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UTILIZAÇÃO DE *SMARTPHONES* POR ESTUDANTES DE ENFERMAGEM NA PRÁTICA CLÍNICA: PROTOCOLO DE UMA *SCOPING REVIEW*

SMARTPHONE USE BY NURSING STUDENTS IN CLINICAL PRACTICE: A SCOPING REVIEW PROTOCOL

USO DE *SMARTPHONES* POR ESTUDIANTES DE ENFERMERÍA EN LA PRÁCTICA CLÍNICA: PROTOCOLO DE *SCOPING REVIEW*

Vitor Sérgio de Oliveira Parola[1]
Susana Maria da Silva Gaspar[2]
Hugo Leiria Neves[3]
Rui Filipe Lopes Gonçalves[4]
Isabel de Jesus Oliveira[5]

[1]Escola Superior de Enfermagem de Coimbra, Unidade de Investigação em Ciências da Saúde: Enfermagem (UICISA: E) (vitorparola@esenfc.pt) | https://orcid.org/0000-0002-0050-5004
[2]Escola Superior de Enfermagem de Coimbra, Unidade de Investigação em Ciências da Saúde: Enfermagem (UICISA: E) (susanagaspar@esenfc.pt) | https://orcid.org/0000-0002-0494-6771
[3]Escola Superior de Enfermagem de Coimbra, Unidade de Investigação em Ciências da Saúde: Enfermagem (UICISA: E) (hugoneves@esenfc.pt) | https://orcid.org/0000-0002-6843-6228
[4]Escola Superior de Enfermagem de Coimbra, Unidade de Investigação em Ciências da Saúde: Enfermagem (UICISA: E) (rgoncalves@esenfc.pt) | https://orcid.org/0000-0002-7086-1776
[5]Escola Superior de Enfermagem de Coimbra, Unidade de Investigação em Ciências da Saúde: Enfermagem (UICISA: E) (ijoliveira12@esenfc.pt) | https://orcid.org/0000-0001-6627-3907

Corresponding Author
Isabel de Jesus Oliveira
ijoliveira12@esenfc.pt
Avenida Bissaya Barreto, S/n
3004-011 Coimbra, Portugal

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RESUMO

Introdução: Os *smartphones* tiveram um grande impacto nos cuidados de saúde e na educação, incluindo a enfermagem, resultado da COVID-19. Tal conduziu a métodos de aprendizagem mais flexíveis e inovadores. No entanto, é necessário compreender o impacto e a extensão da utilização de smartphones no ensino teórico e clínico.

Objetivo: Explorar e mapear a evidência sobre como os estudantes de enfermagem utilizam os smartphones na prática clínica, centrando-se no seu papel como estratégia alternativa ou de apoio ao processo de ensino-aprendizagem.

Métodos: Orientado pela metodologia do Instituto Joanna Briggs para scoping reviews, serão pesquisadas bases de dados eletrónicas relevantes e literatura cinzenta, utilizando termos como "utilização de *smartphones*", "estudantes de enfermagem", "prática clínica" e "processo de ensino-aprendizagem". A revisão incluirá diferentes desenhos de estudo, incluindo investigação quantitativa, qualitativa e de métodos mistos e revisões sistemáticas.

Resultados: Espera-se que os resultados contribuam para explorar as formas multifacetadas como os estudantes de enfermagem utilizam os smartphones em contextos clínicos, centrando-se na identificação de potenciais benefícios, desafios e resultados associados à sua utilização.

Conclusão: Os achados poderão contribuir para melhorar os métodos de ensino, aumentar a participação dos estudantes e enfrentar os desafios da aprendizagem à distância, assim como identificar lacunas e orientar investigação futura. Este protocolo está registado no *Open Science Framework*.

Palavras-chave: aprendizagem; tecnologia sem fio; estudantes de enfermagem; *smartphone*; ensino

ABSTRACT

Introduction: Smartphones have greatly impacted healthcare and education. Due to COVID-19, digital technologies have accelerated in nursing education, leading to more flexible and innovative learning methods. However, further research is needed to understand the impact and extent of smartphone usage in clinical training and education.

Objective: To explore and map the existing evidence on how nursing students utilize smartphones in clinical practice, focusing on their role as an alternative or supportive strategy to the teaching-learning process.

Methods: Guided by the Joanna Briggs Institute's methodology for scoping reviews, this study will search relevant electronic databases and grey literature, employing terms such as "smartphone use," "nursing students," "clinical practice," and "teaching-learning process." The review will include various study designs, including quantitative, qualitative, and mixed-methods research and systematic reviews.

Results: The findings are anticipated to contribute to exploring the multifaceted ways nursing students are anticipated to employ smartphones in clinical settings, focusing on identifying potential benefits, challenges, and outcomes associated with their use.

Conclusion: Smartphone usage in nursing education can yield insights to enhance teaching methods, increase student engagement, and address remote learning challenges. Findings can identify research gaps and guide future studies. This protocol is registered in the Open Science Framework.

Keywords: learning; wireless technology; nursing students; smartphone; teaching

RESUMEN

Introducción: Los *smartphones* han tenido una gran repercusión en la atención sanitaria y la educación, incluida la enfermería, gracias a COVID-19. Esto ha dado lugar a métodos de aprendizaje más flexibles e innovadores. Sin embargo, es necesario comprender el impacto y el alcance del uso de los smartphones en la enseñanza teórica y clínica.

Objetivos: Explorar y mapear la evidencia existente sobre cómo los estudiantes de enfermería utilizan los smartphones en la práctica clínica, centrándose en su papel como una estrategia alternativa o de apoyo al proceso de enseñanza-aprendizaje.

Métodos: Guiado por la metodología del Instituto Joanna Briggs para revisiones de alcance, este estudio buscará en bases de datos electrónicas relevantes y literatura gris, empleando términos como "uso de smartphones", "estudiantes de enfermería", "práctica clínica" y "proceso de enseñanza-aprendizaje". La revisión incluirá varios diseños de estudio, incluyendo investigación cuantitativa, cualitativa y de métodos mixtos y revisiones sistemáticas.

Resultados: Se espera que los resultados contribuyan a explorar las múltiples formas en que los estudiantes de enfermería utilizan los smartphones en contextos clínicos, centrándose en la identificación de los posibles beneficios, retos y resultados asociados a su uso.

Conclusión: Las conclusiones podrían ayudar a mejorar los métodos de enseñanza, aumentar la participación de los estudiantes y afrontar los retos de la enseñanza a distancia, así como a detectar lagunas y orientar futuras investigaciones. Este protocolo está registrado en el *Open Science Framework*.

Palabras Clave: aprendizaje; tecnología inalámbrica; estudiantes de enfermería; *smartphone*; enseñanza

1. Introduction

Integrating digital technology into educational frameworks has profoundly transformed learning paradigms across various disciplines, with nursing education being no exception (Kaminskienė et al., 2022; Ravik et al., 2024). In recent years, particularly with the advancements in mobile technology, smartphones have emerged as a pivotal educational tool, offering innovative strategies to enhance the teaching-learning process (Kim & Park, 2019). This scoping review aims to explore how nursing students utilize smartphones within clinical practice settings. It examines their role as both an alternative and a supportive strategy to traditional pedagogical methods. The widespread availability of smartphones and their capacity to facilitate access to information, communication, and educational resources present unique opportunities to enrich nursing education, particularly within the high-pressure context of clinical training, where time and resources are often limited.

Amidst the dynamic and often unpredictable clinical practice environment, nursing students must assimilate a vast array of knowledge, skills, and professional attitudes in a relatively short timeframe (Kavanagh & Sharpnack, 2021). Smartphones offer numerous potential benefits, including real-time access to evidence-based resources, decision-support tools, and clinical guidelines. These devices may enhance learning through multimedia resources such as instructional videos and interactive applications, which support skill acquisition and reinforce theoretical concepts. Moreover, they foster collaborative learning and communication by enabling instant interaction between students, educators, and healthcare professionals, creating a more connected and resource-rich learning environment.

Despite these apparent benefits, the integration of smartphones into clinical education raises significant concerns. Distractions caused by personal use during clinical tasks, ethical dilemmas arising from inappropriate use, and risks to patient privacy are critical issues that must be addressed to ensure their effective and responsible implementation (Pedro et al., 2018). These challenges underscore the need for a balanced and critical evaluation of the role of smartphones in nursing education, particularly concerning their impact on patient safety, quality of care, and the development of essential clinical competencies.

This review also seeks to examine the theoretical underpinnings that support the integration of digital tools into education. The Technology Acceptance Model (TAM) provides a valuable framework for understanding the factors influencing nursing students' willingness to adopt and use digital tools effectively in their learning environments (Padilha et al., 2024). Similarly, constructivist learning theories emphasize the importance of active, self-directed learning, which smartphones are well-positioned to facilitate through their interactive and user-driven capabilities (Hong & Lee, 2022). By grounding this review within these frameworks, it seeks to provide a comprehensive understanding of the opportunities and challenges associated with using smartphones in nursing education, offering evidence-based insights to inform future practice and research.

While smartphones present significant potential to transform clinical nursing education, their integration must be carefully managed to mitigate risks and maximize educational value. By investigating both the benefits and challenges associated with smartphone use, this review aims to provide a nuanced perspective that informs the design of effective teaching-learning strategies in clinical practice.

Guided by the Joanna Briggs Institute's methodology for conducting scoping reviews, this study aims to systematically map the existing literature on nursing students' use of smartphones in clinical practice. By examining how these devices are employed to support or substitute traditional teaching and learning processes, this review seeks to uncover the breadth of evidence available on this topic, identify gaps in the literature, and delineate the implications for nursing education and practice. An initial search across key databases such as MEDLINE (PubMed), Scielo, Scopus, and CINAHL (EBSCOhost), suggests a burgeoning interest in this area, yet a comprehensive synthesis of the evidence is lacking (Khalil et al., 2016; Peters, Godfrey, et al., 2020; Peters, Marnie, et al., 2020).

This scoping review will address the following critical questions:

- How do nursing students utilize smartphones as an alternative or supportive strategy in the teaching-learning process within clinical practice?
- How does smartphone use impact nursing students' learning outcomes and clinical skills development?
- What are the perceived benefits, challenges, and barriers to the effective use of smartphones by nursing students in clinical settings?

By focusing on these questions, the review aims to provide a nuanced understanding of the role of smartphones in nursing education, offering insights into how these devices can enhance or complement traditional learning methods in clinical practice. This exploration is intended to inform educators, policymakers, and practitioners about the potential of smartphones to contribute to the advancement of nursing education, preparing students more effectively for the complexities of modern healthcare delivery.

2. Methods

The protocol for this scoping review follows the Joanna Briggs Institute's (JBI) latest guidance on scoping review methodology (Khalil et al., 2016; Peters, Godfrey, et al., 2020; Peters, Marnie, et al., 2020). The review aims to map the evidence on the use of smartphones by nursing students in clinical practice, specifically examining how these devices are utilized as an alternative or supportive strategy to the teaching-learning process. This protocol aligns with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews (PRISMA-ScR) guidelines (Tricco et al., 2018). It is registered with the Open Science Framework (OSF) to ensure transparency and reproducibility of the research process.

2.1 Inclusion Criteria

Following JBI recommendations for scoping reviews, the inclusion criteria are defined by the Population, Concept, and Context (PCC) mnemonic:

- **Population:** This review will consider studies involving undergraduate nursing students engaged in clinical practice.
- **Concept:** The focus will be on studies exploring the use of smartphones by nursing students as a supportive or alternative strategy in the teaching-learning process within clinical settings.
- **Context:** The review will encompass studies conducted in various clinical practice settings, without geographical limitations, to capture a global perspective on the phenomenon.
- **Types of Sources:** Quantitative, qualitative, and mixed-methods research designs, as well as systematic reviews, will be considered for inclusion to ensure a comprehensive overview of available evidence.
- **Publication Period:** Studies published within the last ten years will be selected to ensure the relevance and currency of the evidence. This timeframe is strategically chosen, as it aligns with the period during which the mass use of mobile devices has significantly increased, fundamentally altering the landscape of digital technology integration in education and healthcare practices (Madden et al., 2013). This period encapsulates the rapid evolution of smartphone technology and its adoption in nursing education, ensuring the review captures the most pertinent and contemporary insights into how these devices are utilized in clinical training.
- **Language of Publication:** The review will include English, Portuguese, and Spanish studies. This decision acknowledges the linguistic capabilities of the review team and ensures a thorough and quality-assured analysis of the included studies. While this approach embraces the diversity of nursing education across different linguistic contexts, it also ensures that the selection procedure and data extraction processes are manageable and maintain the integrity of the research findings.

2.2 Search Strategy

The search strategy aims to identify both published and unpublished primary studies and reviews. Developed collaboratively by two reviewers and peer-reviewed by a third expert reviewer(Peters, Godfrey, et al., 2020; Peters, Marnie, et al., 2020), the strategy adheres to the Peer Review of Electronic Search Strategies (PRESS) checklist(McGowan et al., 2016). A preliminary search of MEDLINE (via PubMed) and CINAHL Complete (EBSCOhost) was conducted to identify relevant articles and inform the development of a comprehensive search strategy. This strategy will be adapted for each information source to account for database-specific nuances. The search strategy will be meticulously developed using a combination of keywords and MeSH terms related to "smartphone use," "nursing students," "clinical practice," and "teaching-learning process." This approach will be adapted for each database to align with its specific indexing terms and search functionalities. Additionally, the reference lists of all included articles will be hand-searched to identify any further studies of relevance.

The search will include the following databases: MEDLINE (via PubMed), the Cochrane Library, Scielo, Scopus, and CINAHL (via EbscoHost). Searches for unpublished studies will encompass grey literature sources like DART-Europe and OpenGrey. Table 1 presents the full strategy search for MEDLINE (via Pubmed):

Table 1 – Full strategy search

(((“nursing students”[Title/Abstract] OR “nursing student”[Title/Abstract] OR “nurse students”[Title/Abstract] OR “nurse student” [Title/Abstract] OR students, nursing[MeSH Terms]) AND (“clinical training”[Title/Abstract] OR “clinical learning”[Title/Abstract] OR “clinical practice”[Title/Abstract] OR Preceptorship[Title/Abstract] OR preceptorship[MeSH Terms])) AND (smartphone[Mesh] OR “cell phone”[Title/Abstract] OR cellphone[Title/Abstract] OR “mobile phone”[Title/Abstract] OR smartphone[Title/Abstract] OR smart phon*[Title/Abstract] OR mobile[Title/Abstract] OR software[Title/Abstract] OR electronic[Title/Abstract])) AND (devic*[Title/Abstract] OR technolog*[Title/Abstract] OR app[Title/Abstract] OR apps[Title/Abstract] OR applic*[Title/Abstract] OR Mobile Applications[Mesh]) Filters: in the last 10 years, English, Portuguese, Spanish, MEDLINE

2.3 Study Selection

All identified records from the database search will be collated and managed using Mendeley Reference Manager (Mendeley Ltd., Elsevier, Amsterdam, The Netherlands), ensuring duplicates are efficiently removed. The screening and selecting studies will involve several stages to maintain rigorous inclusion standards and provide the relevance and quality of the evidence included in the review.

Initially, two independent reviewers will screen the titles and abstracts of retrieved records to assess their eligibility against the predefined inclusion criteria. To enhance the reliability of the screening process, a pilot test will be undertaken on a sample of records to achieve at least an 80% agreement between the reviewers. This step is crucial for refining the screening criteria and ensuring consistency in applying inclusion criteria.

After the initial screening, potentially eligible studies will be examined more closely. This involves retrieving the full text of these studies and assessing them against the inclusion criteria. The assessment will consider whether the full text is available, whether the studies meet the inclusion criteria comprehensively, and whether the study's relevance to the research questions is clear. Studies excluded at this full-text stage will be documented, with reasons for exclusion. This practice ensures transparency in the review process and allows readers to understand the decision-making process behind the study selection.

Disagreements between the two reviewers at any stage of the selection process will be resolved through discussion or, if necessary, by consulting a third reviewer. This collaborative approach ensures that decisions are made collectively and are grounded in the review's methodological framework.

When the full text of a potentially relevant study is inaccessible, efforts will be made to contact the study's authors to obtain the necessary documents. This step is vital for ensuring that all relevant evidence is considered, regardless of accessibility issues.

The search results and selection process will be detailed in the final scoping review and presented in a flow diagram following the Preferred Reporting Items for Systematic Reviews and Meta-analyses for Scoping Reviews (PRISMA-ScR) guidelines (Tricco et al., 2018). This visual representation will provide an overview of the search and selection process, illustrating the flow of information through the different phases of the review and highlighting the number of studies included and excluded at each stage.

2.4 Data Extraction

Data will be extracted from included studies using a template advised by the Joanna Briggs Institute (JBI), which will be modified as necessary to align closely with the specific objectives of this review (Peters, Godfrey, et al., 2020; Peters, Marnie, et al., 2020). A pilot extraction will be conducted on a sample of the first five to ten studies to ensure high consistency and reliability in the data extraction process. This pilot phase aims to refine the data extraction tool and resolve any ambiguities, ensuring that all relevant data are captured accurately and systematically (Levac et al., 2012).

Two independent reviewers will undertake the data extraction process, charting the extracted information according to the JBI-proposed template. The information extracted will include, but not be limited to, study characteristics (e.g., authors, year of publication, study design), smartphone use strategies (e.g., types of apps used, purposes of smartphone use), learning outcomes (e.g., knowledge acquisition, skill development), and key findings relevant to the review question. Additionally, any novel uses of smartphones in clinical practice identified in the studies will be documented.

Given the potential for evolving insights during the review process, the data extraction tool will be revisable. Adjustments may be made to the tool during the data extraction phase to ensure comprehensive coverage of all relevant data points.

In instances of missing data or the need for clarification, the authors of the included studies will be contacted to request additional information. This step is crucial for ensuring the completeness and accuracy of the data being analyzed.

A third reviewer will be consulted to resolve discrepancies between the two reviewers during the data extraction process. This measure ensures that decisions are made collaboratively and are based on a consensus, enhancing the reliability of the data extraction process.

Should the review include preliminary studies or report on the same dataset (data duplication), a decision will be made to report the most comprehensive or recent study to avoid redundancy.

The extracted data will be synthesized and presented in alignment with the review's objectives, potentially in tabular form (as outlined in a draft extraction tool, presented in Table X) and through narrative synthesis. This structured approach to data extraction and presentation will facilitate a clear and comprehensive understanding of how smartphones are utilized by nursing students in clinical practice, highlighting implications for education and practice.

2.5 Data Analysis and Presentation

The data collected from the included studies will be meticulously analyzed and presented to align with the overarching objectives of this scoping review (Peters, Godfrey, et al., 2020; Peters, Marnie, et al., 2020). The analysis will employ tabular and narrative synthesis methods to accommodate the diverse nature of the data and ensure a comprehensive understanding of the findings.

Tabular Presentation: Key information and findings will be organized into tables (e.g., Table X), providing a clear and concise overview of each included study. This tabular form will consist of study characteristics, smartphone use strategies, learning outcomes, and key findings. Using tables will facilitate easy comparison across studies and help identify patterns or trends in the data.

Narrative Synthesis: Alongside the tabular presentation, a narrative synthesis will articulate the thematic findings from the data. This narrative will delve into the nuances of how nursing students utilize smartphones in clinical practice, exploring themes such as types of smartphone use (educational apps, communication platforms, clinical decision support tools), impacts on learning outcomes (knowledge enhancement, skills development), and perceived benefits and challenges (accessibility of information, distraction potential). This qualitative analysis will be guided by the emergence of themes from the data, potentially revealing insights not immediately apparent through quantitative analysis alone.

A descriptive summary will accompany the tabular and narrative presentations, providing a synthesized overview of the extracted data. This summary will highlight the key findings and insights from the review, addressing the initial research questions and objectives.

The analytical process will aim to determine the complexities of smartphone use by nursing students in clinical practice, considering the contextual factors that influence this phenomenon. By systematically organizing and synthesizing the data, this review section will offer a nuanced understanding of the current evidence base, identifying knowledge gaps and suggesting future research directions.

3. Results/Discussion

This scoping review has strategically focused on studies published in English, Portuguese, and Spanish, aiming to capture a broad spectrum of research across diverse linguistic and cultural contexts. While this approach ensures inclusivity and access to a wide range of evidence pertinent to the topic, it inherently introduces a limitation by potentially omitting valuable insights from studies published in other languages.

The review's findings are expected to clarify nursing students' multifaceted use of smartphones in clinical settings, exploring both the pedagogical benefits and challenges. By mapping the current evidence, these results may assist in informing educational strategies and technological integration in nursing education, providing a foundation for institutional managers and educators to implement measures that enhance learning environments and address the unique needs of nursing students in clinical practice.

This endeavor is particularly relevant in the rapidly evolving field of healthcare education, where technological advancements and global health crises, such as the COVID-19 pandemic, continually reshape educational requirements and learning modalities. Recognizing the potential for future health emergencies, this review stresses the importance of being prepared to integrate digital tools in educational settings, ensuring that nursing education remains resilient and responsive to changing circumstances.

While this scoping review does not critically evaluate the included studies, any corroborated limitations encountered during the review process will be reported. Such transparency is crucial for contextualizing the findings and offering valuable insights for future investigations, especially for those considering systematic reviews in related areas.

Conclusion

This scoping review will provide a comprehensive overview of current evidence on the use of smartphones by nursing students in clinical practice settings. By mapping the literature, the review aims to identify gaps, explore pedagogical implications, and uncover effective practices and challenges. These insights will inform future research and guide the development of innovative educational strategies, ultimately supporting nursing educators and curriculum developers in leveraging mobile technologies to enhance learning outcomes and adapt to the evolving needs of healthcare education.

Conflict of interest

The authors declare no conflict of interest.

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