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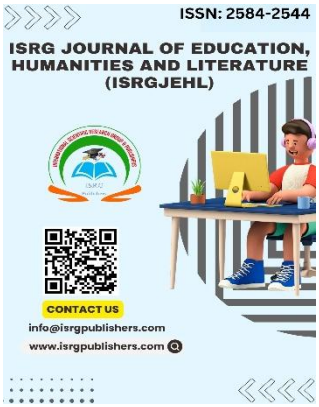

Influence of Information and Communication Technologies on Referral and Counter-Referral Between the First Level of Health Care and Tertiary Care

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Abstract

Information and Communication Technologies have become increasingly central to improving coordination and continuity of care within health systems, particularly in processes that require structured communication between different levels of care. This narrative literature review examines the influence of Information and Communication Technologies on referral and counter-referral processes between the First Level of Health Care and Tertiary Care, emphasizing their potential contributions, limitations, and implications for the organization of Health Care Networks. A comprehensive search was conducted in databases, focusing on studies published in the last five years that addressed the use of Information and Communication Technologies to support communication, care integration, and information exchange across levels of care. The findings were organized into three analytical categories: Information and Communication Technologies as tools to enhance interprofessional communication; challenges and barriers to Information and Communication Technologies implementation; and impacts of Information and Communication Technologies on continuity of care and network organization. The results indicate that Information and Communication Technologies facilitate more timely and accurate information sharing, support collaborative decision-making, and reduce fragmentation in patient trajectories. However, persistent challenges, such as limited interoperability, infrastructure constraints, insufficient training, and inconsistent governance, continue to hinder their full integration into routine practices. Despite these barriers, Information and Communication Technologies show significant potential to strengthen the structure and performance of Health Care Networks by improving transparency, reducing delays, and expanding access to specialized services. The review highlights the need for investments in digital infrastructure, workforce development, and policy alignment to enhance the effectiveness of Information and Communication Technologies in supporting coordinated and patient-centered care.

Keywords: Information and Communication Technologies; Referral and Counter-Referral; First Level of Health Care; Tertiary Care; Care Coordination; Health Care Networks; Digital Health.

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Introduction

The growing digitalization of health systems has transformed how professionals communicate, share information, and coordinate care across different levels of service delivery. Information and Communication Technologies (ICTs) have become essential tools for improving the quality and safety of healthcare processes, particularly in contexts where patient pathways depend on efficient exchanges of clinical data and timely decision-making. As health needs become increasingly complex, especially in aging and chronically ill populations, the role of ICTs in supporting integrated care becomes even more critical (Akter et al., 2025).

Despite the potential benefits associated with ICT adoption, many health systems continue to face challenges in ensuring effective communication between the First Level of Health Care and Tertiary Care. Fragmented information flows, inconsistent documentation practices, and insufficient technological infrastructure often compromise the coordination of care, leading to delays, duplication of procedures, and reduced continuity in patient management. These structural and organizational barriers underscore the need to understand how digital tools can be effectively integrated into referral and counter-referral processes to enhance care pathways (Burak et al., 2025; Castro & Clark, 2025).

At the same time, evidence suggests that when ICTs are successfully implemented, they can strengthen interprofessional collaboration and contribute to more responsive and patient-centered health networks. Digital systems, such as electronic health records, referral management platforms, and telehealth tools, support more agile communication among clinicians and promote transparency in decision-making across levels of care. These technologies also facilitate monitoring of patient transitions, enabling health services to better align diagnostic, therapeutic, and follow-up actions in a coordinated manner (David et al., 2025; Machado & Siqueira, 2023).

Given the ongoing expansion of digital health initiatives and the recognized importance of ICTs in improving care coordination, it is essential to deepen the understanding of their role in enhancing referral and counter-referral processes within the health system. Examining both their contributions and persistent limitations can inform more effective implementation strategies and support the development of integrated care models. Therefore, the objective of this study is to analyze how Information and Communication Technologies influence referral and counter-referral processes between the First Level of Health Care and Tertiary Care, highlighting their potential impacts, challenges, and implications for continuity of care.

Methodology

This study is a narrative literature review, a methodological approach that enables the collection, analysis, and synthesis of available evidence on a specific phenomenon. This strategy allows the integration of studies with different designs and research methods, promoting a broad, critical, and contextualized understanding of how Information and Communication Technologies (ICTs) influence referral and counter-referral processes between the First Level of Health Care and Tertiary Care.

The guiding question of this review was: How do Information and Communication Technologies influence the referral and counter-referral processes between the First Level of Health Care and Tertiary Care, and what are their impacts on continuity of care?

The literature search was conducted in the PubMed, SciELO, and LILACS databases, selected for their relevance in public health, health technologies, service organization, and research on health care networks. These databases offer extensive coverage of national and international studies related to ICT use, communication across levels of care, and care coordination within the health system.

Controlled descriptors and free-text terms were used in Portuguese, English, and Spanish, combined through the Boolean operators AND and OR. The main search terms included: *"information and communication technologies," "referral and counter-referral," "care coordination," "first level of health care," "tertiary care," "electronic health records,"* and *"telehealth."*

Studies published within the last five years were included if they addressed the use of ICTs in referral and counter-referral processes between different levels of care, emphasizing their impacts on communication among professionals, continuity of care, and the organization of Health Care Networks.

Excluded from the review were duplicate studies, non-systematic reviews, editorials, letters to the editor, experience reports, and studies that did not directly examine the use of ICTs in the articulation between the First Level of Health Care and Tertiary Care or were not aligned with the Brazilian health system context.

The analysis of the selected studies was conducted rigorously, considering thematic relevance, methodological quality, and each study's contribution to understanding the role of ICTs in improving referral and counter-referral flows. The synthesis of data enabled the identification of recurring thematic categories, which supported the organization of the results and guided the critical discussion on the potential of ICTs to strengthen continuity of care, as well as the challenges that still hinder their effective implementation in health services.

Results and Discussion

The analysis of the selected studies revealed a consistent body of evidence demonstrating the multifaceted influence of Information and Communication Technologies (ICTs) on referral and counter-referral processes between the First Level of Health Care and Tertiary Care. The findings highlight how ICTs contribute to improving communication between professionals, while also exposing persistent barriers that hinder their full integration into routine health practices. Furthermore, the literature underscores the significant impact of these technologies on the continuity and organization of care within health networks, particularly in contexts marked by complexity and high service demands. To present these insights in a structured and coherent manner, the results were organized into three analytical categories: (1) ICTs as tools to enhance interprofessional communication; (2) challenges and barriers to ICT implementation; and (3) impacts of ICTs on continuity of care and the organization of Health Care Networks. Together, these categories provide a comprehensive understanding of the potential, limitations, and transformative role of ICTs in strengthening care coordination across levels of the health system.

Information and Communication Technologies as Tools to Enhance Interprofessional Communication

Information and Communication Technologies (ICTs) have emerged as essential instruments for improving interprofessional communication across different levels of care, particularly between the First Level of Health Care and Tertiary Care. Digital tools such

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as electronic health records, shared clinical platforms, teleconsultation systems, and referral management software facilitate real-time information exchange, reduce communication gaps, and promote greater alignment in clinical decision-making. By enabling professionals to access updated patient information, ICTs help minimize duplication of procedures and enhance the coordination of care pathways, thus supporting more efficient and responsive communication practices across the health system (Ahmed et al., 2025).

In addition to optimizing the flow of clinical information, ICTs play a key role in strengthening collaborative work and ensuring continuity of care. The integration of digital systems allows multidisciplinary teams to share not only patient data but also care plans, diagnostic hypotheses, and follow-up strategies, fostering shared accountability among professionals. This enhanced connectivity is particularly relevant in the management of complex cases, where timely communication supports safer transitions between levels of care. Studies indicate that such tools contribute to greater standardization of referral processes, reduction of information loss, and improved alignment between primary and specialized services, ultimately promoting a more coherent care network (Azevedo et al., 2025; Caldas et al., 2024).

Moreover, ICTs have been shown to facilitate the articulation of interprofessional practices by expanding opportunities for remote collaboration and telehealth-based interactions. Teleconsultations, asynchronous messaging systems, and decision-support tools enable clinicians to clarify doubts, co-manage cases, and coordinate interventions even in contexts of geographic dispersion or limited specialist availability. These technologies reduce delays in the referral process and improve the accuracy of counter-referrals by ensuring that essential information reaches the appropriate professionals in a timely manner. Evidence suggests that such digital mechanisms strengthen interprofessional trust, enhance workflow efficiency, and contribute to a more integrated service delivery model across the care continuum (David et al., 2025; Machado & Siqueira, 2023).

Despite variability in implementation across regions and services, the literature consistently highlights the transformative potential of ICTs in professional communication and network integration. Their adoption contributes not only to operational efficiency but also to improved clinical governance and enhanced responsiveness to users' needs. The positive impacts reported include better communication quality, greater transparency of care processes, and more effective monitoring of patient trajectories within the health system. As ICT infrastructures evolve, they continue to create opportunities for more dynamic, coordinated, and patient-centered communication between care teams (Mendonça et al., 2024; Menezes et al., 2025).

Challenges and Barriers to the Use of ICTs in Referral and Counter-Referral Processes

Despite the recognized potential of Information and Communication Technologies (ICTs) to improve coordination between the First Level of Health Care and Tertiary Care, several structural and operational barriers continue to limit their effective use. One of the most frequently cited challenges is the lack of interoperability among digital systems, which prevents seamless communication and disrupts the continuity of patient information across services. Fragmented platforms, heterogeneous software solutions, and insufficient integration between municipal, state, and federal systems contribute to data silos that hinder efficient referral and counter-referral workflows. These technological gaps compromise the fluidity of information exchange and slow down decision-making processes within the care network (Akter et al., 2025).

Infrastructure limitations also pose substantial obstacles to the effective use of ICTs. In many health services, particularly in remote or underserved regions, inadequate internet connectivity, outdated hardware, and limited technical support impede the digitalization of referral procedures. These constraints not only restrict professionals' ability to access electronic systems but also reduce their confidence in the reliability and usability of technological tools. Such barriers reinforce inequalities in access to timely and high-quality communication channels, compromising the coordination of care and contributing to inconsistencies in the implementation of digital solutions (Burak et al., 2025; Chaves et al., 2024).

Organizational and human factors further complicate the incorporation of ICTs into everyday professional routines. Insufficient training, lack of continuous education programs, and resistance to adopting new technologies are frequently cited issues. Health professionals often face high workloads and time constraints, which may discourage them from learning and effectively using digital systems. Moreover, the absence of clear protocols or standardized procedures for ICT-supported communication can lead to variations in use, reduced system adherence, and misunderstandings among team members. These challenges reveal the need for institutional strategies that strengthen digital literacy and promote a culture of technological integration within health services (Jucá et al., 2025).

Policy and governance-related barriers also influence the effectiveness of ICT adoption in referral and counter-referral processes. Inconsistent funding mechanisms, insufficient regulatory guidance, and limited coordination between health system managers hinder the long-term sustainability of digital initiatives. The lack of systematic monitoring and evaluation frameworks undermines efforts to assess the real impact of ICTs on care coordination, making it difficult to identify gaps and promote continuous improvement. Strengthening governance structures and aligning digital health strategies with broader health system priorities are essential steps to overcoming these barriers and ensuring robust, equitable implementation of ICT-based solutions (Macena et al., 2025; Pinto et al., 2024).

Impacts of ICTs on Continuity of Care and the Organization of Health Care Networks

Information and Communication Technologies (ICTs) have demonstrated significant potential to strengthen continuity of care by enabling more coordinated, timely, and patient-centered communication between the First Level of Health Care and Tertiary Care. By ensuring that essential clinical information accompanies the patient across different levels of the system, ICTs reduce fragmentation and support more coherent therapeutic trajectories. Digital referral platforms and electronic health records facilitate comprehensive documentation of clinical history, diagnostic findings, and treatment plans, thus enhancing decision-making and reducing delays in accessing specialized services. These contributions reinforce the role of ICTs in promoting a more seamless and integrated care experience (Araujo et al., 2024).

In addition to improving the flow of information, ICTs influence the overall organization of Health Care Networks by optimizing

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regulatory processes, strengthening clinical governance, and enabling more efficient resource allocation. Digital systems allow managers and clinicians to track patient flows, monitor referral patterns, and identify bottlenecks that hinder care continuity. This visibility into service dynamics helps guide planning decisions, reduce unnecessary referrals, and improve the distribution of workloads across the network. As a result, ICTs contribute to more balanced and responsive care pathways, reinforcing the structural integration of services within the health system (Arenas et al., 2025; Castro & Clark, 2025).

ICTs also play a central role in enhancing patient safety and quality of care. By reducing information loss, minimizing transcription errors, and ensuring that specialists receive complete and accurate clinical data, digital tools increase the reliability of the referral and counter-referral process. Patients benefit from more precise diagnostic evaluations, more appropriate treatment recommendations, and more consistent follow-up strategies. These improvements are particularly relevant for individuals with complex or chronic conditions, who require coordinated interventions across multiple services and professionals. The resulting gains in communication and care management reinforce the relevance of ICTs as facilitators of safer and more patient-centered care (Langowsky et al., 2025).

Finally, the incorporation of ICTs into referral and counter-referral workflows has broader implications for equity, access, and the overall performance of the health system. Digital tools can reduce geographical disparities by connecting remote regions to specialized services, expanding opportunities for telehealth consultations, and improving the timeliness of care. They also support more transparent communication and foster accountability among professionals and services, contributing to stronger networks of shared responsibility. As ICT adoption evolves, their capacity to streamline care processes, enhance coordination, and promote equitable access positions them as strategic components for modernizing health systems and strengthening integrated care delivery (Meneses, 2025; Pires et al., 2024).

Conclusion

The findings of this narrative review demonstrate that Information and Communication Technologies (ICTs) play a crucial role in strengthening communication and coordination between the First Level of Health Care and Tertiary Care. By enabling more efficient information exchange, supporting clinical decision-making, and facilitating shared management of patient trajectories, ICTs contribute to more integrated and responsive care pathways. Their capacity to enhance interprofessional communication underscores their strategic importance for improving the quality and continuity of care across different levels of the health system.

Despite these benefits, the review also highlights persistent challenges that limit the full potential of ICTs in referral and counter-referral processes. Barriers related to system interoperability, digital infrastructure, workforce training, and organizational readiness remain significant obstacles. These issues hinder the seamless flow of information and impede the effective use of technological tools in daily clinical practice. Addressing these limitations requires coordinated efforts from managers, policymakers, and health professionals to promote investments in digital infrastructure, strengthen governance mechanisms, and foster a culture of technological integration within health services.

Finally, the evidence indicates that expanding and optimizing the use of ICTs can substantially improve the organization of Health Care Networks and promote more equitable access to specialized care. By enhancing transparency, reducing procedural bottlenecks, and enabling more precise monitoring of patient flows, ICTs contribute to a more efficient and patient-centered health system. Future research should explore innovative digital strategies, evaluate implementation outcomes, and investigate user experiences to deepen understanding of how ICTs can continue to transform care coordination. Strengthening these technological solutions is essential for advancing integrated care models and reinforcing the responsiveness and sustainability of the health system.

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