Protocol

Economic Evaluations of Digital Health Interventions for Cancer Survivorship Care: Protocol for a Systematic Review

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Abstract

Background: With the increasing number of survivors of cancer, there is a corresponding rise in global health care expenditure. Digital health interventions have the potential to improve cancer survivorship by overcoming mobility and geographic barriers and, more critically, by leveraging AI to deliver dynamic, just-in-time supportive interventions and real-time risk stratification based on continuous monitoring of patient-generated health data. Although the clinical benefits of digital health in cancer survivorship care are widely recognized, their economic value remains unclear. This review aims to systematically collate and synthesize the available economic evidence on digital health interventions for cancer survivorship.

Objective: This systematic review aims to review and synthesize the available economic evidence on digital health interventions designed for cancer survivorship care to inform policy and resource allocation.

Methods: We will systematically review the full and partial economic evaluations of digital health for cancer survivorship. The search will cover the following databases: PubMed, Embase, Web of Science, and Scopus. It will also be supplemented by gray literature identified through Google Scholar. Studies will be included if they target cancer survivorship and report economic outcomes of digital health interventions. Data extraction will be structured by the World Bank's framework for economic evaluation of digital health interventions, allowing a thematic synthesis of costs, outcomes, and perspectives. The reporting quality and transparency of each included study will then be critically appraised using the Consolidated Health Economic Evaluation Reporting Standards (CHEERS) checklist. A narrative synthesis will then be conducted to group and compare the findings by intervention type, cancer type, evaluation perspective, and reported cost-effectiveness.

Results: This systematic review was registered with PROSPERO on January 19, 2026 (CRD420251251151). The database searches identified 5091 records. After the removal of 896 (17.6%) duplicates in Covidence, 4195 records were screened by title and abstract. Following title and abstract screening, 3831 (91.3%) records were excluded, 364 (8.7%) records were retained for full-text review, and 46 studies were included in the review. As of November 2026, data extraction has been completed, while quality assessment and data synthesis are ongoing. The review is expected to be completed in January 2027.

Conclusions: This will be the first systematic review to comprehensively synthesize the economic evidence of digital health interventions for survivors of cancer. The findings will provide an evidence base to guide health care policy, investment decisions, and the implementation of sustainable and cost-effective digital survivorship care models.

Trial Registration: PROSPERO CRD420251251151; https://www.crd.york.ac.uk/PROSPERO/view/CRD420251251151

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KEYWORDS

economic evaluation; digital health; cancer survivorship; artificial intelligence; AI

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Introduction

Background

Globally, the economic cost of cancer is projected to reach INT $25.2 trillion (in international dollars at constant 2017 prices) between 2020 and 2050 [1], driven not only by the increasing cost of health care but also by the needs of a rapidly expanding population of survivors of cancer worldwide [2]. China bears nearly a quarter of the world's new cancer diagnoses but has demonstrated substantial improvements in survival outcomes [3]. The overall 5-year survival rate for all cancers combined has increased significantly, rising from 30.9% (2003 to 2005) to a recent estimate of 43.7% (2019 to 2021) [4,5]. Similarly, in the United States, the number of survivors is projected to exceed 22 million by 2035 [6].

Cancer survivorship is not merely a period but a "complex state of being" that encompasses the physical, psychological, social, and economic challenges experienced by survivors and their families [7]. The success in oncology, however, has exposed a critical gap in the care continuum: the transition into long-term survivorship. At this stage, survivors' needs fundamentally shift—from a focus on acute treatment toward the ongoing management of complex physical symptoms, psychosocial symptoms, and financial burden. This evolution in survivors' needs highlights a significant challenge in delivering appropriate, sustainable, and cost-effective survivorship care [8]. The traditional cancer care model, focused on physician-led, phased outpatient care, is unable to provide survivors with the sustained and multidimensional health support they need during the survivorship stage [9,10]. Unaddressed needs, including psychosocial distress and inadequate symptom self-management, lead to increased health care use [11], reduced productivity [12], and lower quality of life [13], imposing a heavy burden on the health care system and society. In response, digital health—a broad category of technologies, including eHealth , mobile health, telemedicine, and AI—has emerged as a promising solution [14]. It uses technology and data to improve health care delivery [15], with the potential to improve clinical outcomes and optimize resource utilization.

Despite their growing implementation and demonstrated clinical benefits, the economic implications of digital health interventions in cancer survivorship care remain inadequately understood. The adoption of such technologies often requires substantial upfront investment, including infrastructure development, software licensing, hardware procurement, and workforce training, complicating economic assessment [16,17]. Consequently, a synthesis of existing economic evidence is essential to guide policy and investment decisions. To date, no systematic review has comprehensively synthesized the economic evidence relating to digital health interventions for cancer survivorship care. This protocol outlines the first systematic review designed to identify, synthesize, and appraise the economic evidence for digital health interventions in cancer survivorship, guided by the World Bank's framework for economic evaluation for digital health interventions [18]. This review aims to fill a critical research gap, providing the evidence base needed to translate promising digital tools from pilot projects into scalable and sustainable survivorship care models.

Review Question

This review focuses on the following question: What is the economic value of digital health interventions in supporting cancer survivorship care compared with alternative interventions?

Review Objectives

The objectives of this review are as follows: (1) to identify key economic and contextual parameters to inform future economic modeling and policy decision-making in cancer survivorship care; (2) to explore variations in cost-effectiveness results by intervention type, cancer type, and health care levels; and (3) to examine contextual and implementation factors influencing economic outcomes and clinical findings.

Methods

Study Design

This systematic review protocol has been registered in PROSPERO (CRD420251251151) and will be reported using the PRISMA-P (Preferred Reporting Items for Systematic Reviews and Meta-Analysis Protocols) checklist (Multimedia Appendix 1) [19]. This review will be informed by the World Bank's framework for economic evaluation of digital health interventions [18], which consists of five steps: (1) determine the context, (2) determine the intervention type, (3) establish the level of complexity, (4) set the analytic principles, and (5) represent the value proposition. The systematic review will include both full and partial economic evaluation studies of digital health interventions in cancer survivorship. Full economic evaluations systematically compare both the costs and outcomes of 2 or more interventions, including cost-effectiveness analysis, cost-utility analysis, cost-benefit analysis, cost-minimization analysis, and cost-consequence analysis. Partial economic evaluations provide the cost or cost and outcome of an intervention but do not compare them with an alternative intervention [20].

Search Strategy

The literature search will be conducted in 5 online databases: PubMed, Web of Science, Embase, and Scopus, as well as Google Scholar for gray literature. In addition, the reference list of the final selected studies will be consulted for further evidence. The key terms used include the following 4 search themes: digital health, survivorship, cancer, and economic evaluation. The complete retrieval strategy is provided in Multimedia Appendix 2.

Eligibility Criteria

Web-based survivorship care plan tools had begun to be implemented in real-world settings during 2007 to 2008 [21]. As these tools were in the early stages of implementation, studies published before this period were considered less likely to provide economic evaluation evidence on digital health interventions for cancer survivorship care. Therefore, 2008 was selected as the starting year for the literature search. Eligible

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study designs include trials and observational studies, with interventions required to be in the digital health category. Reviews, editorials, commentaries, conference abstracts, or protocols will be excluded. Digital health interventions may include web-based programs, mobile apps, SMS-based interventions, telemedicine, and video consultations. Studies focusing exclusively on nondigital interventions or lacking economic outcomes will be excluded. The detailed criteria for inclusion in this study are shown in Table 1.

Table 1. Study inclusion criteria.

PICOS[a]	Inclusion criteria
Population	Patients diagnosed with any type of cancer, regardless of the stage of disease progression
Intervention	Any tool based on digital health (eg, online programs, mobile health apps, SMS-based support, telehealth, and video consultations), as well as AI-enabled tools (eg, chatbots, predictive algorithms, and personalized feedback systems)
Comparator	Any comparator, including usual care, nondigital interventions, another digital health intervention, or no comparator for partial economic evaluations
Outcome	Economic outcomes, including intervention costs, health care costs, resource use, cost savings, incremental cost-effectiveness ratios, cost per quality-adjusted life year, benefit-cost ratio, and return on investment
Study design	Primary research studies, including trials and observational studies
Other	English-language studies and peer-reviewed studies

[a]PICOS: population, intervention, comparator, outcome, and study design.

Selection of Studies

All records retrieved from the databases will be imported into EndNote 21 (Clarivate) for reference management, and the review workflow will be managed using Covidence (Veritas Health Innovation). Duplicates will be removed prior to screening. We will then conduct the first round of screening based on the title and abstract. At the full-text stage, studies will be assessed against the predefined inclusion and exclusion criteria, with consideration of the intervention type, study population, and reported outcomes. Two reviewers will independently carry out the title and abstract screening and full-text screening. Any discrepancies between the 2 reviewers will be resolved through discussion with a third reviewer. The study selection procedure will be shown in a PRISMA-P flowchart.

Data Extraction

We will extract the following general and economic evaluation specific characteristics from the selected studies: author and publication year, geographical setting, study design, target population, type and description of digital intervention, type of economic evaluation, perspective, time horizon, and economic outcomes. Reported sensitivity analyses, key findings, and study limitations will also be extracted. Data extraction will be conducted by 1 reviewer and verified by a second reviewer.

Quality of Reporting and Risk of Bias Assessment

The reporting quality of the included studies will be assessed independently by 2 reviewers using the Consolidated Health Economic Evaluation Reporting Standards (CHEERS) checklist [22]. This tool provides a framework to assess the completeness of reporting in economic evaluations. Discrepancies will be resolved by a third reviewer. The results of the quality assessment will be summarized in tabular and graphical formats to identify patterns across included studies.

We will conduct a risk of bias assessment to appraise the internal validity of included studies and support the credibility of the synthesized findings. Assessment tools will be selected according to the study design. For randomized controlled trials, we will use the Cochrane Risk of Bias 2 tool, examining domains such as randomization, allocation concealment, blinding, incomplete outcome data, and selective reporting. For observational studies, we will apply the Newcastle-Ottawa Scale to evaluate the selection of study groups, comparability between groups, and outcomes.

Data Synthesis and Analysis

Results will be reported in accordance with the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analysis) guidelines [23]. Given the anticipated heterogeneity in digital health interventions, study populations, health care settings, and economic evaluation methods, a structured narrative synthesis will be conducted rather than a formal meta-analysis. The synthesis will be informed by the principles outlined in chapter 20 (“Economic Evidence”) of the *Cochrane Handbook for Systematic Reviews of Interventions* [24].

The characteristics and economic findings of the included studies will first be summarized in structured evidence tables. Studies will then be grouped into four primary digital health intervention categories: (1) mobile health, (2) eHealth, (3) telemedicine, and (4) AI. For interventions involving multiple digital health technologies, classification will be based on the primary intervention component described in the original study, while additional technological components will also be recorded. Where no primary component can be clearly identified, the intervention will be classified as multicomponent. Within these categories, economic findings will be synthesized separately by evaluation type (eg, cost-effectiveness analysis, cost-utility analysis, and partial economic evaluation) and economic perspective (eg, health care payer and societal).

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All cost data will be converted to international dollars and presented in 2026 value with adjustments for inflation. The review will report the economic outcomes regarding cost-effectiveness, including incremental costs, health outcomes, incremental cost-effectiveness ratios (ICERs), benefit-cost ratio, and the specific willingness-to-pay thresholds against which the study was evaluated. Findings from partial economic evaluations will be presented separately, and cost-effectiveness will not be inferred from cost data alone.

When economic findings differ across studies, their comparability will first be assessed in terms of interventions, comparators, outcome measures, and economic evaluation methods. Subsequently, potential reasons for inconsistent results will be explored by examining differences in study populations, intervention characteristics, health care settings, economic evaluation methods, analytic perspectives, time horizons, and cost components. Reported sensitivity analyses, reporting quality assessed using CHEERS, and risk of bias assessed using appropriate tools will also be considered. Findings will be presented in structured summary matrices to illustrate patterns across studies. Where inconsistencies cannot be adequately explained, findings will be reported separately.

Ethical Considerations

This protocol does not require ethics approval. The results of the systematic review will be published in peer-reviewed journals and presented at national and international conferences.

Patient and Public Involvement

No patients or members of the public were involved in the design, conduct, reporting, or dissemination plans of this research, as this is a protocol for a systematic review of existing literature.

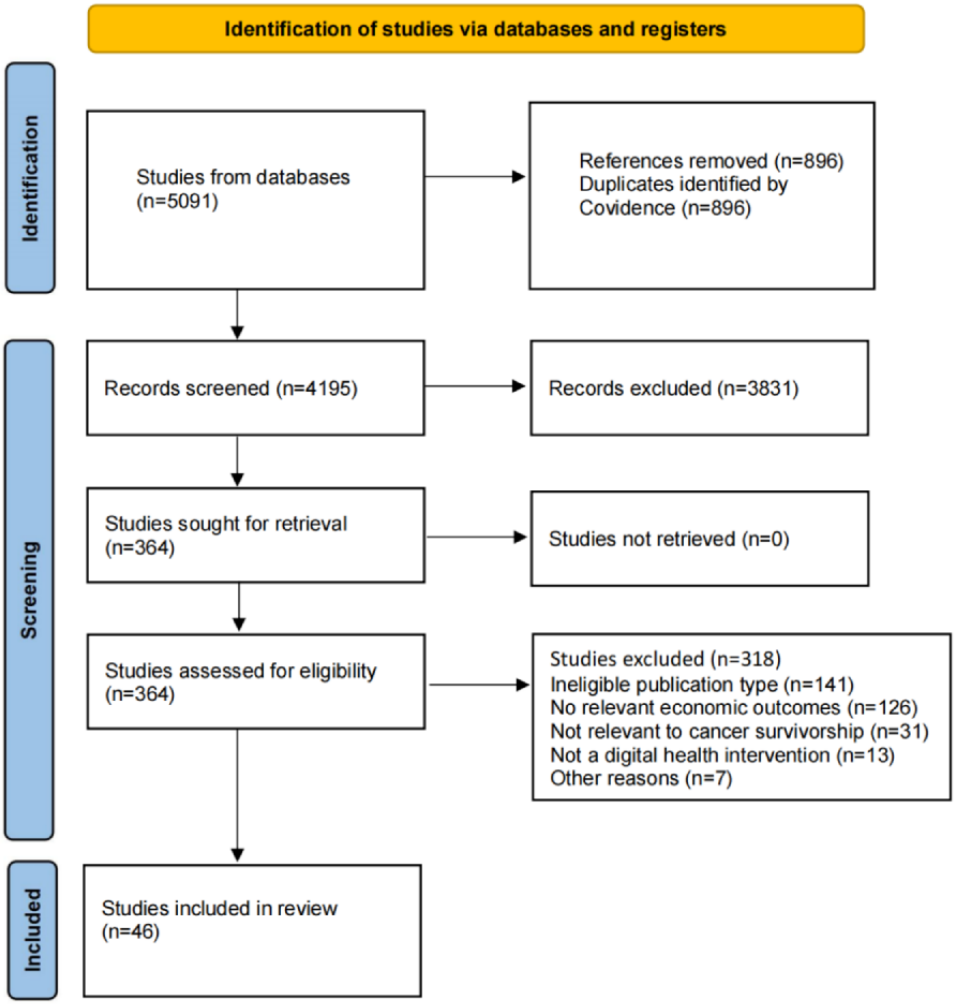
Results

This systematic review was registered with PROSPERO on January 19, 2026 (CRD420251251151). The review started on December 15, 2025, and is expected to be completed by January 2027. The database searches identified 5091 records. After the removal of 896 (17.6%) duplicates using Covidence, 4195 records remained for title and abstract screening. Following title and abstract screening, 3831 records were excluded, 364 (8.7%) records were advanced to full-text eligibility assessment, and 46 studies were included in the review (Figure 1). As of November 2026, data extraction has been completed, while quality assessment and data synthesis are ongoing.

The completed review is expected to synthesize economic evidence on digital health interventions for cancer survivorship care, including costs, cost-effectiveness, budget-related outcomes, and other cost-related outcomes. The findings are expected to identify methodological trends, contextual factors, and evidence gaps to inform future economic modeling, policy evaluation, and implementation of digital survivorship care.

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Figure 1. PRISMA-P (Preferred Reporting Items for Systematic Review and Meta-Analysis Protocols) selection flowchart.



Discussion

Anticipated Findings

This systematic review will contribute to the evidence base at the intersection of cancer survivorship, digital health, and health economics. While prior research has largely focused on the clinical effectiveness of digital interventions for discrete survivorship outcomes, the economic value of these technologies across the survivorship continuum remains insufficiently synthesized [25-27]. By systematically evaluating and integrating available economic evidence, this review will address a critical gap concerning the cost-effectiveness and value for money of digital health interventions in survivorship care. The findings will provide evidence to inform health care policy, resource allocation, and implementation decisions. In addition, stakeholder engagement may support contextual interpretation of results and facilitate translation into clinical practice and sustainable care models.

From the perspectives of health care payers and health care institutions, this review is intended to inform decision-making regarding resource allocation and reimbursement for digital health services [28]. For payers, it will synthesize evidence on ICERs and budget impact, directly informing coverage and reimbursement policies by identifying which options offer the best value for money within established willingness-to-pay thresholds [29]. Concurrently, for health care institutions such as hospitals and clinics, this review will clarify how digital health interventions can be economically efficient and support a more rational allocation of health care resources [30,31]. The evidence will highlight operational efficiencies (eg, reducing unnecessary in-person visits or staff workload) and opportunities to alleviate pressure on offline services and optimize clinical capacity, thereby informing providers' decisions about service planning [32].

From the patient's perspective, this review will integrate evidence on how digital interventions impact their overall well-being. While this may include alleviating "financial toxicity" by reducing direct out-of-pocket expenses and nonmedical supplies, the perspective extends to more fundamental health outcomes. By enabling self-management and remote monitoring, digital interventions can facilitate the early detection of adverse events or disease recurrence. This may translate into specific clinical benefits, such as improved overall survival [33]; reduced hospital readmissions [34]; and, ultimately, improved health-related quality of life [35]. Therefore, our synthesis will seek evidence on outcomes such as quality-adjusted life years gained, which outline these crucial health benefits and represent the ultimate value from the patient's perspective.

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Finally, the societal perspective offers the most comprehensive assessment of an intervention's value by accounting for all costs and consequences. The total economic burden of cancer includes substantial indirect costs, such as productivity losses for both survivors and their caregivers [36]. A synthesis of studies of the societal perspective is expected to demonstrate that even interventions with higher upfront costs may generate significant net savings for society by enabling survivors and caregivers to return to work sooner. This macro perspective is essential for developing sustainable public health strategies to manage the growing population of survivors of cancer.

Strengths and Limitations

This systematic review protocol has several notable advantages. First, this will be the first systematic review to comprehensively identify and synthesize the economic evidence for digital health interventions specifically among survivors of cancer. Second, reporting quality (CHEERS) and risk of bias (Risk of Bias 2 and Newcastle-Ottawa Scale) will be assessed independently. This multidimensional approach will allow us to evaluate both the methodological quality of the included studies and the completeness of their reporting.

However, the review may face limitations related to heterogeneity. We expect variations in the digital interventions (eg, SMS vs complex apps), populations (different cancer types and stages), and health care settings (diverse national systems and cost structures). This heterogeneity may preclude a formal meta-analysis and will require a structured narrative synthesis instead. Second, the potential for publication bias is a concern, as studies demonstrating the cost-effectiveness of digital interventions may be more likely to be published than those with negative outcomes. To mitigate this risk, efforts will be made to identify relevant gray literature during the search process. Finally, the rapid evolution of digital health technologies may limit the applicability of older economic evaluations to current health care settings, as technological capabilities, implementation costs, and health care delivery models change over time.

Conclusions

This systematic review will address an important evidence gap by evaluating the economic value of digital health interventions for cancer survivorship care. The results will help clarify whether, how, and under what conditions these interventions may offer value for money across different cancer populations, intervention types, and health care contexts. The findings will inform future research, economic modeling, and policy decisions regarding the sustainable implementation of digital survivorship care.

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Generative AI Use

The authors declare that generative AI was not used in the preparation of this manuscript.

Authors' Contributions

XW, YH, RL, and HH-B contributed to the conception and design of the study protocol. JL drafted the initial manuscript. RL, XW, YH, and HH-B critically reviewed the manuscript for important intellectual content. All authors read and approved the final manuscript for publication. RL is the guarantor of the review.

Conflicts of Interest

None declared.

Multimedia Appendix 1

PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) checklist.
[DOCX File , 30 KB-Multimedia Appendix 1]

Multimedia Appendix 2

Search strategy.
[DOCX File , 20 KB-Multimedia Appendix 2]

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Abbreviations

CHEERS: Consolidated Health Economic Evaluation Reporting Standards
ICER: incremental cost-effectiveness ratio
PRISMA: Preferred Reporting Items for Systematic Reviews and Meta-Analyses
PRISMA-P: Preferred Reporting Items for Systematic Review and Meta-Analysis Protocols

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