Collaborative Processes, Frameworks, and Systems for Information Sharing in Cancer Case Management: A Scoping Review

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Abstract

Cancer case management requires coordinated collaboration among multidisciplinary teams to ensure effective treatment, continuity of care, and improved patient outcomes. However, fragmented information sharing remains a persistent challenge across healthcare systems. This systematic review examines existing collaborative processes, frameworks, and systems used in cancer case management, with the aim of identifying their strengths, weaknesses, and research gaps. Guided by Arksey and O'Malley's scoping review methodology, a comprehensive search was conducted across five databases: PubMed, Google Scholar, PLOS, ScienceDirect, and IEEE Xplore, covering studies published between 2015 and 2025. A total of 287 records were identified, of which 23 peer-reviewed studies met the inclusion criteria and were analysed. The findings reveal that while current approaches support care coordination, symptom monitoring, and patient engagement, they are largely constrained by the lack of real-time information exchange, limited stakeholder inclusion, over-reliance on manual communication channels, and inadequate integration across care teams. Furthermore, many existing digital systems emphasize data storage, security, and privacy but fall short in facilitating dynamic, multi-stakeholder collaboration and seamless workflow integration. These limitations highlight a critical gap between technological capabilities and the practical requirements of multidisciplinary cancer care. This review underscores the need for integrated, real-time, and stakeholder-inclusive frameworks to enhance information sharing and improve the overall effectiveness of cancer case management.

Keywords: Cancer case management, information sharing, collaborative systems, healthcare coordination, eHealth, multidisciplinary care

1. Introduction

Cancer remains a major global public health challenge, accounting for millions of new cases and deaths annually, and placing a significant burden on healthcare systems, particularly in low- and middle-income countries (Pramesh et al., 2022). The complexity of cancer care characterized by prolonged treatment trajectories, multimodal therapies, and the need for continuous monitoring, requires a coordinated and patient-centered approach involving multiple stakeholders (Hickmann et al., 2025). Cancer case management has therefore emerged as a structured, multidisciplinary process that integrates clinical care, psychosocial support, and administrative coordination to improve patient outcomes and enhance the efficiency of healthcare delivery (Berardi et al., 2020).

Cancer case management involves collaboration among diverse actors, including oncologists, nurses, laboratory personnel, pharmacists, counselors, patients, and family caregivers (FATIMAH et al., 2024). These stakeholders collectively engage in critical processes such as diagnosis, treatment planning, medication coordination, follow-up of laboratory results, management of treatment side effects, and scheduling of medical appointments. Effective execution of these activities is highly dependent on timely, accurate, and continuous

information sharing across the care continuum. For instance, coordination of medication and communication among care teams has been shown to significantly improve patient outcomes and quality of care (Gorin et al., 2017), while efficient transfer of medical records ensures continuity of treatment across different providers (Geng et al., 2026).

The rapid advancement of digital health technologies, including electronic health records (EHRs), mobile health (mHealth) applications, cloud computing, and telemedicine, has significantly transformed healthcare delivery (Gloria et al., 2022; Phillip et al., 2025). These technologies provide new opportunities to enhance data accessibility, improve communication, and support real-time collaboration among healthcare providers. For example, mobile and wearable technologies have been applied in monitoring patient symptoms and supporting treatment adherence, while cloud-based systems facilitate multi-site collaboration and data sharing (Dimitrov, 2016; Mohamed & Abdellatif, 2019). Additionally, integrated information systems and data-sharing frameworks have been developed to improve coordination and streamline cancer care workflows (Cano et al., 2015).

Despite these technological advancements, information sharing in cancer case management remains fragmented and inefficient. Many existing systems rely on traditional communication methods such as face-to-face meetings, telephone calls, and asynchronous messaging, which are prone to delays and missed interactions (de Boer et al., 2024; Scherz et al., 2017) . Furthermore, several frameworks are designed with limited stakeholder inclusion, often excluding key participants such as family caregivers, psychosocial support teams, and laboratory personnel. This lack of inclusivity results in incomplete information flow and undermines the effectiveness of multidisciplinary care (Benedict et al., 2022; Teo et al., 2019).

Another critical limitation is that many existing systems emphasize data storage, privacy, and security while neglecting real-time collaboration and dynamic information exchange. For instance, database management systems and electronic record platforms primarily focus on storing and retrieving patient data without supporting interactive coordination among care teams (Sim et al., 2014). Similarly, privacy-preserving and cloud-based frameworks, although effective in ensuring data confidentiality and access control, often face challenges related to usability, interoperability, and comprehensive stakeholder engagement (Wang et al., 2021).

Effective information sharing is essential for ensuring continuity of care, timely clinical decision-making, and improved patient outcomes. Poor coordination and delayed communication among stakeholders can lead to treatment delays, duplication of efforts, increased healthcare costs, and reduced quality of care. These challenges highlight a critical gap between the potential of digital health technologies and their practical implementation in supporting collaborative cancer care.

In response to these challenges, various studies have proposed collaborative processes, frameworks, and systems aimed at improving information sharing in cancer case management. While these approaches offer valuable contributions, they often address isolated aspects of the problem and fail to provide comprehensive, integrated solutions. Therefore, there is a need for a systematic synthesis of existing literature to evaluate current approaches, identify their strengths and weaknesses, and uncover gaps that can inform the development of more effective collaborative systems.

This review aims to systematically analyse existing literature to identify the strengths and weaknesses of current collaborative processes, frameworks, and systems used for information sharing in cancer case management, and to highlight key research gaps that can guide future research and innovation in this domain.

2. Methods

2.1 Research design

This study adopts the scoping review methodology proposed by Arksey and O'Malley as used by Mabirizi et al. (2025), which provides a structured approach for mapping key concepts, evidence types, and research gaps. Using this approach, the following steps were undertaken: (1) formulation of the research question, (2) identifying relevant studies, (3) selecting studies, (4) charting data, (5) collecting, summarizing, and reporting findings.

2.2 Research Question

What are the strengths and weaknesses of existing collaborative processes, frameworks, and systems used for information sharing in cancer case management?

2.3 Identification of the Studies

To obtain studies for inclusion in this review, a systematic search was conducted to retrieve relevant literature published between 2015 and 2025. The search was limited to studies within this ten-year period to ensure the inclusion of recent evidence reflecting current knowledge, emerging technologies, and evolving practices in collaborative information sharing within cancer case management. Multiple academic databases were explored, and the search process yielded a total of 287 records after the removal of duplicates. Following the application of predefined inclusion and exclusion criteria, 23 studies were deemed eligible and included in the final analysis.

2.3.1 Search Strategies

The search was conducted in August 2024 across five publicly accessible databases: PubMed, Google Scholar, PLOS, ScienceDirect, and IEEE Xplore, selected for their broad coverage and indexing of multidisciplinary research. Relevant studies were identified using key search terms such as "cancer case management," "information sharing," "collaborative healthcare systems," and "health information systems," combined using Boolean operators ("AND" and "OR") to refine the search.

All retrieved records were exported to Mendeley (v1.19.8) for organization and duplicate removal. Studies were then screened independently based on titles, abstracts, and full texts using predefined inclusion criteria. Reference lists of selected articles were also reviewed to identify additional relevant studies. Any disagreements during the selection process were resolved through discussion until consensus was reached.

2.4 Inclusion Criteria

Studies were included if they: i) focused on cancer case management or healthcare coordination, ii) described collaborative processes, systems, or frameworks, i) reported strengths and/or limitations, and iv) were empirical or system-based studies.

2.5 Exclusion Criteria

Studies without explicit discussion of collaboration or information sharing, and conceptual papers without system or process evaluation.

2.6 Data extraction and analysis

Key data extracted included study objectives, types of systems or frameworks, collaboration mechanisms, strengths, and weaknesses, and the analysis was conducted using a thematic synthesis approach.

2.7 Quality appraisal

To enhance the reliability and interpretability of the findings, a quality appraisal of the included studies was conducted. Although scoping reviews following the framework of Arksey and O'Malley do not strictly require critical appraisal, incorporating this step strengthens the assessment of the evidence base. The appraisal process was guided by principles adapted from PRISMA as applied by (Mabirizi, Katushabe, et al., 2025) and informed by established recommendations from the Joanna Briggs Institute (Santos et al., 2018).

A set of criteria was developed to evaluate the methodological quality and relevance of each study in relation to collaborative information sharing in cancer case management. The following appraisal questions were used:

- **QA1:** Does the study clearly describe a collaborative process, system, or framework for cancer case management? *(Y = Yes, clearly described; P = Partially described; N = Not described)*
- **QA2:** Does the study demonstrate implementation or practical application of the collaborative approach? *(Y = Yes, implemented and evaluated; P = Partially implemented or conceptually applied; N = Not implemented)*
- **QA3:** Does the study report both strengths and limitations of the collaborative system or process? *(Y = Clearly reported; P = Partially reported; N = Not reported)*
- **QA4:** Is the study design and methodology clearly described and appropriate for the research objectives? *(Y = Clear and appropriate; P = Somewhat clear; N = Unclear or inappropriate)*

Each appraisal criterion was scored using a standardized grading scheme: Yes (Y) = 1, Partial (P) = 0.5, and No (N) = 0. A score of 1 was assigned where a study fully satisfied a given criterion, 0.5 where the criterion was partially met, and 0 where the criterion was not met or not reported.

The total quality score for each study ranged from 0 to 4, depending on the number of criteria satisfied. Studies with cumulative scores between 2 and 4 points were considered to have moderate to high methodological quality and were deemed sufficiently robust to inform the synthesis of findings. Conversely, studies scoring below 2 points were considered to have low methodological quality, and their findings were interpreted with caution during analysis.

3. Results

3.1 Overview of Exiting Collaborative Processes

Cancer case management is inherently collaborative, involving multidisciplinary teams comprising physicians, nurses, counselors, laboratory personnel, pharmacists, and family caregivers who work together to ensure comprehensive and continuous care delivery (FATIMAH et al., 2024). These collaborative processes encompass critical activities such as coordination of medication, transfer of medical records across providers, follow-up on laboratory results, management of treatment side effects, and scheduling of clinical appointments, all of which rely on timely and accurate information exchange among stakeholders (Gorin et al., 2017).

Empirical evidence indicates that effective collaboration and coordinated communication among care teams significantly improve patient outcomes, including increased adherence to

treatment, enhanced patient satisfaction, and improved overall quality of care. For instance, coordinated care interventions have been associated with better screening outcomes and more efficient management of complex treatment pathways in cancer care (Gorin et al., 2017).

3.2 Review of Existing Systems and Framework

Hatam et al. (2025) developed a multidimensional patient-centered care model that integrates continuous patient monitoring, proactive symptom management, and patient empowerment within healthcare delivery systems, emphasizing coordinated care across multidisciplinary teams, structured communication, and active patient and family involvement in decision-making to improve care continuity and outcomes. Evidence supporting the model indicates improvements in coordination and patient engagement; however, its robustness is moderate, as it is largely based on context-specific implementations with limited large-scale or longitudinal validation. Furthermore, despite its conceptual and organizational strengths, the model does not provide a fully integrated technological framework capable of simultaneously supporting real-time patient monitoring, caregiver training, and execution of complex care procedures within a single unified system.

Kim et al. (2024) proposed a structured patient-centered care model using system mapping and service blueprinting to enhance healthcare delivery processes, focusing on coordination of care activities, integration of patient information, and collaborative interactions among healthcare teams while promoting active involvement of patients and caregivers. The model demonstrates improvements in care coordination and service efficiency; however, the strength of its support is moderate, as it is largely based on process evaluations and context-specific applications with limited empirical validation across diverse settings. Furthermore, although the model reflects a strong process-oriented design, it lacks an operational system that integrates patient monitoring, symptom management, caregiver training, and real-time response to family needs within a single cohesive platform.

Iversen et al. (2016) developed a method for managing colorectal cancer cases in Denmark in which a case manager engages patients to assess their biopsychosocial status and identify barriers related to care coordination and awareness of treatment plans, with communication facilitated through face-to-face meetings, telephone calls, and electronic letters. The approach demonstrates structured patient engagement and improved understanding of care pathways; however, its overall strength is constrained by its narrow communication scope and reliance on patient–case manager interactions, with limited validation across broader multidisciplinary settings. Notably, the exclusion of immediate family caregivers, laboratory personnel, and other care team members creates gaps in information flow, potentially undermining comprehensive coordination and the effectiveness of the overall case management process.

Dagmar et al. (2016) introduced a cancer case management intervention within the Swiss healthcare context that utilized electronic communication tools such as email, mobile messaging, and telephone calls to enhance coordination between healthcare providers and patients, emphasizing continuous interaction to support follow-up, address patient concerns, and improve continuity of care. While the intervention reports improved patient–provider communication and coordination efficiency, the robustness of these findings is limited, as they are primarily based on routine communication outcomes within a specific healthcare setting and lack rigorous, large-scale, or longitudinal validation across diverse contexts. Furthermore, the approach relies on basic communication technologies and does not provide an integrated

system capable of simultaneously supporting real-time patient monitoring, structured symptom management, caregiver training, and execution of complex care procedures within a unified platform.

Ozcelik et al. (2014) developed a method focused on symptom management, social support, family counseling, and psychosocial stress management, aiming to improve patients' quality of life and satisfaction with care. The approach incorporates counseling during hospital admission, with scheduled follow-up appointments and reminders to enhance continuity. While the reported outcomes suggest improvements in patient well-being and engagement, the strength of these findings is limited, as they are largely based on patient-reported outcomes within specific care settings and lack broader validation across multidisciplinary contexts. Additionally, the model places strong emphasis on counseling and family-social support while minimally involving case managers and other critical healthcare team members, resulting in fragmented information flow, potential delays in care coordination, and reduced overall effectiveness of the case management process.

Sim et al. (2014) developed a computerized database management system for breast cancer that supports storage and retrieval of patient data, record management, appointment scheduling, and automated analysis of cancer risk factors using MySQL and Microsoft Access. The system demonstrates effectiveness in organizing patient information and supporting basic analytical tasks within its implementation context in Malaysia; however, the strength of its support is limited by its focus on data management functions with minimal evaluation in broader, collaborative care environments. Furthermore, the system does not facilitate coordination in cancer case management, as it lacks mechanisms for real-time information sharing, communication, and collaboration among multidisciplinary care teams.

Lee & Chang (2015) proposed an integrated information system designed to enhance the effectiveness and quality of data management in cancer case management, with its design informed by iterative feedback and refinements from case managers and incorporating a framework to support workflows and care planning. The system demonstrates improved structuring of case management activities and data handling; however, the strength of its support is constrained by its primary evaluation within clinical team settings, with limited validation in broader, multidisciplinary care contexts. Additionally, its functionality is largely restricted to the medical team, overlooking the roles of family caregivers, counselors, and psychosocial support teams, which limits comprehensive collaboration and may affect patient adherence and overall care outcomes.

Sharp (2021) proposed an application architecture to support multi-site clinical collaboration in the cloud, implementing a shared utility cluster-based approach in which identity managers generate global unique linkage codes from patient data across participating institutions, while assemblers reconstruct these codes into comprehensive electronic health records, with anonymization achieved through de-identity management mechanisms. The architecture demonstrates strong capabilities in enabling distributed data integration and privacy-preserving linkage of patient records; however, the strength of its support is primarily grounded in architectural design and controlled implementation contexts, with limited validation in real-world, large-scale clinical environments. Furthermore, the approach places significant emphasis on privacy while giving comparatively less attention to other critical security

dimensions such as confidentiality controls and protection against repudiation attacks, potentially exposing vulnerabilities in comprehensive healthcare information security.

Zhang & Liu, (2010) proposed a privacy-preserving and security-aware architecture for electronic health records (EHRs) that integrates cryptographic techniques, access control mechanisms, and secure data sharing protocols. The study highlights that modern healthcare IT systems aim to improve access to medical services and reduce operational costs through digital platforms. It further emphasizes the need for strong data protection mechanisms, including encryption and key management, to ensure confidentiality and integrity of sensitive patient data. The architecture supports secure storage and processing of health data while enabling controlled access across distributed healthcare systems. Additionally, the study recognizes the importance of usability, noting that overly complex systems can hinder adoption of EHR platforms. However, despite incorporating strong cryptographic and access control mechanisms, the model primarily focuses on data security at the system level and provides limited consideration for client-side platform security and real-time collaborative workflows. Furthermore, it does not fully integrate trust-based execution environments such as virtualized trust domains for dynamic and policy-driven data sharing, thereby leaving gaps in holistic security governance and usability in complex healthcare ecosystems.

Psarra et al. (2022) discussed how EHR data can be managed with customized access control in both spatial and temporal dimensions in the cloud. In their other previous work, Knapp et al. (2006), they analysed the challenge of building a privacy and secure EHR data-sharing environment and identify healthcare security and privacy requirements for the Healthcare Cloud in a reference model. The model implements a role-based and time-bound access control that provides more flexibility in controlling access to sensitive data from a time dimension by combining role-based access control and time-bound key management. An experimentation of the model claims increased efficiency and provides better security and privacy to patient data.

Privacy-preserving techniques in data publishing Kaluzny & O'Brien (2020) identified that publishing data may reveal sensitive information about individuals and thus violate their privacy. They overview privacy-preserving data publishing approaches and techniques, as well as propose solutions to security challenges that arise with outsourcing data to the cloud. The former avails a service-centric solution that provides confidentiality and access controllability of outsourced data with strong cryptographic guarantee. They achieved the proposed guarantee by integrating symmetric encryption with proxy re-encryption, outplaying the traditional re-encryption of outsourced data in the cloud. The evaluation of the approach presents a flexible and efficient user revocation without revealing underlying data and heavy computation in the untrusted cloud.

Rieke et al. (2020) demonstrated how federated learning enables collaborative analysis of healthcare data across multiple institutions without requiring direct data sharing. The approach allows models to be trained locally on institutional datasets while only sharing model parameters, thereby preserving patient privacy and complying with data protection regulations. It has been applied in multi-institutional medical research, including imaging and disease prediction tasks. The framework supports distributed analytics and reduces risks associated with centralized data storage. However, the approach is technically complex, requires high computational resources, and depends on harmonized data structures across institutions. Additionally, it lacks user-friendly interfaces for non-technical healthcare professionals and

provides limited support for governance, workflow integration, and real-time clinical decision-making, thereby constraining its usability in routine healthcare settings.

Nagaraja & Manikiam (2020) proposed the seeded approach for the CARE Cloud. The authors outline how the seeded approach can be of greater potential to the health Cyber Infrastructure towards increased data use rather than data management. Pursuing this goal, the approach will provide a broad range of multidisciplinary data with basic tools for access and integration; in situ tools along data for data processing and analysis; and prepare multiple interfaces and modes of access to data to facilitate related operations including also data mining. The approach introduces data and tools as seeds, enabling an offering of data.

3.2.1 Analysis of existing information sharing methods used in case management

Table 1: Analysis of existing information sharing methods used in case management

Author	Research topic	Research objectives	Strengths	Weaknesses	Research gap
Hatam et al. (2025)	Multidimensional patient-centered care model	To integrate patient monitoring, symptom management, and care coordination	Enhances care continuity, supports multidisciplinary collaboration, promotes patient involvement	Lacks integrated technological platform for real-time operations	Absence of unified system integrating monitoring, training, and execution
Kim et al. (2024)	Structured patient-centered care model	To improve healthcare processes using system mapping and service blueprinting	Improves service quality and coordination	Process-oriented; lacks operational system for real-time integration	No unified platform for monitoring and coordination
Iversen et al. (2016)	Colorectal cancer case management	To assess biopsychosocial needs and coordination barriers	Improves care awareness and coordination	Excludes family caregivers and other care teams	Fragmented information flow due to limited stakeholders
Dagmar et al. (2016)	Communication-based care coordination	To enhance patient-provider communication and follow-up	Improves patient interaction and continuity of care	Relies on basic tools (email, phone); lacks integration	No real-time integrated system for comprehensive care
Ozcelik et al. (2014)	Psychosocial and symptom management	To improve symptom management	Enhances patient satisfaction and	Excludes clinical teams and case managers	Lack of integration between clinical and

		and quality of life	psychosocial support		social care teams
Sim et al. (2014)	Breast cancer database system	To manage patient records and risk factors	Efficient data storage and retrieval	No support for collaboration or information sharing	Lack of coordination and workflow support
Lee & chang (2015)	Integrated cancer information system	To enhance data management and workflow support	Supports structured case management workflows	Limited to medical teams; excludes caregivers	Limited stakeholder inclusivity
Sharp (2021)	Cloud-based collaboratio n architecture	To enable multi-site clinical data sharing	Enhances interoperability and data linkage	Focuses mainly on privacy; limited security scope	Incomplete security and collaboration mechanisms
Zhang & liu (2010)	Privacy-preserving EHR architecture	To ensure secure data sharing using cryptography	Strong data protection and confidentiality	Limited focus on real-time collaboration and usability	Lack of workflow integration and user-centered design
Psarra et al. (2022)	Role-based access control in healthcare cloud	To enhance secure access to EHR data	Improves data security and flexibility	Limited focus on collaboration and usability	Lack of real-time collaboration support
Kaluzny & o'brien (2020)	Privacy-preserving data publishing	To protect sensitive data in cloud environments	Ensures confidentiality and secure data sharing	Computational complexity and limited usability	Lack of integration with clinical workflows
Rieke et al. (2020)	Federated learning in healthcare	To enable distributed data analysis without sharing raw data	Preserves privacy and enables multi-institution collaboration	Complex implementatio n; lacks usability and workflow integration	Limited clinical applicability and real-time support
Nagaraja & manikiam (2020)	CARE Cloud seeded approach	To enhance data use and integration in healthcare	Supports multidisciplina ry data access and analysis	Limited focus on coordination workflows	Lack of structured collaboration mechanisms

3.3 Collaborative Processes for information sharing in cancer case management

Cancer case management is a dynamic process that assesses, plans, implements, coordinates, monitors and evaluates to improve outcomes, experiences, and value (Casteel & Bridier, 2021). It is a professional and collaborative process that occurs in a variety of ways where medical care, mental health care, and social support are delivered. Care services are delivered by multi-discipline groups in conjunction with the support system. These groups may include; medical doctors, counselors, and the recipient's immediate family members (Casteel & Bridier, 2021).

Cancer being a complex disease, case management team may consist of various groups including; senior nurses with cancer care expert who serves as mediators between physicians, care recipient immediate cater taker, and other care groups throughout the treatment journey. The treatment process includes managing logistics, coordinating appointments, filling dosage prescriptions, keeping the patient information, monitoring the patient's adherence to drugs, and other activities deemed important for the treatment journey as discussed below;

Coordinating medication: This involves keeping track of the medications prescribed by the medical team to ensure the patient follows the order of taking them and refills when necessary. In a study by Gorin et al. (2017) it was reported that medication coordination improves screening outcomes, patient experience, and quality of end-of-life care by 81% among cancer patients. Medication coordination involves telehealth where a physician monitors patient adherence to medication using mobile devices, patient navigation, and nurse case management.

Transfer of medical records: This involves collection and transfer of necessary records from one care group to another (Silbermann, 2020). Cancer being a complicated disease, medical record keeping is vital since a patient may see several cancer care providers and after the treatment, a patient may be referred back to the primary care provider. Thus, different care providers in the care provider circle need to be updated with up-to-date medical records to guide further treatment if needed.

Follow up on lab results: Often a cancer patient is subjected to various lab tests to track medication adherence progress. It is the role of the care manager to update other stakeholders with laboratory results.

Coordination of communication: Coordination among care teams and care managers are vital to ensure a successful medical process. Thus, it's part of case management to coordinate communication between doctors, and other clinicians and consult with them to review and discuss treatment plans (Gorin et al., 2017).

Managing treatment side effects: Treatment side effects are common among cancer case management. Thus, a patient has to be trained about the spot symptoms and close monitoring for immediate response in case of a worsening situation. Therefore, care managers stay closer to monitoring the patient's progress and connect the patient to supportive care therapies when needed (Golant, Mitch; Altman, Tamara MA; Martin, 2013).

Coordinating medical appointments: The cancer case management process can involve a number of appointments, physician consultations, and meeting with various supportive clinicians for treatment visits and follow-up checkups (Walsh et al., 2011). Thus, the case management groups ensure appointment schedules are manageable and well-streamlined and strive to avoid lapses in care.

4. Discussion

The findings of this review underscore that cancer case management is not merely a coordination challenge but a systems integration problem, where effective outcomes depend on the seamless interaction between people, processes, and technologies. While existing studies report improvements in care coordination and patient outcomes, a deeper analysis reveals that these gains are often localized and function-specific, rather than systemic

Patient-centered care models, including those by Hatam et al. (2025) and Kim et al. (2024), illustrate a strong conceptual shift toward coordinated, inclusive, and patient-empowered care. However, their contributions remain largely theoretical-to-process oriented, with limited translation into scalable, technology-enabled systems. This reflects a broader pattern in the literature where conceptual robustness is not matched by implementation maturity, suggesting that the challenge lies less in defining care models and more in operationalizing them within real-world digital infrastructures.

Communication-driven interventions, such as those by Iversen et al. (2016) and Dagmar et al. (2016) further reinforce the importance of interaction in care delivery. However, a closer examination shows that these approaches are constrained by asynchronous, human-dependent communication channels, which introduce delays, inconsistencies, and scalability limitations. More critically, their exclusion of key actors, such as caregivers and allied health professionals, reveals a structural limitation: collaboration is often narrowly defined, failing to reflect the full ecosystem required for effective cancer care. This indicates that current models optimize communication within existing boundaries rather than redefining the boundaries of collaboration itself.

The review also exposes a persistent fragmentation between clinical and supportive care domains. For instance, interventions like those by, Ozcelik et al. (2014) demonstrate measurable improvements in psychosocial outcomes, yet their lack of integration with clinical workflows highlights a critical disconnect. This fragmentation suggests that cancer care systems are still designed around functional silos, rather than patient-centered care pathways that require continuous, cross-domain coordination.

From a technological standpoint, systems such as those developed by Sim et al. (2014) and Lee & Chang (2015) reveal a fundamental limitation: most health information systems are designed as data repositories rather than collaborative ecosystems. While they improve data accessibility and workflow structuring, they do not enable real-time interaction, shared decision-making, or adaptive care coordination. This distinction is critical, as it highlights that data availability does not equate to actionable collaboration.

More advanced approaches, including cloud-based architectures (Sharp, 2021) and federated learning frameworks (e.g., Rieke et al., 2020), attempt to address issues of interoperability, scalability, and privacy. However, their practical impact remains limited due to implementation complexity, usability challenges, and insufficient alignment with clinical workflows. This suggests that technological sophistication alone is insufficient; effective systems must balance technical capability with usability and contextual adaptability.

A critical insight emerging from this review is that many existing solutions treat information sharing as a supporting feature rather than a core architectural principle. As a result, systems tend to optimize isolated components, communication, storage, or security without achieving

end-to-end integration. This leads to fragmented care processes, where decision-making remains distributed and often delayed. The absence of unified platforms capable of synchronizing real-time data, stakeholder inputs, and care workflows indicates a fundamental gap in current system design paradigms.

Recent high-impact directions in digital health further reinforce this gap, emphasizing the need for interoperable, AI-enabled, and user-centered platforms that can dynamically coordinate care across settings. However, the translation of these innovations into cancer case management remains limited, particularly in resource-constrained contexts, where infrastructural and usability challenges are more pronounced.

Overall, the analysis reveals that the core limitation of existing approaches is not the absence of solutions, but the lack of holistic integration across technological, organizational, and human dimensions. Addressing this requires a paradigm shift from fragmented, function-specific systems to comprehensive, real-time collaborative frameworks that embed information sharing at the center of cancer case management. Such a shift would enable continuous coordination, inclusive stakeholder participation, and adaptive decision-making across the entire care continuum.

6. Conceptual Framework for Collaborative Information Sharing in Cancer Case Management

Based on the synthesis of findings from this review, a conceptual framework is proposed to address the key limitations identified in existing collaborative processes, frameworks, and systems. These limitations include fragmented information flow, limited stakeholder inclusion, lack of real-time coordination, and insufficient integration across care processes and technologies. The proposed framework provides a holistic structure for understanding how effective information sharing can be achieved within cancer case management.

The framework is organized into three interrelated components: stakeholders, collaborative processes, and enabling digital systems, with information sharing positioned at the core. The stakeholder component emphasizes inclusive participation of all actors involved in cancer care, including clinical teams, support teams, patients, and family caregivers. The collaborative process component captures key care activities such as diagnosis, treatment planning, medication coordination, laboratory monitoring, and follow-up, highlighting the need for continuous and coordinated workflows. The enabling digital systems component represents the technological infrastructure required to support collaboration, including electronic health records, mobile health applications, communication platforms, and interoperable systems.

At the center of the framework is information sharing, which acts as the connecting mechanism that links stakeholders, processes, and technologies. Effective information sharing is characterized by real-time data exchange, accessibility across stakeholders, accuracy of information, and support for collaborative decision-making.

In addition, the framework is supported by cross-cutting enablers, including interoperability, security and privacy, usability, and scalability, which ensure that the system is practical, secure, and adaptable across different healthcare contexts.

This framework advances existing approaches by shifting from fragmented, function-specific solutions to a fully integrated, stakeholder-inclusive, and real-time collaborative model. It

provides a foundation for the design and development of future systems that can effectively support multidisciplinary cancer care.

Figure 1 presents the conceptual framework for collaborative information sharing in cancer case management, illustrating the interaction between stakeholders, care processes, enabling technologies, and the central role of information sharing.

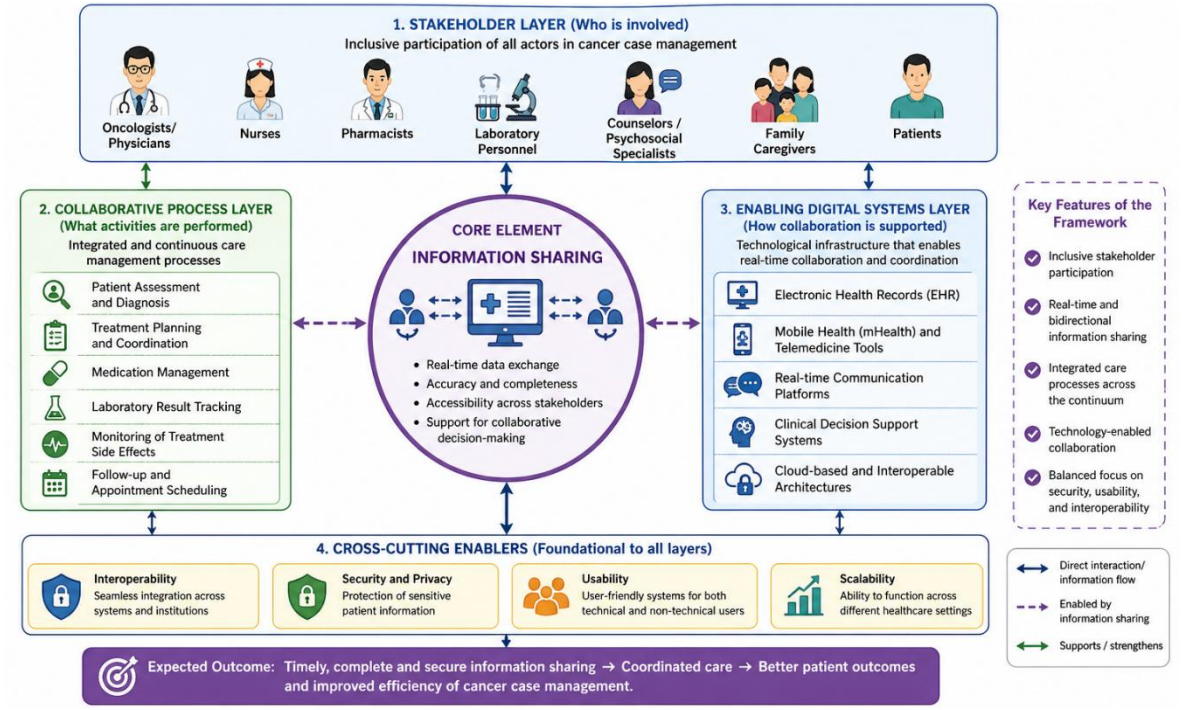

Figure 1: Conceptual Framework for Collaborative Information Sharing in Cancer Case Management

Figure 1: Conceptual framework for collaborative information sharing in cancer case management. The framework highlights information sharing as the core element linking stakeholders, collaborative care processes, and enabling digital systems, supported by interoperability, security, usability, and scalability.

7. Conclusion

This review examined existing collaborative processes, frameworks, and systems used for information sharing in cancer case management. The findings indicate that while significant progress has been made in improving care coordination, patient engagement, and data management, current approaches remain largely fragmented and insufficient to support comprehensive, real-time collaboration across multidisciplinary teams.

Existing models and systems demonstrate strengths in specific areas, including patient-centered care, communication, data storage, and privacy preservation. However, they are often limited by lack of integration, over-reliance on manual communication methods, restricted stakeholder involvement, and inadequate support for real-time information exchange. In particular, many solutions function either as conceptual frameworks without operational systems or as technological platforms that fail to incorporate the full range of stakeholders and care processes required in cancer case management.

The review further highlights critical gaps, including the absence of unified platforms that integrate clinical, psychosocial, and administrative workflows; limited interoperability among systems; and an imbalance between security, usability, and collaborative functionality. These limitations hinder effective coordination, delay decision-making, and ultimately impact the quality and continuity of patient care.

Therefore, there is a clear need for the development of integrated, real-time, and stakeholder-inclusive collaborative systems that can support seamless information sharing across the entire cancer care continuum. Future research should focus on designing frameworks that combine technological innovation with user-centered design, ensuring that systems are not only secure and scalable but also practical and adaptable to real-world healthcare environments. Such advancements will be essential in enhancing collaboration, improving patient outcomes, and strengthening the overall effectiveness of cancer case management.

Ethical Statement

This study did not involve any experiments or data collection from human or animal subjects. It forms part of a PhD research project that received ethical approval from the Kampala International University (Protocol No.: KIU-2025-1864) and is conducted under the supervision of Assoc. Professor Elly Gamukana, Dr. Ramadhan Malinga, and Dr. Justina Ogabon.

Conflict of Interest

The authors declare that they have no conflict of interest to this work.

Data availability statement

Data sharing is not applicable to this article as no new data were created or analysed in this study

References

Benedict, C., Walsh, E. A., & Penedo, F. J. (2022). Psychosocial interventions in cancer. In *Psychological aspects of cancer: A guide to emotional and psychological consequences of cancer, their causes, and their management* (pp. 159–196). Springer.

Berardi, R., Morgese, F., Rinaldi, S., Torniai, M., Mentrasti, G., Scortichini, L., & Giampieri, R. (2020). Benefits and limitations of a multidisciplinary approach in cancer patient management. *Cancer Management and Research*, 9363–9374.

Cano, I., Alonso, A., Hernandez, C., Burgos, F., Barberan-Garcia, A., Roldan, J., & Roca, J. (2015). An adaptive case management system to support integrated care services: Lessons learned from the NEXES project. *Journal of Biomedical Informatics*, *55*, 11–22.

Casteel, A., & Bridier, N. L. (2021). Describing populations and samples in doctoral student research. *International Journal of Doctoral Studies*, *16*(1).

Dagmar, M., Maria, J., Perron, J., Astrid, N., Dash, J., Haller, D. M., Sommer, J., & Perron, N. J. (2016). Use of email , cell phone and text message between patients and primary-care physicians : cross-sectional study in a French-speaking part of Switzerland. *BMC Health*

Services Research, *16*. https://doi.org/10.1186/s12913-016-1776-9

de Boer, A. G. E. M., Tamminga, S. J., Boschman, J. S., & Hoving, J. L. (2024). Non-medical interventions to enhance return to work for people with cancer. *Cochrane Database of Systematic Reviews*, *3*.

Dimitrov, D. V. (2016). Medical internet of things and big data in healthcare. *Healthcare Informatics Research*, *22*(3), 156–163. https://doi.org/10.4258/hir.2016.22.3.156

FATIMAH, S. A., ALANAZI, S. S. J., ALENEZI, M. R. M., ABDULMAJEED, H. J., Aldhafeeri, B. M. L., Sawadi, I. M. A., ALNAIM, F. A. A., Alasmari, A. S. M., Asiri, M. Y. M., & Almoafa, Y. A. A. (2024). Comprehensive collaboration between different health care providers as family medicine, pharmacy, emergency care, Laboratory technicians, dentistry and rehabilitation services. *Journal of International Crisis and Risk Communication Research*, *7*(S6), 2047.

Geng, J., Xue, E., Li, R., Hu, M., Ye, Z., & Hesketh, T. (2026). Effectiveness of Continuity of Care Interventions Linking Hospital Care to Primary Healthcare for Patients With Cancer: A Systematic Review and Meta-Analysis. *Cancer Medicine*, *15*(3), e71574.

Gloria, M. B., Mukasa, S. P., & Vicent, M. (2022). *A mobile based technology to improve male involvement in antenatal care *. 1*(4), 79–86.

Golant, Mitch; Altman, Tamara MA; Martin, C. (2013). Managing Cancer Side Effects to Improve Quality of Life A Cancer Psychoeducation Program. *An International Journal for Cancer Care Research*, *26*(1), 37–44.

Gorin, S. S., Haggstrom, D., Han, P. K. J., Fairfield, K. M., Krebs, P., & Clauser, S. B. (2017). Cancer Care Coordination: a Systematic Review and Meta-Analysis of Over 30 Years of Empirical Studies. *Annals of Behavioral Medicine*, *51*(4), 532–546. https://doi.org/10.1007/s12160-017-9876-2

Hatam, N., Askarian, M., Taherifard, E., Ahmadkhani, A., Golabi, F., Bordbar, S., & Taherifard, E. (2025). Exploring patient-centered care delivery in outpatient settings for older adults: a scoping review and recommendations for implementation in countries with low and middle income. *BMC Geriatrics*, *25*(1), 940.

Hickmann, E., Richter, P., Schlieter, H., Cemazar, M., Dudek-Godeau, D., Grapentin, N., Griesshammer, E., Jelenc, M., Liutkauskiene, S., & Ravaud, A. (2025). Practical approaches to Patient-Centered care in europe: mixed methods study developing a conceptual framework for comprehensive cancer care networks. *JMIR Cancer*, *11*(1), e59683.

Iversen, L. H., Green, A., Ingeholm, P., Østerlind, K., & Gögenur, I. (2016). Improved survival of colorectal cancer in Denmark during 2001–2012: The efforts of several national initiatives. *Acta Oncologica*, *55*, 10–23. https://doi.org/10.3109/0284186X.2015.1131331

Kaluzny, A. D., & O'Brien, D. M. (2020). How vision and leadership shaped the U.S. National Cancer Institute's 50-year journey to advance the evidence base of cancer control and cancer care delivery research. *Health Policy OPEN*, *1*, 100015. https://doi.org/10.1016/j.hpopen.2020.100015

Kim, E.-J., Koo, Y.-R., & Nam, I.-C. (2024). Patients and healthcare Providers' perspectives on patient experience factors and a model of patient-centered care communication: a systematic review. *Healthcare*, *12*(11), 1090.

Knapp, K. J., Marshall, T. E., Kelly Rainer, R., & Nelson Ford, F. (2006). Information security: management's effect on culture and policy. *Information Management & Computer Security*, *14*(1), 24–36.

Lee, P. Y., & Chang, T. R. (2015). Application of integrative information system improves the quality and effectiveness of cancer case management. *Journal of Multidisciplinary Healthcare*, *8*, 287–290. https://doi.org/10.2147/JMDH.S77714

Mabirizi, V., Katushabe, C., Muhoza, G., & Rugasira, J. (2025). A systematic review of the impact of generative AI on postgraduate research: opportunities, challenges, and ethical implications. *Discover Artificial Intelligence*, *5*(1), 238. https://doi.org/10.1007/s44163-025-00495-3

Mabirizi, V., Kawuma, S., Natumanya, D., & Wasswa, W. (2025). Deep Learning Techniques in DICOM Files Classification: A Systematic Review. *Artificial Intelligence and Applications*, 1–10. https://doi.org/10.47852/bonviewAIA52024425

Mohamed, W., & Abdellatif, M. M. (2019). Telemedicine: an IoT application for healthcare systems. *Proceedings of the 8th International Conference on Software and Information Engineering*, 173–177.

Nagaraja, K., & Manikiam, B. (2020). *Cloud Seeding in Karnataka – Initial Results*. *46*(2), 31–43. Cloud Seeding, Doppler Weather Radar, Weather Model, Weather modification and Rainfall analysis

Ozcelik, H., Fadiloglu, C., Karabulut, B., & Uyar, M. (2014). Examining the effect of the case management model on patient results in the palliative care of patients with cancer. *American Journal of Hospice and Palliative Medicine*, *31*(6), 655–664. https://doi.org/10.1177/1049909113506980

Phillip, S., Allen, A., Akitwi, I. P., & Mabirizi, V. (2025). *Hierarchical CXR-Net: A Two-Stage Interpretable Framework for Efficient and Interpretable Chest X-Ray Diagnosis*.

Pramesh, C. S., Badwe, R. A., Bhoo-Pathy, N., Booth, C. M., Chinnaswamy, G., Dare, A. J., de Andrade, V. P., Hunter, D. J., Gopal, S., & Gospodarowicz, M. (2022). Priorities for cancer research in low-and middle-income countries: a global perspective. *Nature Medicine*, *28*(4), 649–657.

Psarra, E., Apostolou, D., Verginadis, Y., Patiniotakis, I., & Mentzas, G. (2022). Context-Based, Predictive Access Control to Electronic Health Records. *Electronics (Switzerland)*, *11*(19), 1–16. https://doi.org/10.3390/electronics11193040

Rieke, N., Hancox, J., Li, W., Milletarì, F., Roth, H. R., Albarqouni, S., Bakas, S., Galtier, M. N., Landman, B. A., Maier-hein, K., Ourselin, S., Sheller, M., & Summers, R. M. (2020). The future of digital health with federated learning. *Npj Digital Medicine*, 1–7. https://doi.org/10.1038/s41746-020-00323-1

Santos, W. M. dos, Secoli, S. R., & Püschel, V. A. de A. (2018). The Joanna Briggs Institute approach for systematic reviews. *Revista Latino-Americana de Enfermagem*, *26*, e3074.

Scherz, N., Bachmann-Mettler, I., Chmiel, C., Senn, O., Boss, N., Bardheci, K., & Rosemann, T. (2017). Case management to increase quality of life after cancer treatment: A randomized controlled trial. *BMC Cancer*, *17*(1), 1–8. https://doi.org/10.1186/s12885-017-3213-9

Sharp, J. (2021). An application architecture to facilitate multi-site clinical trial collaboration

in the cloud. *ACM Digital Library*, *6*(1), 64–68.

Silbermann, M. (2020). Palliative care for chronic cancer patients in the community: Global approaches and future applications. *Palliative Care for Chronic Cancer Patients in the Community: Global Approaches and Future Applications*, *October*, 1–599. https://doi.org/10.1007/978-3-030-54526-0

Sim, K. S., Chong, S. S., Tso, C. P., Nia, M. E., Chong, A. K., & Abbas, S. F. (2014). Computerized database management system for breast cancer patients. *SpringerPlus*, *3*(1), 1–16. https://doi.org/10.1186/2193-1801-3-268

Teo, I., Krishnan, A., & Lee, G. L. (2019). Psychosocial interventions for advanced cancer patients: a systematic review. *Psycho-oncology*, *28*(7), 1394–1407.

Walsh, J., Young, J. M., Harrison, J. D., Butow, P. N., Solomon, M. J., Masya, L., & White, K. (2011). What is important in cancer care coordination? A qualitative investigation. *European Journal of Cancer Care*, *20*(2), 220–227.

Wang, Y., Zhang, A., Zhang, P., Qu, Y., & Yu, S. (2021). Security-aware and privacy-preserving personal health record sharing using consortium blockchain. *IEEE Internet of Things Journal*, *9*(14), 12014–12028.

Zhang, R., & Liu, L. (2010). Security models and requirements for healthcare application clouds. *2010 IEEE 3rd International Conference on Cloud Computing*, 268–275.