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DIGITAL TRANSFORMATION OF THE ROMANIAN HEALTHCARE SYSTEM: MANAGERIAL CHALLENGES AND OPPORTUNITIES FOR PERFORMANCE

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Digital transformation represents one of the most important strategic directions for the modernization of healthcare systems worldwide. In Romania, the digitalization of healthcare services has accelerated significantly in recent years, driven by investments implemented through national and European programs, as well as by lessons learned during the COVID-19 pandemic. The development of digital infrastructure, the implementation of electronic health services, and the modernization of the Health Insurance Information Platform (PIAS) create favorable conditions for improving the performance of the healthcare system.

The aim of this paper is to analyze the current stage of digital transformation in the Romanian healthcare system and to identify the main managerial challenges and opportunities associated with this process. A narrative review of the scientific literature and policy documents issued by the World Health Organization, the Organisation for Economic Co-operation and Development, the European Commission, and relevant national institutions was conducted.

The analysis highlights that digital transformation can contribute to increased operational efficiency, improved quality of healthcare services, strengthened decision-making processes, and the development of data-driven management. However, important challenges remain regarding interoperability, data governance, digital competencies, and organizational change management.

A central element of the ongoing modernization process is the development of the new Health Insurance Information Platform (PIAS), which may support the implementation of data-driven management and performance monitoring throughout the healthcare system.

The findings suggest that the success of digital transformation depends not only on technological investments but also on the capacity of institutions to integrate technology into managerial and clinical processes in order to enhance healthcare system performance and sustainability.

Keywords: digital health; digital transformation; healthcare management; interoperability; performance; PIAS.

INTRODUCTION

Digital transformation has become one of the major priorities of health policies worldwide and is increasingly recognized as an essential instrument for improving the accessibility, efficiency, and quality of healthcare services [1]. The rapid development of information technologies, artificial intelligence, and data analytics systems creates significant opportunities for modernizing healthcare organizations and supporting evidence-based decision-making [4].

The COVID-19 pandemic accelerated the adoption of digital services and the expansion of telemedicine across numerous healthcare systems, highlighting the importance of digital infrastructures for ensuring continuity of care and monitoring population health [13]. As a result, many European countries intensified investments in digital health and in the development of integrated information ecosystems.

Within this context, the European Commission promotes the development of the European Health Data Space (EHDS), an initiative aimed at facilitating the secure exchange of health data and enhancing its use for clinical, managerial, and research purposes [2].

In Romania, the digitalization process has included the implementation of the Unique Integrated Information System (SIUI), the Electronic Health Record (EHR), electronic prescribing, and telemedicine services [3]. Currently, the development of the new Health Insurance Information Platform (PIAS), financed through the National Recovery and Resilience Plan, represents one of the most important investments in the digital infrastructure of the Romanian healthcare system [16].

The aim of this paper is to analyze the managerial and organizational challenges and opportunities associated with the digital transformation of the Romanian healthcare system.

METHODOLOGY

A narrative literature review was conducted. Policy documents, institutional reports, and scientific publications relevant to digital health, healthcare management, interoperability of information systems, and the use of health data were analyzed.

The selection of sources focused primarily on literature published between 2020 and 2025 in order to reflect recent developments in digital health transformation, including current European and national initiatives. The analysis →

was complemented by earlier landmark publications considered relevant for the conceptual framework of the topic, particularly in the fields of change management, adoption of digital technologies, telemedicine, patient safety, and avoidable hospitalizations [5–7,12,13,15].

The review included documents issued by the World Health Organization (WHO), the Organization for Economic Co-operation and Development (OECD), the European Commission, the National Health Insurance House, the Romanian Ministry of Health, the Romanian Court of Accounts, as well as peer-reviewed scientific articles and other relevant publications addressing digital transformation in healthcare.

THE EUROPEAN CONTEXT OF DIGITAL TRANSFORMATION IN HEALTHCARE

Digital transformation has become one of the major strategic priorities of healthcare systems across the European Union during the last decade. Increasing pressures generated by population ageing, the growing prevalence of chronic diseases, healthcare workforce shortages, and the need to improve resource efficiency have encouraged European countries to accelerate investments in digital infrastructure and data-driven healthcare management [2,14].

According to the World Health Organization, digital health refers to the use of information and communication technologies to support healthcare delivery, improve population health, and strengthen health system management functions [1]. From this perspective, digital transformation goes beyond the simple computerization of existing processes and involves a fundamental redefinition of how healthcare services are organized, delivered, and evaluated.

At the European level, the development of digital health is closely linked to broader strategic objectives concerning digital transformation and the resilience of healthcare systems. The European Commission considers digitalization a key instrument for improving access to healthcare services, enhancing quality of care, reducing inequalities, and strengthening the financial sustainability of health systems [2]. Consequently, digital technologies are increasingly viewed not only as operational tools but also as drivers of organizational transformation and evidence-informed decision-making.

A central pillar of current European policy is the European Health Data Space (EHDS). This initiative seeks to facilitate the secure access, exchange, and secondary use of health data while ensuring data protection and privacy. It is designed to provide citizens with greater control over their health information and to support the use of health data for healthcare delivery, research, innovation, and policymaking [2].

The need for EHDS arises largely from the fragmentation of health information systems across Member States. Health data are often collected and stored in separate systems that use different standards and formats, limiting interoperability and reducing the effectiveness of data utilization for both clinical and managerial purposes [2,8]. As a result, the development of common standards and interoperable digital infrastructures has become a strategic priority throughout the European Union.

Digital transformation is further supported through initiatives that facilitate the cross-border exchange of health information, including electronic prescriptions and patient summaries. These tools are intended to improve continuity of care and patient safety in the context of increasing mobility across Europe [2].

In recent years, many European countries have achieved substantial progress in digital health maturity. The implementation of electronic health records, the expansion of digital health services, and the growing use of data analytics have contributed to improvements in healthcare accessibility, efficiency, and quality [8,14].

At the same time, OECD analyses emphasize that digitalization plays a central role in strengthening the resilience of healthcare systems in the post-COVID-19 era. Emerging digital technologies and artificial intelligence-based solutions provide significant opportunities for improving efficiency, enhancing care coordination, and expanding access to healthcare services [4,14].

Another important trend is the increasing use of health data to support performance management and evidence-based policymaking. Modern digital systems enable the collection and analysis of large volumes of information regarding healthcare utilization, resource consumption, clinical outcomes, and patient experiences. Such information can support organizational performance assessment, identification of unwarranted variations in clinical practice, and continuous quality improvement initiatives [9,11].

However, digital transformation also introduces new challenges for European healthcare systems. These include data privacy protection, cybersecurity, digital workforce development, and the reduction of inequalities in access to digital technologies [1,9,10]. Deficiencies in digital skills and persistent interoperability barriers continue to be identified as key factors limiting the full realization of digital health investments across Europe [8,9].

In conclusion, the European experience demonstrates that digital transformation has become an essential component of healthcare reform. The development of interoperable digital infrastructures and the strategic use of health data represent key elements for improving performance, resilience, and sustainability. Within this framework, Romania is aligning with broader European trends through investments in healthcare digitalization and the modernization of the Health Insurance Information Platform (PIAS), which may serve as an important catalyst for accelerating national digital transformation efforts [16–21].

CURRENT STATUS OF DIGITAL HEALTH IN ROMANIA

The digitalization of the Romanian healthcare system has evolved gradually over the last two decades through the implementation of national information systems designed to support healthcare delivery, reimbursement processes, and interactions among healthcare providers, payers, and patients (Table1). Although Romania still lags behind the European average in terms of digital health adoption and the strategic use of health data, recent investments

Table 1. Main Components of Romania's Digital Health Infrastructure

Component	Year of Implementation	Main Function
Unique Integrated Information System (SIUI)	2008	Administration of healthcare services and reimbursement processes
Electronic Prescription System	2012	Medication management and reduction of prescribing errors
National Health Insurance Card	2015	Patient identification and insurance validation
Electronic Health Record (EHR)	2015	Management of clinical information
Telemedicine Services	2020	Delivery of healthcare services at a distance

and ongoing reforms indicate an acceleration of digital transformation efforts across the healthcare sector [8,14].

The existing digital infrastructure is centered around the Health Insurance Information Platform (PIAS), administered by the National Health Insurance House (CNAS). PIAS integrates several major digital components, including the Unique Integrated Information System (SIUI), the Electronic Health Record (EHR), the Electronic Prescription System, and the National Health Insurance Card. These systems have contributed to the standardization of administrative processes, increased transparency of healthcare services, and improved electronic communication among healthcare stakeholders [3].

A major milestone in Romania's digital health development was the implementation of the Electronic Health Record, which enables the centralized storage and management of relevant patient information. Nevertheless, its utilization remains below its full potential, and integration with other healthcare information systems continues to be limited. European assessments of health system digitalization indicate that the use of health data for performance management and evidence-based policymaking remains insufficiently developed in many healthcare systems undergoing digital transformation [8,9,11].

The COVID-19 pandemic represented a turning point for digital health development in Romania. During this period, telemedicine services expanded rapidly to ensure continuity of care while reducing face-to-face interactions and limiting infection risks [13]. Subsequently, the regulatory framework for telemedicine was strengthened, and remote healthcare services became an integral component of healthcare delivery. However, utilization remains uneven across regions and healthcare providers, reflecting differences in digital infrastructure availability and workforce digital competencies [1,13].

Another important challenge concerns the relatively low level of digital health service utilization among the general population. Online access to health information, electronic appointment scheduling, and consultation of personal health records remain less common than in European countries with higher levels of digital maturity [8,14]. These findings suggest the persistence of barriers related to digital literacy, technological access, and trust in digital services, particularly among older adults and rural populations [1].

From a data governance perspective, one of the major challenges is the fragmentation of health information. Health data are collected by multiple institutions and information systems that frequently rely on different standards and have limited interoperability. This situation restricts the healthcare system's ability to generate integrated information regarding patient pathways, healthcare outcomes, and provider performance. Insufficient interoperability and underutilization of health data remain among the most significant barriers to the development of a data-driven healthcare system [2,8,9].

At the same time, Romania currently benefits from significant opportunities created by investments financed through the National Recovery and Resilience Plan (NRRP). A substantial component of these investments is dedicated to healthcare digitalization, including the modernization of digital infrastructure and the development of a new integrated health information platform [16,17]. These initiatives provide favorable conditions for reducing existing gaps relative to other European healthcare systems and for increasing the digital maturity of healthcare organizations [8,14].

In parallel, Romania is implementing measures aimed at improving interoperability, expanding telemedicine services, strengthening data governance frameworks, and increasing the adoption of digital health services among both healthcare professionals and citizens [16,17]. These objectives are aligned with broader European priorities concerning the development of the European Health Data Space and the creation of a more integrated, efficient, and patient-centered healthcare system [2].

Overall, the current status of digital health in Romania reflects substantial progress in the development of digital infrastructure and electronic health services, while also highlighting persistent challenges related to interoperability, data utilization, and digital competencies. These findings support the need for continued reforms focused on information system integration, data-driven management, and the enhancement of digital maturity across healthcare organizations [8,9,11].

MANAGERIAL CHALLENGES OF DIGITAL TRANSFORMATION

The digital transformation of the healthcare system is not merely a technological process but also a profound organizational and managerial one. International experience demonstrates that the success of digitalization projects depends significantly on organizations' ability to manage change, develop the necessary competencies, and integrate digital technologies into healthcare management and service delivery processes [1,5,6].

In Romania, the development of digital infrastructure is accompanied by persistent challenges related to leadership, interoperability, workforce digital competencies,

data governance, and the sustainability of investments. These challenges affect both the pace of reform implementation and the healthcare system's ability to fully capitalize on the benefits generated by digitalization [8,9,11].

Table 2. Main Barriers to Digital Transformation in the Healthcare System

Domain	Identified Challenge	Managerial Impact
Technology	Limited interoperability	Fragmented data and incomplete decision-making
Human resources	Insufficient digital competencies	Limited utilization of technologies
Management	Resistance to change	Slow implementation of reforms
Financing	High development and maintenance costs	Sustainability concerns
Governance	Lack of data standardization	Difficulties in performance evaluation

Leadership and Change Management

One of the most important challenges of digital transformation is organizational change management. The implementation of new information systems requires modifications to workflows, redefinition of responsibilities, and adaptation of organizational culture to new methods of service delivery and performance monitoring [5].

The literature highlights that resistance to change is one of the leading causes of failure in organizational transformation initiatives [5,6]. In the healthcare sector, this resistance may be amplified by the complexity of clinical processes, the diversity of professional groups involved, and the pressures experienced by healthcare personnel.

In this context, the role of managers becomes crucial. Healthcare leaders must ensure effective communication of digital transformation objectives, facilitate staff engagement, and promote a culture of innovation and continuous improvement. Digital transformation should not be viewed solely as a technological investment but rather as an integral component of the organization's overall development strategy [5].

Development of Digital Competencies

The level of digital competencies among healthcare professionals and administrative staff is a major determinant of successful digitalization. The implementation of complex information systems requires not only technical skills related to the use of applications but also the ability to interpret and effectively utilize the information generated by these systems [7].

The World Health Organization emphasizes that workforce development and the strengthening of digital competencies are essential prerequisites for the successful implementation of digital health reforms [1]. Differences in competencies among professional groups, generations, and types of organizations can significantly influence the adoption and effective use of digital services and information technologies.

Furthermore, the emergence of innovative technologies such as artificial intelligence and predictive analytics requires the development of new competencies, including data analysis, performance evaluation, and the use of digital decision-support tools [4].

Interoperability of Information Systems

Interoperability refers to the ability of information systems to communicate, exchange, and effectively use information in a coherent and efficient manner. Numerous European assessments have identified the lack of interoperability as one of the main barriers to the development of a high-performing digital health ecosystem [2,8,9].

Although multiple information systems operate at national and local levels, they frequently rely on different standards and remain insufficiently integrated. As a result, health data are fragmented across institutions and levels of care, making it difficult to obtain a comprehensive view of patient pathways and healthcare utilization [2,9]. The main barriers to digital transformation in healthcare are presented in Table 2.

Without effective interoperability mechanisms, opportunities for integrated data analysis and the development of evidence-based management remain limited [2,9,11].

Data Governance and Cybersecurity

The growing volume of data generated by healthcare information systems creates additional responsibilities related to data collection, storage, processing, and utilization. Data governance requires the establishment of clear rules regarding data quality, access, use, and protection [9].

At the European level, the development of the European Health Data Space (EHDS) highlights the importance of creating common frameworks for the responsible use of health data [2]. In Romania, key challenges include data standardization, clarification of institutional responsibilities, and the development of effective mechanisms for ensuring information quality.

At the same time, cybersecurity has become a major concern for healthcare organizations. Extensive digitalization increases the vulnerability of information systems to cyberattacks, and security incidents may affect both the continuity of healthcare services and public trust in healthcare institutions [10].

Strengthening cybersecurity infrastructure and fostering an organizational culture focused on data protection are essential components of the digital transformation process [9,10].

Financial Sustainability of Digital Investments

The implementation and maintenance of digital infrastructures require substantial investments in hardware, software, cybersecurity, and workforce development. In recent years, a significant proportion of these investments has been supported through European funding mechanisms and the National Recovery and Resilience Plan (NRRP) [16,17].

However, international experience indicates that the success of digitalization projects depends on organizations' ability to ensure financial sustainability once external funding periods have ended [11]. The costs associated with system maintenance, upgrades, and integration can become substantial and require long-term strategic planning.

In Romania, the development of the new Health Insurance Information Platform (PIAS) represents both an important opportunity for modernizing digital infrastructure and a challenge in terms of securing the resources required for its long-term operation and continuous development [16–20].

Digital Inequalities and Access to Technology

An additional challenge is represented by significant disparities among regions and population groups regarding access to technology and digital competencies. Rural populations, older adults, and vulnerable groups may experience difficulties in accessing and using digital health services [1]. These inequalities risk exacerbating existing disparities in access to healthcare services if digital health development is not accompanied by measures promoting inclusion and digital literacy.

Conclusions

The managerial challenges associated with digital transformation are complex and interdependent. Addressing these challenges requires an integrated approach that combines technological investments with leadership development, strengthening of professional competencies, improvement of data governance, and the achievement of financial sustainability.

Only under these conditions can digitalization effectively contribute to improving the performance, resilience, and sustainability of the healthcare system [1,5,9,11].

OPPORTUNITIES FOR IMPROVING HEALTH SYSTEM PERFORMANCE

Digital transformation offers substantial opportunities for improving healthcare system performance at both organizational and system levels. By integrating information technologies into clinical and managerial processes, digitalization can contribute to greater operational efficiency, enhanced quality of care, optimized resource utilization, and the development of modern data-driven management approaches [1,11,14].

International evidence suggests that healthcare systems capable of effectively leveraging digital infrastructures are better equipped to address challenges related to population ageing, the growing burden of chronic diseases, workforce shortages, and increasing financial pressures [11,14]. In this context, digital transformation can become a key driver of healthcare system resilience and sustainability.

Improving Operational Efficiency and Process Optimization

One of the most significant benefits of digitalization is its ability to streamline and automate administrative and clinical processes. Integrated information systems reduce the time required for data entry, transmission, and validation, thereby decreasing administrative workload and improving workforce productivity [3,11].

Electronic health records, e-prescriptions, and healthcare management information systems provide rapid access to relevant patient information and reduce unnecessary duplication of investigations and administrative errors [3]. Furthermore, the automation of repetitive tasks allows healthcare professionals to devote more time to clinical activities and direct patient care.

From a managerial perspective, digitalization facilitates the monitoring of organizational activities and operational workflows, contributing to more efficient resource utilization and lower administrative costs [11].

Enhancing Quality and Patient Safety

Digital technologies have considerable potential to improve healthcare quality by increasing access to complete and up-to-date clinical information. The availability of relevant health data in real time supports better-informed clinical decision-making and reduces the likelihood of medical errors [12]. Electronic health records facilitate continuity of care by providing healthcare professionals with comprehensive patient histories and enabling coordination among different healthcare providers [3]. In addition, modern digital systems may incorporate clinical decision-support tools and alert mechanisms that help identify high-risk situations and support adherence to evidence-based clinical guidelines [4]. Several studies have demonstrated that the use of electronic information systems is associated with reduced prescribing errors and improved patient safety outcomes [12].

Promoting Patient-Centered Care

Digital transformation contributes to reshaping the relationship between patients and healthcare systems by facilitating the development of more patient-centered models of care [1].

Access to personal health information, online appointment scheduling, teleconsultations, and digital self-management applications can increase patient engagement and participation in health-related decision-making [7,13]. Telemedicine represents a particularly important example. The expansion of telehealth services can reduce geographical barriers and improve access to specialized healthcare services for populations living in rural or underserved areas [13]. Moreover, remote monitoring of patients with chronic diseases may contribute to the prevention of complications and reduce unnecessary hospital utilization.

Data-Driven Management and Performance Monitoring

One of the most important opportunities generated by digital transformation is the development of data-driven management. Modern healthcare information systems allow continuous collection and analysis of information regarding healthcare utilization, resource consumption, clinical outcomes, and patient experiences [9,11]. The systematic use of these data can support decision-making at all levels of the healthcare system. Managers can monitor

performance indicators in real time, identify inefficiencies, and implement corrective interventions more rapidly than would be possible through traditional reporting systems [11]. At the same time, data analytics facilitate benchmarking across healthcare providers and the identification of unwarranted variations in clinical practice, thereby contributing to quality improvement and more efficient resource allocation [9,11].

Identification and Monitoring of Avoidable Hospitalizations

An area of particular relevance for healthcare management is the use of digital health data to identify and monitor avoidable hospitalizations. These hospital admissions are widely recognized as indicators of primary care performance and continuity of care [15]. The integration of information from primary care, outpatient services, pharmacies, and hospitals can support the analysis of patient pathways and the evaluation of preventive interventions. Conditions such as diabetes mellitus, heart failure, hypertension, and asthma are frequently used as indicators of ambulatory care-sensitive conditions and healthcare system performance [15]. Integrated databases may facilitate real-time monitoring of these indicators and support interventions aimed at strengthening preventive care and improving care coordination [11,15].

Research, Innovation, and Artificial Intelligence

Digital transformation also creates important opportunities for healthcare research and innovation. Access to large volumes of health data enables sophisticated epidemiological analyses, evaluation of healthcare interventions, and development of predictive models for healthcare needs assessment [4,9]. Artificial intelligence and advanced analytics technologies offer the possibility of identifying patterns that are difficult to detect through traditional analytical approaches. These tools can support early diagnosis, risk stratification, and optimization of healthcare resource allocation [4].

Furthermore, the development of the European Health Data Space creates favorable conditions for expanding data-driven research and increasing Romania's participation in international health innovation initiatives [2]. The main benefits of digital transformation are summarized in Table 3.

Conclusions

Digital transformation offers significant opportunities for improving the performance of the Romanian healthcare system. Potential benefits extend beyond technological modernization and include improved quality of care, data-driven management, enhanced patient engagement, and greater organizational efficiency.

The realization of these opportunities depends on the ability of healthcare institutions to overcome existing barriers and integrate digital technologies into a strategic vision focused on performance, sustainability, and improved health outcomes [1,9,11,14].

Tabel 3. Beneficiile transformării digitale pentru principalele categorii de actori

Stakeholder	Main Benefits
Patients	Improved access to healthcare services and continuity of care
Healthcare professionals	Rapid access to information and decision-support tools
Managers	Performance monitoring and resource optimization
Healthcare system	Evidence-based policymaking and increased efficiency
Research community	Advanced analytics, predictive models, and innovation

THE NEW HEALTH INSURANCE INFORMATION PLATFORM (PIAS): AN OPPORTUNITY FOR DATA-DRIVEN MANAGEMENT AND PERFORMANCE MONITORING

One of the most important healthcare digitalization initiatives currently underway in Romania is the redesign, standardization, and modernization of the Health Insurance Information Platform (PIAS), financed through the National Recovery and Resilience Plan (NRRP) [16,17]. The project aims to modernize the digital infrastructure administered by the National Health Insurance House and to develop a modern, interoperable information platform capable of supporting complex processes of data collection, integration, and analysis across the healthcare system [16–18].

The need for a new platform is largely driven by the technical and functional limitations of existing systems. While the current PIAS infrastructure has played a significant role in supporting healthcare digitalization and electronic service delivery, the growing volume of data, increasing number of users, and evolving requirements related to interoperability and cybersecurity have highlighted the need for comprehensive modernization [18–20].

The new PIAS platform is designed to integrate the main digital components of the health insurance system—including the Unique Integrated Information System (SIUI), the Electronic Health Record, the Electronic Prescription System, and services associated with the National Health Insurance Card—within a unified architecture [16–19]. This approach seeks to reduce information fragmentation and create a digital ecosystem capable of supporting efficient data exchange across different levels of healthcare delivery.

From a managerial perspective, one of the most important opportunities offered by the new platform is the development of data-driven management. Integrated data infrastructures can provide healthcare managers and policymakers with timely information regarding service utilization, resource allocation, healthcare outcomes, and provider performance [9,11] (table 4).

Table 4. Expected Managerial Benefits of the New PIAS Platform

Functionality	Expected Managerial Impact
Integration of multiple data sources	Improved decision-making quality
Enhanced interoperability	Monitoring of patient pathways
Real-time dashboards and reporting	Continuous performance assessment
Data standardization	National benchmarking and comparative analysis
Digital access for patients	Increased engagement and satisfaction
Modern and scalable infrastructure	Operational efficiency and sustainability

The availability of standardized and interoperable data may facilitate the implementation of real-time performance monitoring systems and electronic dashboards, enabling continuous assessment of organizational performance and more rapid identification of operational inefficiencies [11].

The integration of healthcare data across primary care, outpatient care, pharmacies, and hospitals may also facilitate comprehensive analysis of patient pathways and continuity of care. Such information is essential for evaluating healthcare system performance and identifying opportunities for service improvement [9,11].

Moreover, the platform may support the monitoring of avoidable hospitalizations by linking information from multiple sectors of the healthcare system. This capability could provide valuable insights into the effectiveness of preventive interventions and the performance of primary healthcare services [15].

The modernization of PIAS is also closely aligned with the objectives of the European Health Data Space. Interoperability, standardization, and secure data exchange are fundamental requirements for participation in the emerging European digital health ecosystem [2].

Consequently, the new platform may facilitate Romania's integration into European health data initiatives and support international collaboration in research and innovation.

The success of the new PIAS platform, however, will depend not only on technological implementation but also on organizational readiness, workforce competencies, cybersecurity measures, and the effective use of generated data for healthcare management and policy development [5,6,9].

Overall, the new Health Insurance Information Platform represents a strategic opportunity to strengthen Romania's capacity for data-driven management, performance monitoring, and evidence-based decision-making. If successfully implemented, it may become one of the key instruments supporting healthcare system modernization and improving healthcare outcomes nationwide [16–21].

DISCUSSION

The findings of this review indicate that digital transformation represents one of the most important reform directions for healthcare systems at both the European and national levels. Although technological progress is often perceived as the primary driver of change, the literature consistently demonstrates that the success of digital transformation depends equally on organizational, managerial, and institutional factors [1,5,6].

The analysis of the Romanian context shows that healthcare digitalization has advanced considerably over the past two decades through the development of important digital infrastructure components and the expansion of electronic health services for both healthcare professionals and patients [3]. Nevertheless, the level of digital maturity remains uneven, and the full benefits of digital transformation have not yet been fully realized. This situation is comparable to experiences reported in other healthcare systems undergoing digital transformation, where the development of information infrastructure has often preceded the establishment of mechanisms for the strategic use of data and the integration of digital technologies into managerial processes [8,11].

An essential aspect highlighted by the international literature is that digital transformation should not be evaluated solely based on the number of information systems implemented or the volume of data collected. The true impact of digitalization depends on organizations' ability to transform available information into actionable knowledge that supports decision-making and performance improvement [9,11]. In this regard, the development of an organizational culture oriented toward the systematic use of data becomes just as important as investments in technology.

The findings presented in this paper suggest that one of the major challenges facing the Romanian healthcare system is the transition from a predominantly administrative model of information use toward a model focused on performance analysis and outcomes evaluation. Currently, data generated by healthcare information systems are used primarily for reporting and administrative purposes, while their use for performance management and evidence-based policymaking remains insufficiently developed [9,11].

From this perspective, digital transformation can contribute to the development of an evidence-based governance model. The systematic use of performance indicators and real-time health data may facilitate the rapid identification of organizational problems, continuous monitoring of outcomes, and more efficient allocation of available resources [11,14].

Another important conclusion concerns the role of human resources in the success of digital transformation. Numerous studies indicate that insufficient digital competencies and resistance to change are among the most significant barriers to the implementation of digital reforms [1,5,6]. Consequently, investments in digital infrastructure must be accompanied by comprehensive workforce development initiatives aimed at strengthening digital competencies among all categories of healthcare professionals and managers.

At the same time, digital transformation should also be examined from the patient's perspective. Digital health

offers opportunities to develop healthcare models that are more accessible, flexible, and patient-centered [1,7]. However, there is also a risk that the benefits of digitalization may be distributed unevenly, particularly in the context of disparities in access to technology and differences in digital literacy. Addressing these inequalities should remain an important objective of digital health policies [1].

Cybersecurity and data protection have also become critical components of healthcare management. As the volume of health data continues to grow and information systems become increasingly interconnected, the risks associated with cybersecurity incidents become more significant [9,10]. Developing robust data governance frameworks and strengthening institutional capacities for cyber risk management are essential prerequisites for successful digital transformation.

A particularly important opportunity for Romania is represented by the development of the new Health Insurance Information Platform (PIAS). The integration of data generated across different levels of the healthcare system may create the foundations for data-driven management and continuous performance monitoring. Furthermore, alignment with the principles of the European Health Data Space may facilitate Romania's participation in European research, innovation, and data-sharing initiatives [2].

The interpretation of these findings should also consider the limitations of this study. As a narrative literature review, the conclusions are based on the analysis of available publications and policy documents rather than on primary empirical data. Nevertheless, the integration of both international and national sources provides a comprehensive overview of the major challenges and opportunities associated with digital transformation in the Romanian healthcare system.

Overall, the analysis suggests that digital transformation can contribute substantially to healthcare system performance improvement. However, the success of this process depends on the ability of institutions to integrate technology into managerial and clinical processes, develop the necessary competencies, and use data strategically to support decision-making and improve healthcare outcomes [1,9,11].

CONCLUSIONS

Digital transformation represents one of the most important opportunities for the modernization of the Romanian healthcare system. The findings of this review demonstrate that the development of digital infrastructure and the expansion of electronic health services have generated significant progress in terms of access to information, administrative efficiency, and healthcare service delivery.

The analysis indicates that the benefits of digitalization depend not only on the implementation of technological solutions but also on the ability of healthcare organizations to integrate these tools into clinical and managerial processes. Interoperability of information systems, development of digital competencies, strengthening of data governance, and promotion of evidence-based management are critical factors for the success of digital transformation.

Digital transformation offers important opportunities to improve healthcare quality, increase efficiency in resource utilization, and develop modern mechanisms for performance monitoring. The effective use of data generated by information systems can support managerial decision-making and outcomes evaluation, facilitating the development of more effective and responsive healthcare policies.

In this context, the development of the new Health Insurance Information Platform represents a strategic opportunity to strengthen institutional capacity and advance data-driven management across the Romanian healthcare system. The integration of information generated at different levels of care may facilitate performance monitoring, patient pathway analysis, and evaluation of healthcare interventions.

Furthermore, digitalization can support the development of a more patient-centered healthcare system by improving access to services, strengthening continuity of care, and encouraging citizen engagement in health management.

The implementation of the new PIAS platform and alignment with the objectives of the European Health Data Space provide Romania with the opportunity to move from a predominantly administrative model of information management toward a model based on the strategic use of data and continuous performance monitoring. In this sense, digital transformation can become a catalyst for reforms focused on efficiency, quality, and sustainability, contributing to greater healthcare system resilience and improved outcomes for patients.

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