presents itself as a coherent methodological strategy, since it allows for the broad, rigorous, and systematic mapping of evidence to be adopted in professional practice. Furthermore, by allowing answers to specific research questions and objectives, it will provide an opportunity to verify the breadth and/or coverage of the topic in the literature²⁶⁻²⁷. In this way, it will be possible to elucidate relevant contextual factors in order to provide relevant recommendations for the implementation and monitoring of care strategies, policies, and actions for prevention, promotion, and health education on the subject in question¹⁴.

To that end, strict alignment with the methodology proposed by JBI, as well as with other consolidated frameworks that guide the operationalization of scoping reviews, will enable the availability of reliable, transparent, and applicable findings in different contexts. Researchers emphasize that establishing clear goals, objectives, and research questions is essential for developing a coherent and transparent scoping review. Furthermore, this structured protocol will help clarify the types of studies eligible for review, the screening and selection process, search strategies, and methods for synthesizing and analyzing the evidence to be incorporated²⁷.

Furthermore, careful planning of team composition will allow for the utilization and combination of relevant knowledge, skills, and experiences to successfully conduct and complete the scoping review. This aspect is relevant for managing the workload, reducing errors and biases in interpretation, achieving methodological rigor, and enabling the findings to contribute significantly to the field of study^{15,28}.

In light of the above, it is expected that the findings of this study will contribute to the synthesis and standardization of recommendations regarding home BP self-monitoring, promoting the widespread adoption of this procedure in the daily care of hypertension, reducing errors and health complications related to it, improving health education actions, and enhancing patient adherence to self-care and self-management behaviors for hypertension.

Conclusion

This scoping review will map the scientific evidence on home BP self-monitoring by people with hypertension. Its findings may expand knowledge on this topic, informing insights for future research and structured educational interventions. Furthermore, it is expected that the findings will benefit both healthcare professionals and patients by encouraging greater adherence to this procedure in daily hypertension care and promoting rigorous adherence to recommended guidelines. These efforts will enable greater effectiveness in the use of this method and the achievement of satisfactory health outcomes.

Authors Contributions

Conception of this study: Francisco Marcelo Leandro Cavalcante, Ana Caroline da Silva Estácio e Livia Moreira Barros. **Data collection:** Francisco Marcelo Leandro Cavalcante, Ana Caroline da Silva Estácio e Lara Rebeca Marcelino do Carmo. **Data analysis and interpretation:** Francisco Marcelo Leandro Cavalcante, Ana Caroline da Silva Estácio e Lara Rebeca Marcelino do Carmo. **Writing of the manuscript:** Francisco Marcelo Leandro Cavalcante, Francisca Carla dos Angelos Santos, Thamires Sales Macedo, Antonio Aglailton Oliveira Silva e Kaio Gilvanilson Marques de Oliveira. **Critical review of the manuscript:** Francisco Marcelo Leandro Cavalcante, Francisca Carla dos Angelos Santos, Thamires Sales Macedo, Antonio Aglailton Oliveira Silva, Kaio Gilvanilson Marques de Oliveira e Livia Moreira Barros. **Approval of the final version of the article:** Francisco Marcelo Leandro Cavalcante, Francisca Carla dos Angelos Santos, Thamires Sales Macedo, Antonio Aglailton Oliveira Silva e Kaio Gilvanilson Marques de Oliveira.

Conflict of interest

The authors declare that there is no conflict of interest.

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