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Scoping Review Protocol on the Use of Digital Serious Games for Patients and Caregivers Education in Acute Care Settings

Protocole d'une revue de la portée sur l'utilisation des jeux sérieux numériques dans l'enseignement aux patients et à leurs proches dans le contexte des soins aigus

Émilie Paul-Savoie https://orcid.org/0000-0003-0147-6804 School of Nursing, Université de Sherbrooke, Quebec, Canada

Mikaël Gingras https://orcid.org/0009-0001-9043-1917 School of Nursing, Université de Sherbrooke, Quebec, Canada

Assma Grini https://orcid.org/0009-0004-2859-6501 School of Nursing, Université de Sherbrooke, Quebec, Canada

Émilie Gosselin https://orcid.org/0000-0001-7244-8486 School of Nursing, Université de Sherbrooke, Quebec, Canada

Correspondance | Correspondence:
Émilie Gosselin
emilie.gosselin3@usherbrooke.ca

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Keywords

acute care; patient education; caregivers; digital serious games; gamification

Abstract

Introduction: In acute care settings, patient and caregiver education is essential for health management and promoting autonomy. Short hospital stays often limit opportunities for effective teaching. To address this, innovative approaches, including digital serious games using gamification principles, have been developed. Nevertheless, the literature on their use in acute care is heterogeneous, varying by context, timing, type of game, and target population, which makes synthesis difficult. A preliminary search in Joanna Briggs Institute Evidence Synthesis, the Cochrane Database, MEDLINE, and other sources confirmed that no similar review exists. **Objective**: To map and categorize the existing evidence on the use of digital serious games for patient and caregiver education in acute care settings. **Method**: This scoping review will follow the Joanna Briggs Institute methodology. A comprehensive search will be conducted in 11 databases and Google Scholar to include grey literature. Inclusion and exclusion criteria are defined according to the Population, Concept, and Context methodological framework. Study selection and data extraction will be performed by 2 reviewers. Findings will be synthesized and presented descriptively to characterize the scope, nature, and key features of existing evidence on digital serious games for patient and caregiver education in acute care. **Discussion and Research Spin-offs**: The results will contribute to clarifying key concepts related to serious games in acute care, identifying gaps in the existing literature, and providing a foundation to guide future research on the development, implementation, and evaluation of these innovative educational tools in these settings. The review will also offer clinicians an overview of current educational tools, target populations, and design characteristics of digital serious games used in acute care, supporting informed and reflective integration into practice.

Mots-clés

soins aigus; éducation aux patients; proches aidants; jeux sérieux numériques; ludification

Résumé

Introduction : En soins aigus, l'éducation du patient et de ses proches est essentielle pour la prise en charge de la santé et la promotion de l'autonomie. Or, la brièveté des séjours hospitaliers limite les occasions d'enseignement. Pour y remédier, des approches innovantes, comme la ludification par les jeux sérieux numériques, ont été développées. Néanmoins, la littérature sur leur utilisation en soins aigus demeure hétérogène, variant selon le contexte, le moment d'utilisation, le type de jeu et les clientèles, rendant difficile une synthèse globale. Une recherche préliminaire dans *Joanna Briggs Institute Evidence Synthesis*, Cochrane, MEDLINE et d'autres sources a confirmé qu'aucune revue similaire n'existe. **Objectif** : Cartographier l'état des connaissances sur l'utilisation des jeux sérieux numériques et catégoriser leurs types pour l'éducation des patients et de leurs proches en soins aigus. **Méthode** : Cette revue de la portée suivra la méthodologie de l'Institut Joanna Briggs. La recherche documentaire sera effectuée dans 11 bases de données et Google Scholar pour inclure la littérature grise. Les critères de sélection ont été définis selon le modèle Population, Concept et Contexte. La sélection et l'extraction des données seront réalisées par 2 chercheurs. Les résultats seront synthétisés et présentés de manière descriptive afin de caractériser la portée, la nature et les principales caractéristiques des données probantes existantes sur les jeux sérieux numériques destinés à l'éducation des patients et des proches en soins aigus. **Discussion et retombées anticipées** : Les résultats permettront de clarifier les concepts associés aux jeux sérieux, d'identifier les lacunes et de fournir une base pour orienter le développement, l'implantation et l'évaluation de ces outils éducatifs innovants. La revue offrira également aux cliniciens un aperçu des outils éducatifs actuels, des populations ciblées et des caractéristiques de conception des jeux sérieux numériques, soutenant une intégration réfléchie et éclairée à la pratique.

INTRODUCTION

Digital serious games are an innovative strategy to enhance patient and caregiver education across healthcare contexts, addressing the need for engaging learning tools. Unlike generic digital games designed primarily for entertainment (Michael & Chen, 2006), serious games integrate interactive and immersive gameplay with explicit educational objectives to foster active participation and behavioral change (Sharifzadeh et al., 2020; Warsinsky et al., 2021). These games leverage game mechanics, dynamics, and aesthetics to create meaningful experiences that stimulate motivation and sustain engagement (Hamari et al., 2014; Huotari & Hamari, 2017; Warsinsky et al.; Zichermann & Cunningham, 2011). Evidence suggests serious games can generate cognitive, emotional, and behavioral benefits, including improved knowledge retention, reduced anxiety, enhanced adherence, and greater empowerment (Alsawaier, 2018; Jansson et al., 2022; Kapp, 2012). Their increasing use in health education reflects their potential to make complex concepts more accessible while offering a motivating and memorable learning experience (Cascella et al., 2023; Laghari et al., 2024; Olszewski & Wolbrink, 2017; Sharifzadeh et al., 2020).

Acute care refers to any active or immediate treatment aimed at stabilizing or managing a serious or urgent health problem, including emergency care, surgery, or critical care (Hirshon et al., 2013; Mosby, 2016). Patients in these settings often face multiple challenges, such as loss of autonomy, emotional distress, and the complexity of medical treatments (Bin et al., 2004; Sekhon et al., 2017; Townshend et al., 2023). These challenges are compounded by short hospital stays, limiting time for effective education and increasing risks of non-adherence, readmissions, complications, and anxiety (Amouzeshi et al., 2017; Karl et al., 2020). Education during hospitalization and at discharge is therefore critical to support safe transitions and foster self-management beyond the acute episode (Coyoca et al., 2024; Kang et al., 2018). Caregivers play an essential role by reinforcing education and ensuring continuity of care at home (Clement et al., 2023; Pinto et al., 2024).

While digital serious games have been widely studied in the context of healthcare professional education (Gentry et al. 2019; Olszewski & Wolbrink, 2017), their use for patient and caregiver learning raises distinct considerations. Although some theoretical frameworks and engagement strategies developed for professional education may inform interventions, patients and caregivers differ in terms of prior knowledge, learning needs and objectives, motivation, and care context (Knowles et al., 2015). Consequently, evidence from healthcare professional education cannot be directly applied to patient and caregiver learning. This highlights the need to synthesize evidence specifically addressing the use of digital serious games in patient and caregiver education.

Despite this potential, research on digital serious games for patient and caregiver education in acute care remains heterogeneous. Existing studies differ substantially in terminology, theoretical grounding, and educational objectives, and indications of when and how these games are integrated into the patient and caregiver journey. A preliminary search in Joanna Briggs Institute Evidence Synthesis, the Cochrane Database, and MEDLINE confirmed the absence of a comprehensive synthesis on this topic. Given this heterogeneity and lack of standardized definitions, conducting a systematic review would be premature. A scoping review is therefore well suited to map the types of serious games used, their design features, theoretical underpinnings, reported outcomes, and gaps related to timing and integration within the patient and caregiver journey (Peters et al., 2020).

OBJECTIVE

By systematically mapping the available evidence, this review aims to clarify conceptual boundaries, identify design features and educational objectives, and highlight gaps related to population targeting and timing of interventions. Such insights are essential to inform future research and guide the development of theory-informed educational tools for acute care settings. Accordingly, this protocol describes a scoping review designed to map existing evidence

on the use of digital serious games for patient and caregiver education in acute care settings.

METHOD

This scoping review will follow the first five steps of the Joanna Briggs Institute (JBI) methodology (Peters et al., 2020): 1) Identifying the research question; 2) Identifying relevant studies; 3) Selecting studies; 4) Charting the data; and 5) Collating, summarizing, and reporting the results. Each of the steps will be detailed sequentially.

STEP 1 – IDENTIFYING THE RESEARCH QUESTION

The general research question of this scoping review is: "What is known about the use of digital serious games for the education of patients and their caregivers in acute care settings?" Consistent with the Population, Concept, Context (PCC) methodological framework, the review focuses on 1) Population: Patients of all ages and their caregivers; 2) Concept: Digital serious games designed for educational purposes; and 3) Context: Acute care settings such as emergency departments, surgical units, inpatient medical units, intensive care units, and pre-/post-operative care. Based on these PCC elements, the following four specific research questions will guide this scoping review:

i. "How are digital serious games conceptualized and defined in the literature for patient and caregiver education in acute care settings?"
ii. "What design characteristics and modalities are reported (theoretical frameworks, platforms, duration, frequency, gaming elements), and at which points in the patient and caregiver journey are they implemented?"
iii. "Which target populations are addressed by these digital serious games (e.g., patients by age group or health condition, caregivers)?"
iv. "What educational objectives and health-related content are targeted and what types of reported outcomes (e.g., affective, cognitive, behavioral) are described for patients and caregivers?"

STEP 2 – IDENTIFYING RELEVANT STUDIES

Articles will be identified via the EBSCO databases (Academic Search Complete, AgeLine, AMED, CINAHL, Education Source, EMBASE, ERIC, MEDLINE, Psychology and Behavioral Sciences Collection, and PsycINFO) and EMBASE separately. Grey literature from Google Scholar will be screened (first 100 manuscripts), as recommended (Haddaway et al., 2015). The search process will be conducted independently by two members of the research team, with the assistance of a research librarian who helped refine the search strategy across databases. The PCC framework was operationalized into three main search sets: 1) Population combined with educational terms; 2) Concept focused on digital serious games and related approaches; and 3) Context representing acute care settings. These sets were then combined using Boolean operators (AND, OR) and proximity operators (N2, N3) to capture studies at the intersection of all three dimensions. The PCC framework guided the research questions, resulting in some overlap between Population and Concept. This approach was considered the most effective at retrieving relevant literature given the variability in indexing and terminology across databases. Duplicate records will be removed using the Covidence software (Veritas Health Innovation, 2026) before screening. A summary example of the search strategy is presented in Table 1, and the exhaustive list of keywords is provided in Table 2. No publication year limits will be applied, and studies published in any language will be considered eligible. When necessary, translations will be performed using artificial intelligence tools to ensure the inclusion of non-French or non-English sources. Specifically, Microsoft Copilot (current version) will be used to assist with translation when required.

STEP 3 - SELECTING STUDIES

Eligibility criteria for study selection were defined according to the PCC framework and the four specific research questions to ensure that the studies included are directly relevant to mapping how digital serious games are used for patient and caregiver education in acute care settings.

Table 1

Sample Search Terms of EBSCO Databases

Concepts	Initial keywords
Education of patients of all ages and their caregivers	((patient* OR family* OR caregiver* OR relative*) N3 (education* OR instruction* OR "health literacy"* OR teaching* OR counseling* OR training* OR coaching* OR guidance* OR "health instruction*" OR "medical education*" OR "health education*"))
Digital serious games	(gamification* OR "assimilation software" OR "immersive virtual reality*" OR "computer*" OR "simulation*" OR "screen-based simulator*" OR "simulation software*" OR "virtual reality*" OR "augmented reality*" OR ((serious* OR video* OR online* OR virtual* OR interactive* OR electronic* OR mobile*) N3 (game* OR gaming*)))
Acute care settings	(((surgical* OR surgery* OR acute* OR intensive* OR emergency* OR critical* OR "short term*" OR short-term*) N2 (care* OR assistance*)) OR presurgery* OR postsurgery* OR operative* OR "post-op*" OR "pre-op*" OR "peri-op*" OR postop* OR preop* OR periop*)

Note. Boolean operators (AND, OR) and proximity operators (N2, N3) were used to combine these sets across databases. No date or language limits applied.

Table 2

List of Keywords

Concept 1	Concept 2	Concept 3
1) Education of patients of all ages and their caregivers	2) Digital serious games	3) Acute care settings
- Medical education	- Gamification	- Surgical care
Relative	Serious games	Presurgery
Family	Exergames	Postsurgery
Patient	Assimilation software	Surgical assistance
- Patient education	Immersive virtual reality	Surgery care
Patient instruction	- Video game	Urgent care
Health literacy	Online game	- Acute care
Health education	Interactive game	Intensive care
Medical education	Electronic game	Emergency care
Patient teaching	Gaming	Critical care
Patient counseling	Virtual game	Short-term care
Patient training	Mobile game	- Operative
Health coaching	Mobile app*	Post-op*
Health guidance	- Computer simulation	Pre-op*
Caregiver education	Digital simulation	Peri-op*
	Immersive simulation	Postop*
	Screen-based simulator	Preop*
	Simulation software	Periop*
	Virtual reality	
	Augmented reality	

3.1 Type of Manuscripts and Study Design

All primary research studies employing quantitative, qualitative, or mixed-methods designs will be eligible for inclusion, as these designs provide empirical data on the development, implementation, and evaluation of digital serious games. This approach ensures a comprehensive overview of both measurable outcomes and experiential insights.

In contrast, literature reviews, opinion papers, editorials, and study protocols will be excluded, as they do not contribute to original empirical findings. However, to minimize the risk of omitting relevant studies, primary studies cited within excluded reviews will be identified through backward snowballing and considered for inclusion. Conference abstracts will generally be excluded because they often lack sufficient methodological and contextual detail to support data extraction and synthesis. However, abstracts that provide adequate information to determine eligibility and extract key data relevant to the review questions (e.g., description of the digital serious game, context of use, and outcomes) will be considered for inclusion.

Population. The population of interest includes patients of all ages and/or their caregivers, as this review focuses on educational interventions designed to support individuals directly involved in managing health conditions. No age restriction is applied in order to map the full scope of available interventions. Patient age and health conditions will be recorded and findings will be reported by age group where feasible. Studies involving both healthcare professionals and patients and/or their caregivers will be eligible if the intervention targets both groups, as these may provide insights into collaborative educational dynamics. Conversely, studies focusing exclusively on healthcare professionals or healthcare students will be excluded, given their distinct educational needs and learning contexts.

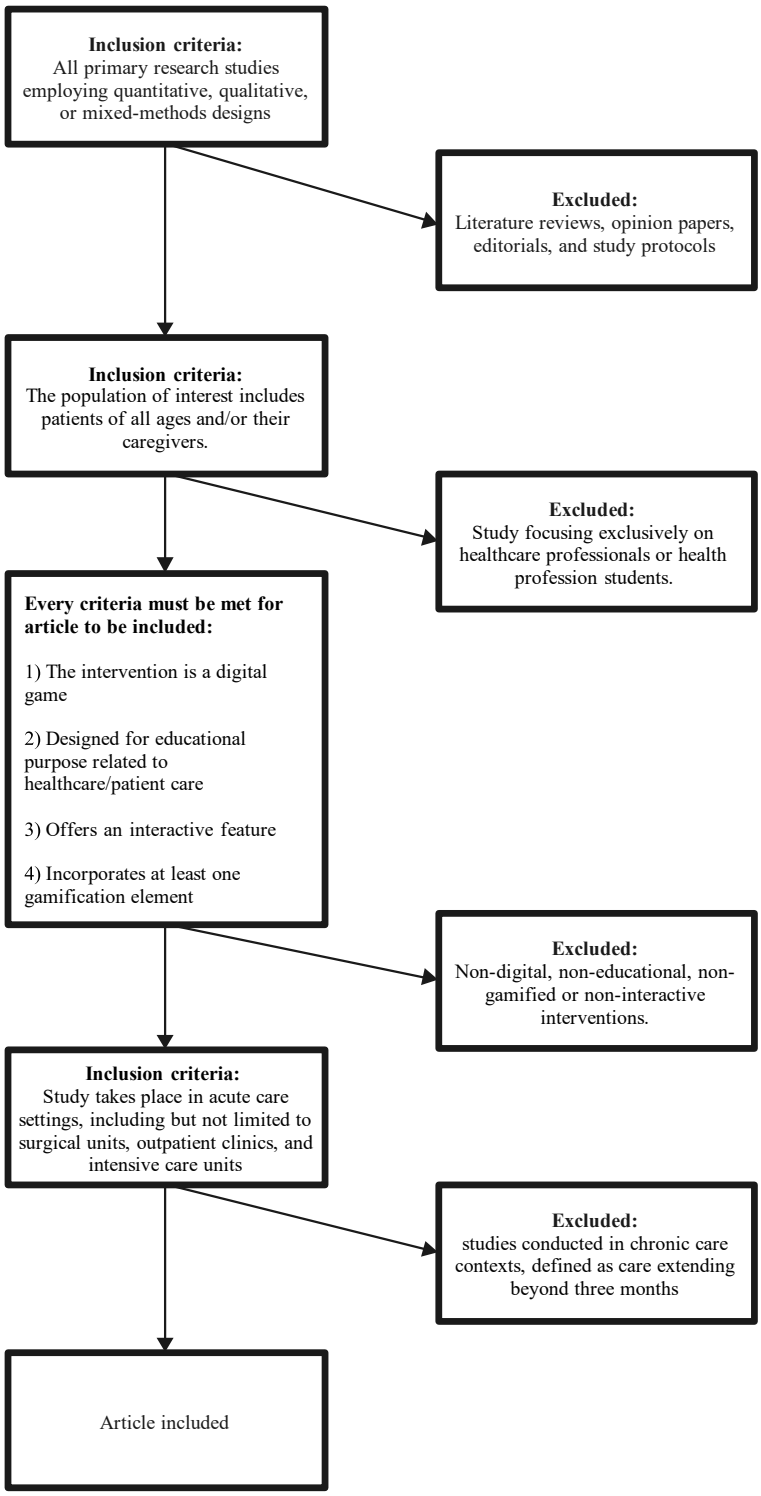
Concept. The concept of interest focuses on digital serious games, and this review examines their application in health education for patients managing active illness. To ensure conceptual clarity, eligible interventions must meet all of the following criteria: 1) Be a digital game; 2) Have an explicit educational purpose related to healthcare or patient care; 3) Offer interactive features (e.g., not be limited to a static digital library of passive content), as interactivity is a defining feature of serious games that fosters active learning (Anastasiadis et al., 2018); and 4) Incorporate at least one gamification element, as defined by the GAFCC (Goal, Access, Feedback, Challenge, and Collaboration) model proposed by Huang and Hew (2018), distinguishing digital serious games from standard digital educational tools. The GAFCC framework is widely cited in the literature on educational gamification and provides a structured approach to identify key game elements that support engagement, motivation, and learning. Its application in this scoping review allows systematic categorization of digital serious games, complementing theoretical frameworks reported in the included studies, and is particularly relevant for patient and caregiver education, where motivation, interactivity, and knowledge acquisition are critical. These inclusion criteria collectively ensure that selected interventions align with the core definition of digital serious games while acknowledging the inconsistent terminology in the literature (Khaldi et al., 2023). Therefore, a wide range of related terms were included in the search strategy. Interventions that are non-digital, non-educational, non-interactive, or non-gamified will be excluded, as they do not meet the conceptual scope of this review.

Context. Studies must take place in acute care settings, such as surgical units, emergency departments, and intensive care units. These contexts were selected because acute care typically involves short, intensive treatment episodes during which educational interventions must be concise, targeted, and often supported by technology. Studies conducted exclusively in chronic care contexts, defined as care extending beyond 3 months (Bernell & Howard, 2016), will be excluded, as the educational needs, timeframes, and care objectives differ substantially from those in acute care contexts.

All eligibility criteria are directly aligned with the PCC framework and with the four specific research questions. This alignment ensures consistency across study selection, data extraction, and synthesis. Figure 1 presents the decision tree that will be used for articles.

Figure 1

Decision Tree



3.2 Screening Process

Covidence software (Veritas Health Innovation, 2026) will be used to manage the screening of selected articles. The review team consists of four reviewers. However, each article will be screened independently by only two reviewers, in line with established scoping review methodology (Peters et al., 2020). The remaining reviewers will contribute to consensus discussions.

The selection process will follow several sequential steps:

i. Initial calibration phase: A search will be conducted across all selected databases and Google Scholar, and eligibility criteria will be applied by all reviewers using the first 15 records as a test set. Any potential conflicts will be discussed and resolved collaboratively by the full review team. Following this initial round, reviewers will determine through consensus whether a second calibration round is necessary.
ii. First screening phase: Reviewers will independently assess whether articles meet the eligibility criteria based on titles and abstracts. Duplicate records will be flagged separately to avoid redundant screening.
iii. Second screening phase: Full-text articles will be reviewed, and exclusion decisions will be documented along with the reasons for exclusion, following the predefined decision tree.

For both the first and second screening phases, regular meetings will be held to resolve any conflicts through consensus. If disagreement persists between two reviewers, another team member will act as a mediator.

Step 4 - Charting the Data

In accordance with the JBI methodology for scoping reviews (Peters et al., 2020), data from the included studies will be charted using a standardized extraction form developed in Microsoft Excel by the research team. Data extraction will begin after full-text screening, following JBI guidance. The extraction grid was developed a priori and will be piloted on a sample of five studies to ensure clarity, consistency, and relevance. Revisions to the grid will be made as needed following this pilot phase. Guided by the PCC framework and the review questions, an a priori analytic structure was developed to support data extraction and synthesis. Rather than constituting a theoretical conceptual framework, this analytic structure serves as an organizing approach to systematically map how digital games are described and used for patient and caregiver education in acute care. It is organized around four core analytic dimensions: 1) design characteristics; 2) terminology and conceptualization; 3) theoretical grounding; and 4) educational content and objectives. These dimensions informed the structure of the data extraction grid and the organization of the extracted variables. Data extraction will include the following categories of information:

i. Descriptive study characteristics: authors, year, study title, country, journal, study design and methodological approach; stated aims or objectives of the study, type of acute care setting.
ii. Population: patient/caregivers/both, patient characteristics (age/age group pediatric, adult, older adult), health condition or clinical context; caregiver characteristics (age, relationship to patient - parent, spouse, informal caregiver), sample size.
iii. Context: type of acute care setting (e.g., emergency departments, intensive care units, surgical units); phase of care or point in the patient and caregiver journey (pre-admission, during hospitalization, pre-operative/post-operative, discharge or transition phase, integration within clinical workflows (if described).
iv. Methodological characteristics (e.g., recruitment strategy, eligibility criteria, study design, type of data collected, targeted domains, and method of analysis).
v. Concept: digital games (e.g., type of digital games, use parameters – timing, duration, frequency), and the presence of gamification elements based on the GAFCC model (Huang & Hew, 2018). As well as theoretical or conceptual frameworks underpinning the game (when reported), and educational

purposes (e.g., health-related topics and stated learning objectives).

vi. Educational objectives and content: knowledge acquisition, self-management, decision-making; health-related content areas (e.g., procedures, symptom management, treatment adherence); level of tailoring or personalization (if reported).

vii. Implementation: timing of intervention implementation, implementation strategies or supports (e.g., staff involvement, training), reported facilitators and barriers to implementation.

viii. Reported Outcomes: cognitive (e.g., knowledge, understanding), affective (e.g., engagement, confidence, anxiety), behavioral (e.g., adherence, skill performance); outcome measurement tools or indicators (if applicable); timing of outcome assessment (if reported).

ix. Main reported findings (e.g., outcomes, general strengths and limitations reported by the authors).

The GAFCC model is used as a descriptive and organizing tool to systematically identify and classify gamification features reported in the literature, rather than as a validated theory of educational effectiveness. Appendix I presents the planned extraction grid.

Data extraction will be performed by one member of the research team and independently revised by a second member to ensure completeness and accuracy. Any disagreements will be resolved through discussion and, if needed, consultation with a third reviewer. In line with JBI guidance, authors will not be contacted to obtain missing data, as scoping reviews aim to map available evidence rather than supplement it. Missing data will be explicitly indicated as "not available" in the extraction tables. Only information published in the included articles or referenced in prior publications by the study teams—i.e., data accessible to the scientific community—will be analyzed (Peters et al., 2020).

Step 5 - Collating, Summarizing, and Reporting the Results

The analysis of the included studies will follow the three-step approach proposed by the JBI methodology for scoping reviews (Peters et al., 2020): 1) data analysis; 2) presentation of results; and 3) interpretation of findings in relation to the review objectives.

First, a descriptive numerical summary will be produced to outline the general descriptive characteristics of the included studies. This will allow for the identification of patterns in publication trends and methodological approaches.

Second, a narrative synthesis will be conducted to address the review questions. Specifically, we will map how digital games are conceptualized in the context of patient and caregiver education in acute care and describe the gamification features implemented across interventions using the GAFCC model (Huang & Hew, 2018). Educational objectives, health topics addressed, and reported outcomes will also be synthesized thematically. To go beyond descriptive summaries, we will employ conceptual mapping techniques to visualize relationships between key concepts, gamification features, and educational outcomes. Consistent with JBI scoping review guidance on analysis and presentation of results, these relationships will be illustrated through maps, diagrams, and network visualizations to highlight gaps in the literature (Peters et al., 2021; Pollock et al., 2023). A summary of the strengths and limitations of each study will be provided, along with an analysis of knowledge gaps and implications for future research and practice. Findings will be presented through tables and visual representations (e.g., charts or diagrams) to facilitate interpretation.

Results will be disseminated via an international conference and a peer-reviewed journal to reach both academics and healthcare professionals. Reporting will follow the PRISMA-ScR checklist to ensure transparency, completeness, and methodological rigor, and a PRISMA-ScR flow diagram will document the selection process.

Discussion and Research Spin-offs

The search for relevant articles is currently ongoing. The scoping review will be completed

following the full screening and data charting process, after which the manuscript will be submitted to a peer-reviewed journal. The review is expected to make a significant contribution to the field.

Research Contributions

This scoping review will contribute to advancing knowledge by providing a clearer understanding of how digital serious games are currently used for patient and caregiver education in acute care settings. By systematically mapping and categorizing these interventions, the review will help reduce the conceptual ambiguity that persists in healthcare literature (Warsinsky et al., 2021). It will support the refinement of definitions and operationalization of serious games, a concept that remains heterogeneous across studies (Alvarez & Djaouti, 2012). Through this conceptual clarification and synthesis, the review will establish a stronger theoretical basis to inform and guide future empirical investigations focused on the design, implementation, and evaluation of game-based educational interventions in acute care contexts.

Clinical Implications

From a clinical perspective, the review will identify and describe the characteristics, educational objectives, and target populations of digital serious games employed for patient and caregiver education in acute care. Mapping these features will make it possible to highlight existing practices and educational approaches currently used to support knowledge acquisition and engagement throughout the perioperative period and across acute care contexts. The insights generated will help healthcare professionals, particularly nurses, to better understand the potential and limitations of current digital educational tools and to identify opportunities where such strategies might be relevant in practice. By outlining current trends and gaps, this work will provide a foundation for reflective and evidence-informed development of future educational initiatives, without presuming their effectiveness or direct applicability in clinical settings.

Authors' contribution: ÉPS developed the scoping review protocol in collaboration with ÉG and AG, including the formulation of the research questions and the design of the data extraction grid. The search strategy was developed by AG, in collaboration with a nursing student and a research librarian. AG will perform the literature search and study selection, with screening conducted by AG, MG, and ÉPS. ÉG will serve as third reviewer in case of conflicts. ÉPS and MG will extract the data. ÉPS will lead the analysis and present the findings at an international conference. This protocol article was written by ÉPS and ÉG and revised by all authors.

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Ethics certificate number: An ethics certificate is not required for a synthesis of existing literature, as it does not involve human participants or primary data collection.

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Appendix I

Draft Data Extraction Grid (Part 1 – Descriptive and Methodological Characteristics)

Authors, Year, Title, Country	Journal	Context (types of acute care)	Target population (age group, patients/caregivers) and sample size	Recruitment strategy	Eligibility criteria	Study design	Variables and measurement instrument	Method of analysis

Draft Data Extraction Grid (Part 2 – Analytic Framework Dimensions)

Design characteristics			Terminology / conceptualization	Theoretical grounding	Educational objectives		Outcomes / findings
Type of digital games (virtual reality, console-based game, mobile game, PC-based game)	GAFCC dimensions	Use parameters (timing, duration, frequency)	Terminology use	Theoretical framework	Targeted domain (affective, cognitive, behavioral)	Educational content and objectives (health-related topics)	Outcomes, general strengths and limitations