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Digital Transformation and the Implementation of Telemedicine: Challenges in Healthcare Institution Management

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Abstract: Digital transformation and the implementation of telemedicine represent key steps toward the modernization and sustainability of contemporary healthcare systems. However, the adoption of these technologies poses complex challenges for the management of healthcare institutions. The subject of this study is the analysis of managerial, technical, and legal challenges faced by hospital and primary healthcare center managers during the transition to e-healthcare. The aim of the research was to assess the level of readiness of healthcare professionals to work in a digital environment and to identify the main sources of resistance and systemic barriers to implementation. An empirical research method was employed using an anonymous survey questionnaire administered to a sample of N = 60 healthcare professionals. The results indicate that, despite widespread awareness of the benefits of telemedicine, including reduced patient congestion and decreased administrative burden, the most significant obstacles are the lack of continuous IT training, inadequate technical infrastructure, and concerns regarding legal uncertainty related to the protection of patient data. The findings suggest that the success of digital transformation depends not only on technological advancement but also on strategic human resource management and the systematic reduction of organizational resistance through continuous education and training.

Keywords: healthcare management; digital transformation; telemedicine; e-health; human resources; management challenges

Introduction

Contemporary healthcare systems are facing a dual challenge: a continuous increase in the number of patients requiring care and a chronic shortage of resources, both financial and human. In such an environment, digital transformation is no longer a matter of prestige but has become an imperative for the sustainability of healthcare services (National Alliance for Local Economic Development, 2023). One of the key pillars of this transformation is telemedicine, a concept that involves the use of information and communication technologies (ICT) to provide healthcare services, diagnostics, and consultations remotely, thereby eliminating physical distance between healthcare providers and patients as a barrier to care delivery (Antić, 2024).

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The implementation of systems such as electronic prescriptions, electronic health records (EHRs), and video consultations is fundamentally transforming the management of resources in hospitals and primary healthcare centers (WHO, 2021). The integration of local databases and the application of digital tools facilitate cost optimization and reduce pressure on outpatient services and waiting rooms (WHO, 2021). However, the process of integrating advanced software solutions into traditional clinical workflows presents complex managerial challenges that extend far beyond the mere acquisition of IT infrastructure.

Healthcare management in the context of e-health is defined as the process of planning, organizing, and controlling procedures through which technology is used to enhance the productivity and efficiency of the healthcare system as a whole (Wager, Lee, & Glaser, 2021). The primary obstacle to the successful implementation of telemedicine is often not the technology itself but the human factor, including low levels of digital health literacy among healthcare professionals and patients, as well as the natural resistance of medical staff to changes in established work practices (Keesara, Jonas, & Schulman, 2020). In parallel with human resource challenges, decision-makers must also address legal barriers related to the protection of sensitive personal and medical data in the digital environment (European Union, 2016).

The subject of this paper is the analysis of managerial barriers and challenges encountered by healthcare institution managers during the implementation of telemedicine services. The aim of the study is to identify the principal sources of resistance, as well as the technical and legal obstacles within the healthcare system, through a combination of theoretical review and empirical research. Based on these findings, the paper seeks to formulate clear recommendations for the effective management of digital transformation processes while maintaining patient safety, data security, and the quality of healthcare services.

Telemedicine Concept and Managerial Challenges

In healthcare management theory, telemedicine is no longer viewed solely as a technological tool but rather as a complex socio-technical system that requires a comprehensive reconfiguration of clinical and administrative workflows (Cresswell & Sheikh, 2013). According to foundational definitions, telemedicine encompasses the use of information and communication technologies (ICT) to provide healthcare services remotely, facilitate the exchange of professional information between primary care providers and specialists, and overcome geographical barriers, particularly in underserved or remote areas often referred to as “medical deserts” (Bashshur, Shannon, Krupinski, & Grigsby, 2011).

From the perspective of operational management, the successful integration of electronic healthcare services, such as unified electronic health records (EHRs), electronic sick leave certificates, integrated electronic referrals, and e-prescriptions, directly contributes to the cost-efficiency of healthcare systems, accelerates information flow, and reduces the administrative burden on healthcare professionals (World Health Organization, 2010). However, for technology to fulfill its economic and public health functions by improving the quality of care, managers must possess well-developed conceptual, analytical, and diagnostic skills capable of bridging the gap between technological capabilities and the actual organizational capacities of healthcare institutions (Campanella et al., 2016; Kruse et al., 2017).

Technical, Technological, and Financial Challenges

One of the primary barriers to the implementation of telemedicine solutions is the uneven distribution of technological infrastructure and the lack of adequate computer equipment, particularly outside major clinical centers (Scott Kruse et al., 2018). Strategic planning for the introduction of new information systems, such as teleradiology platforms or integrated centralized databases, requires substantial initial investments in software licenses, cloud-based server systems, and uninterrupted network power supply infrastructure (Wager et al., 2021).

In practice, decision-makers are frequently confronted with the challenge of allocating limited financial resources. Financial management must balance urgent expenditures for medical supplies with long-term capital investments in information technology infrastructure (Agarwal et al., 2010). Furthermore, the implementation of telemedicine entails hidden maintenance costs and necessitates the continuous engagement or outsourcing of IT professionals, which often encounters administrative and bureaucratic obstacles within public healthcare institutions.

Human Resources and Resistance to Organizational Change

The most complex challenge facing healthcare management is the effective management of the human factor. Hospitals and primary healthcare centers are among the most complex modern organizations, characterized by deeply embedded clinical protocols and established work practices that are often resistant to change (Lorenzi & Riley, 2000). Resistance among healthcare professionals, including physicians and nurses, toward the digitalization of healthcare services typically stems not from opposition to technology itself but from several underlying factors (Gagnon et al., 2012; Cresswell & Sheikh, 2013):

1. **Workload Overload Syndrome:** Physicians already operating under demanding schedules often perceive data entry into newly implemented electronic systems as an additional administrative burden that reduces the time available for direct patient care (Shanafelt et al., 2016; Arndt et al., 2017).
2. **Deficiencies in Digital Health Literacy:** The absence of formal, structured, and continuous IT training programs within healthcare institutions frequently generates uncertainty among older members of the medical workforce (Kruse et al., 2018; Gagnon et al., 2012).
3. **Limited Understanding of Benefits:** When management fails to communicate the objectives and advantages of digital transformation transparently, employees may perceive new software systems as instruments of managerial surveillance and control rather than tools designed to facilitate and improve their daily work processes (Lorenzi & Riley, 2000; Cresswell & Sheikh, 2013).

Consequently, the role of healthcare managers increasingly requires a shift from traditional authoritarian management styles toward transformational leadership approaches that emphasize staff education, empowerment, and the development of an organizational culture that encourages innovation and continuous improvement (Wager, Lee, & Glaser, 2021).

Legal and Ethical Aspects and Information Security

From a legal and ethical perspective, the transmission of medical data, diagnostic images, and patient records through digital communication networks raises significant concerns regarding information security and patient privacy. Medical information belongs to the category of highly sensitive personal data, and healthcare institutions bear both legal and professional responsibility for preventing unauthorized access, data breaches, and misuse of information contained within electronic health records.

The accelerated digital transformation of healthcare systems is inseparably linked to the exponential growth of cybersecurity threats. Healthcare organizations worldwide have become frequent targets of ransomware attacks, making information security a primary managerial priority (Coventry & Branley, 2018; Kruse et al., 2017). Effective risk management therefore requires healthcare leaders not only to implement technical safeguards, such as data encryption and firewall protection systems, but also to establish strict operational protocols and provide continuous staff training aimed at minimizing human error, which remains the most common cause of security breaches.

Research Methodology

The subject of this empirical study is the analysis of healthcare professionals' attitudes toward the process of digital transformation and the implementation of telemedicine within their respective healthcare institutions. The primary objective of the research was to identify the main organizational, technical, and legal barriers that hinder managers in implementing technological innovations, as well as to assess the level of staff readiness to operate in a digital healthcare environment.

The study was conducted as a cross-sectional survey using an anonymous and structured questionnaire distributed electronically. A convenience sample was employed, comprising N = 60 healthcare professionals, including general practitioners, medical specialists, registered nurses, and administrative personnel working in primary and secondary healthcare settings.

The questionnaire consisted of five closed-ended questions designed in the form of multiple-choice items and Likert-scale measures (ranging from 1 to 5) to assess the intensity of respondents' attitudes and perceptions regarding digital transformation and telemedicine implementation.

Participation in the study was voluntary, and all respondents were informed about the purpose of the research. The survey was conducted anonymously, and the collected data were processed and analyzed in accordance with ethical principles governing healthcare and social science research, ensuring the confidentiality and privacy of all participants.

The collected data were analyzed using descriptive statistical methods. The results were presented in the form of frequencies, percentages, and graphical representations, enabling the identification of dominant attitudes, perceived barriers, and key factors influencing the implementation of telemedicine and digital transformation within healthcare institutions.

Results

The collected data were statistically processed and grouped according to the frequency (f) and percentage (%) distribution of responses within the sample.

The first question aimed to determine the level of basic implementation of digital healthcare services (e.g., electronic health records, e-prescriptions, and video consultations) in the institutions where respondents were employed.

Table 1. Current Use of Telemedicine Tools in Healthcare Institutions

Response	**Frequency (f)**	**Percentage (%)**
Yes, regularly used	18	30.0
Partially / Occasionally used	28	46.7
No, not used at all	14	23.3
Total	**60**	**100.0**

Source: Authors' calculations.

The results presented in Table 1 indicate that telemedicine is present in some form for the majority of respondents, with 76.7% reporting either regular or partial use. However, the fact that nearly one-quarter of respondents (23.3%) reported no exposure to telemedicine services suggests an uneven pace of digital transformation across the healthcare system.

Table 2. Self-Assessment of Digital Literacy Among Healthcare Professionals

Rating	Frequency (f)	Percentage (%)
1 (Very Low)	10	16.7
2 (Low)	10	16.7
3 (Average)	22	36.6
4 (High)	6	10.0
5 (Excellent)	12	20.0
Total	**60**	**100.0**

Source: Authors' calculations.

Responses to the question, *"How would you assess your own digital literacy for working within e-health systems?"*, were measured on a five-point scale ranging from 1 (very low) to 5 (excellent).

The predominance of the average rating (36.6%) and the substantial proportion of low ratings (33.4% combined for ratings 1 and 2) indicate that a significant segment of healthcare personnel does not feel fully comfortable using advanced digital solutions. This finding suggests the existence of a potential risk of workflow disruption and reduced efficiency during the implementation of digital healthcare initiatives.

The third question allowed multiple responses in order to identify the most significant barriers to telemedicine implementation from the perspective of healthcare professionals.

Table 3. Ranking of Major Challenges in Telemedicine Implementation

Barrier Category	Number of Responses (f)	% of Respondents
Lack of time and adequate training	42	70.0

Insufficient equipment and inadequate software	38	63.3
Employee resistance to change	36	60.0
Legal uncertainty and data protection concerns	28	46.7

Source: Authors' calculations.

As shown in Table 3, healthcare professionals identified the lack of education and training as the most significant obstacle (70.0%), followed by technical limitations (63.3%) and organizational resistance to change (60.0%). These findings suggest that healthcare managers should prioritize employee training and capacity-building initiatives if successful digital transformation is to be achieved.

The fourth question examined the extent to which respondents believed telemedicine could effectively reduce patient congestion and alleviate physicians' workload.

Table 4. Perceptions of Telemedicine Effectiveness in Reducing System Burden

Level of Agreement	Frequency (f)	Percentage (%)
1 (Not at all)	4	6.7
2 (To a small extent)	12	20.0
3 (Neutral)	10	16.7
4 (Significantly)	20	33.3
5 (Completely)	14	23.3
Total	**60**	**100.0**

Source: Authors' calculations.

An encouraging finding for healthcare managers is that the majority of respondents (56.6% combined for ratings 4 and 5) recognize the organizational benefits of telemedicine and digitalization. This result suggests the existence of a favorable foundation for the adoption of innovative healthcare delivery models, provided that adequate organizational and technical support is ensured.

The final question evaluated respondents' perceptions of management support during the process of digital transformation.

Table 5. Assessment of Management Support and Training Efforts

Response	Frequency (f)	Percentage (%)
Yes, support is excellent	4	6.7
Partially, improvements are needed	42	70.0
No, support and training are completely lacking	14	23.3
Total	**60**	**100.0**

Source: Authors' calculations.

The results indicate that 70.0% of respondents believe that management support could be improved, while 23.3% report a complete absence of managerial support and training activities. These findings clearly demonstrate that healthcare managers must move beyond a passive administrative role and assume the position of proactive leaders who actively guide and facilitate digital transformation processes within healthcare organizations.

Discussion

The empirical findings of this study clearly confirm that the implementation of telemedicine in domestic healthcare institutions represents primarily a managerial and organizational challenge, and only secondarily a technological one. The result showing that as many as 70% of healthcare professionals identify lack of time and inadequate training as the main barrier (Table 3) directly aligns with theoretical perspectives emphasizing the importance of continuous education in e-health environments (Gagnon et al., 2012; McAlearney et al., 2012; World Health Organization, 2021). When management introduces software solutions without prior preparation of human resources, employees tend to perceive them as an imposed administrative burden, which explains the high proportion of respondents who rated their own digital literacy as average or low (Table 2).

The finding that 56.6% of respondents recognize the potential of telemedicine in reducing system burden (Table 4) represents a strong starting point for decision-makers. It indicates the existence of a basic level of motivation within the workforce, which management can effectively channel through appropriate leadership styles. Healthcare institutions require a transition toward transformational leadership, in which managers actively communicate the vision of digitalization, provide necessary resources, and reduce employee stress through the gradual implementation of new tools (Wager, Lee, & Glaser, 2021).

In addition to the human factor, managers must also systematically address legal and ethical concerns, given that nearly half of the respondents (46.7%) expressed concerns regarding patient data security. Digital transformation is associated with significant cybersecurity threats; therefore, digital literacy in healthcare must also include training in data protection protocols in order to prevent cyberattacks and the leakage of sensitive medical information (Kruse et al., 2017; World Health Organization, 2021).

Key recommendations for healthcare management include:

1. **Establishment of e-health teams:** Formation of multidisciplinary working groups consisting of physicians, nurses, and IT specialists to facilitate the resolution of technical and organizational challenges.
2. **Systematic pre-implementation training:** Organization of courses and practical workshops on the use of new systems prior to their mandatory integration into daily clinical practice.
3. **Proactive managerial support:** Leadership must demonstrate a higher level of understanding regarding the temporary decline in productivity during the initial stages of software implementation (Table 5) and ensure adequate technical infrastructure and equipment (Wager et al., 2021).

Conclusion

Digital transformation and the implementation of telemedicine in healthcare institutions are not merely technological trends but a necessary managerial strategy for achieving operational efficiency, reducing costs, and improving the quality of care under conditions of limited resources.

This study has demonstrated that the primary barrier to successful digitalization does not lie in the technology itself, but in the way management handles change and human resources. The results obtained

from a sample of N = 60 respondents clearly identified lack of time for training, technical deficiencies, and organizational resistance as the key obstacles in the implementation process.

For the transition toward e-health to be successful, healthcare managers must assume a proactive role. This requires moving away from traditional, rigid management models and adopting more flexible approaches that emphasize continuous education of healthcare personnel, legal security, and information security. Only through the synergy of advanced IT infrastructure and adequately trained and motivated human resources is it possible to build a stable and sustainable telemedicine system that benefits both healthcare professionals and patients.

Conflict of interests

The authors declare no conflict of interest.

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