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DIGITALIZATION OF HEALTHCARE SYSTEMS AS A DRIVER OF ORGANIZATIONAL AND SOCIAL TRANSFORMATION OF CONTEMPORARY MEDICAL PRACTICE

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ABSTRACT

Digital transformation is a key process shaping contemporary medical care systems worldwide. The adoption of digital technologies, including electronic health records, telemedicine platforms, and analytics-based clinical systems, is progressively influencing organizational structures and medical practice. This review article examines healthcare digitalization as a socio-technical process that drives organizational and social transformation within contemporary healthcare systems. A structured narrative review methodology was applied to interdisciplinary literature published between 2015 and 2025, focusing on organizational change, physician professional practice, patient–physician relationships, and governance challenges associated with digital health implementation. The analysis shows that digitalization reshapes healthcare institutions by promoting data-driven management models, modifying clinical decision-making procedures, and redefining traditional professional roles. Simultaneously, digital healthcare introduces ethical, legal, and social challenges related to data protection, professional responsibility, and digital inequality. The evidence shows that successful digital transformation depends not only on technological advancement but also on organizational readiness, professional acceptance, and effective administrative frameworks. Healthcare digitalization should therefore be understood as a systemic transformation that requires the combination of technological innovation alongside social and institutional adaptation.

KEYWORDS

Digitalization, Health Systems, Digital Health, Organizational Transformation, Medical Practice, Health Governance

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1. Introduction

Change in healthcare is nothing new—but the speed and scale brought by digital technologies have surprised even established professionals. Not so long ago, computers in hospitals were mostly the domain of administrators. Now, digital tools shape nearly every aspect of medical care, from how doctors make decisions to the way patients interact with their health providers (Agarwal et al., 2010; WHO, 2021). It's fair to say that digitalization is no longer a side note; it's become the backbone of present-day healthcare.

But what does “digitalization” actually mean in practice? The concept is often used as an umbrella term and, at times, applied too broadly. In practice, however, it covers a wide range of technologies, including electronic health records, video consultations, remote patient monitoring, and artificial intelligence–based decision support systems. As digital solutions grow increasingly integrated into healthcare, hospitals and healthcare organizations steadily operate as linked information environments. The ongoing flow of data now plays an important role not only in supporting everyday clinical work but also in informing longer-term strategic decisions (OECD, 2019). As Greenhalgh and colleagues (2017) point out, technology in healthcare doesn't just alter machines or software—it changes how people work together, make choices, and even see their own roles.

Why is this happening now? The answer is partly obvious: we live in an era in which information is king. Data management, once a niche concern, is now central to improving quality, safety, and output. Digital technologies help doctors and nurses cooperate, allow for more uninterrupted care, and tie together services across cities or even countries (Porter & Lee, 2013). This isn't just regarding efficiency. It's a shift away from isolated, single-provider care toward a team-based, interconnected system.

Still, does every new device or software upgrade actually help? That's a question worth asking. Although medical systems have invested heavily in digital technologies, the outcomes remain uneven across hospitals and countries. Simply deploying new equipment does not necessarily lead to better patient care or higher levels of staff satisfaction (Kellermann & Jones, 2013). In many cases, challenges occur when organizations are insufficiently prepared for change, healthcare professionals feel overloaded or skeptical toward new solutions, or when implemented technologies fail to match everyday clinical practice (Kruse et al.,

2016). In other words, digital transformation is just as much about people and culture as it is about hardware and code.

From the physicians' point of view, these changes are becoming increasingly visible in everyday clinical work. Medical professionals now work in settings where large amounts of data are routinely available, digital tools do support diagnostic decisions, and clinical procedures are more standardized than in the past. Rather than replacing doctors, these technologies have contributed to an expansion of their roles and responsibilities. Today's physician is expected to be both a clinician and an interpreter of complex digital outputs—a sort of "information manager" as much as a healer (Topol, 2019; Shaw et al., 2019).

Patients, too, are affected. With a smartphone in almost every pocket, people arrive at appointments armed with information—sometimes accurate, sometimes not. Telemedicine, health apps, and online resources have opened the door to more active participation in one's own care (Lupton, 2014). This has real benefits, but also some risks. How can patients separate trustworthy advice from misinformation? Can the same level of trust be built through a screen as in person?

There are also new ethical issues. Because health systems lean ever more on digital infrastructure, questions pertaining to data privacy, cyberattacks, and legal responsibility have moved to the forefront. Healthcare organizations now face the difficult task of harmonizing innovation alongside patient safety and equity (WHO, 2021).

The pace of digital transformation varies among healthcare organizations. Some clinics adopt new technologies relatively quickly, whereas others introduce them more gradually, mirroring differences in organizational culture, leadership practices, and regulatory settings. Rogers' theory of innovation diffusion (2003) highlights that technological change in healthcare typically occurs as a gradual rather than immediate process. It's a process formed by people and relationships, not just by the latest device. In this sense, digitalization is less a sprint and more a marathon.

Given all this, do we indeed understand digital healthcare through just one lens? Probably not. Medicine, management, social science, and IT all have something to add. As more experts have noted, the key to real progress is not only having the right technology, but also providing education, good organization, and thoughtful leadership (Nambisan et al., 2017).

This review sets out to look at healthcare digitalization as a social and technical process—one that is changing not only the tools we use, but the very nature of medical work, relationships with patients, and the way institutions function. The focus here is on the impact of digital technology on organizations, on what it means to be a doctor, on the developing doctor–patient relationship, and on how healthcare is governed. Drawing on insights from multiple research fields, this article examines digital transformation as a comprehensive organizational and systemic change that is altering healthcare.

2. Methodology

This study uses a structured narrative review approach to bring together research from multiple disciplines on the digitalization of healthcare frameworks, with a focus on organizational and social consequences. A narrative review was chosen for a simple reason: the transformation of healthcare through digital technology is so complex and multidimensional—touching on technical, organizational, professional, ethical, and social issues—that it can't be captured through numbers or statistics alone.

Systematic reviews are often limited to clinical results. Narrative reviews, on the other hand, make it possible to combine different types of studies plus insights from medicine, health policy, information systems, sociology, and organizational research (Greenhalgh et al., 2017). This kind of review is especially useful when it comes to understanding complicated, context-dependent changes like digitization in healthcare, where interpretation and context matter as much as hard data.

2.1 Literature Search Strategy

To secure a thorough and up-to-date overview, I conducted a wide-ranging search using the most respected international scientific databases. My goal was to find peer-reviewed studies that explored how digital transformation is remodeling medical care systems. The databases I turned to were:

- * PubMed,
- * Scopus,
- * Web of Science,
- * Google Scholar.

I paid particular attention to studies published between 2015 and 2025—a decade that saw a rapid global rollout of digital health technologies and significant growth in e-health infrastructure. However, I also included some earlier, landmark works when they gave valuable theoretical perspectives on technology adoption or corporate change.

For the literature search, I used a combination of keywords that captured both the technological and organizational aspects of healthcare digitalization, such as:

- * healthcare digitalization,
- * digital transformation in healthcare,
- * digital health systems,
- * electronic health records,
- * telemedicine,
- * health information systems,
- * physician workflow,
- * healthcare organization,
- * digital governance,
- * socio-technical systems in healthcare.

To make sure the search focused on healthcare system transformation (and not just the technical side of software), I used Boolean operators and specific database filters to narrow down the results.

2.2 Inclusion and Exclusion Criteria

When deciding which publications to include in my review, I focused on a clear set of criteria to guarantee both academic rigor and pragmatic relevance. I looked for:

1. Peer-reviewed journal articles or academic books,
2. Publications written in English,
3. Studies that explored the organizational, professional, social, or governance aspects of healthcare digitalization,
4. Empirical research, theoretical examinations, or review papers examining how digital health technologies are implemented or what impact they have,
5. Work related to clinical practice settings or the management of healthcare systems.

On the other hand, I excluded studies if they:

- * Focused only on the technical engineering side of digital systems,
- * Reported solely on clinical effectiveness without any organizational analysis,
- * Described prototype technologies that hadn't been implemented in real-life contexts,
- * Or were non-peer-reviewed reports or opinion pieces lacking a scholarly foundation.

By applying these selection criteria, I ensured the review stayed true to its social science viewpoint while still being highly relevant to everyday medical practice.

2.3 Study Selection Process

The literature selection process for this review involved several steps. First, titles and abstracts were screened to identify works that addressed digital transformation in healthcare environments. Following this initial screening, full texts were examined to ensure each study was relevant in content and methodologically robust.

Particular attention was given to publications that explored how digital technologies are actually being implemented in practice—especially those looking at their impact on healthcare organizations, professionals, or patient experiences. The final collection of literature was intentionally diverse and included qualitative studies, quantitative analyses, policy research, and conceptual models.

The diversity of sources enabled the interpretation of healthcare digitalization as a broad, systemic phenomenon rather than a narrow technical intervention. Thematic analysis was used to organize the results around recurring themes identified in previous research (Nambisan et al., 2017):

1. Organizational transformation within healthcare institutions,
2. The impact on physicians' professional practice,
3. Changes in the patient–physician relationship,
4. Ethical and governance challenges are major considerations in the digital transformation of medical systems.
5. Socio-technical barriers continue to impede the effective implementation of digital health solutions.

By synthesizing insights from multiple disciplines, this review highlights digitalization as an adaptive process that is fundamentally reshaping medical systems.

2.4 Methodological Restrictions

Like any research approach, this qualitative review is subject to certain limitations. The included studies vary considerably in terms of context, methodology, and scope, which limits the possibility of direct comparison or the formulation of precise quantitative conclusions. In addition, the fast speed of technological development means that some findings may lose relevance over time. Publication bias also represents a potential limitation, since academic journals are more likely to report successful digital health programs, whereas unsuccessful or discontinued projects are less frequently documented in the literature (Heeks, 2006). Nevertheless, narrative synthesis provides a useful approach for examining the larger administrative and social aspects of healthcare digitalization.

2.5 Ethical Aspects

This study is based exclusively on the analysis of previously published academic literature. It does not involve human participants, patient data, or experimental interventions; therefore, ethical approval was not required.

The findings of the review are presented in the following Results section, organized according to key thematic areas identified in the literature.

3. Results (Thematic Findings)

Healthcare digitalization is beyond a buzzword—it denotes a process that cuts across technology, organizational structure, professional roles, and the ways people interact in healthcare. While the term pops up often in both academic and policy debates, its meaning can shift depending on who is using it. For that reason, having a clear, practical definition is key to understanding how digitalization is truly shaping today's medical world.

It's important not to view digitalization as just another step in technological development. Instead, it should be seen as a process that fundamentally changes how healthcare institutions function and how people within the system relate to each other (Agarwal et al., 2010). The move to digitally mediated healthcare is part of a much bigger trend—one that parallels how society as a whole is becoming more information-driven and data-driven.

3.1 Concept and Scope of Healthcare Digitalization

The academic literature usually draws a line between three related—yet distinct—processes: digitization, digitalization, and digital transformation. Digitization refers to the conversion of analog information into digital forms, for example, by replacing paper-based medical records with electronic documentation. Although this improves access to information, it does not in itself radically change how healthcare organizations or professionals operate.

Digitalization represents a further stage, involving the use of digital technologies to improve, streamline, or optimize existing processes and workflows. Think of electronic prescribing, automated scheduling, or secure messaging systems for clinical teams. In this phase, technology mostly helps things run more smoothly, but the basic framework of the organization stays the same.

Digital transformation, on the other hand, is a bigger leap. It means rethinking and restructuring how care is delivered, with technology becoming part of the fundamental structure of decision-making and management. This stage leads to whole new models of care—like telemedicine, remote patient monitoring, or integrated health information networks (Meskó et al., 2017). As Nambisan et al. (2017) point out, digital transformation changes the way value is created, not just how work is done.

Noticing those differences matters. Many of the problems seen in actual implementations happen when organizations try to tackle major transformations with approaches meant only for minor technological upgrades.

The extensive adoption of digital technologies has contributed to the emergence of digital health ecosystems, understood as linked networks of healthcare providers, patients, administrators, and technology companies. Within such ecosystems, medical data increasingly flows across organizational and geographic boundaries, enabling care teams to coordinate services at local, national, and international levels.

Technologies such as electronic health records, telehealth solutions, wearable devices, mobile health applications, and clinical decision-support systems collectively form the information infrastructure underpinning contemporary medical care systems (WHO, 2021). These aren't just stand-alone gadgets—they work together as interlinked parts of a bigger socio-technical system.

As Greenhalgh et al. (2017) argue, you can't really judge the impact of digital health technologies without seeing how they're used in practice—outcomes depend on the relationship between design, everyday routines, and human behavior. That's why digitalization is best seen as building an environment in which technology and people adjust and develop together.

These digital frameworks also mean that everyone in healthcare is more connected and interdependent than ever before. Doctors use shared databases, patients interact with web platforms, and administrators plan using big data analytics. The result is a shift to network-based systems in which collaboration and information-sharing are central.

The reviewed literature indicates that digitalization increasingly positions data as a central organizational resource influencing clinical and managerial decision-making (OECD, 2019). At the same time, technology adoption depends on the social embedding of tools in clinical practice and the alignment of systems with everyday workflows (Heeks, 2006; Kruse et al., 2016). Digitalization also supports a shift toward networked models of care enabled by integrated information systems, while raising governance priorities related to data protection, cybersecurity, and accountability (Porter & Lee, 2013; WHO, 2021). Taken together, these themes provide a framework for the synthesis presented in Sections 3.2–3.6.

3.2 Organizational Transformation of Healthcare Institutions

Digitalization is helping to bring significant changes in the way healthcare institutions are organized, managed, and operated in everyday practice. In contrast to earlier stages of computerization, current digital transformation goes beyond the introduction of new technological tools and increasingly affects organizational processes and models of care delivery. More and more, hospitals and clinics are becoming data-driven organizations, where information flow is at the heart of coordination, planning, and resource management (Agarwal et al., 2010).

This organizational shift affects everything from medical workflows and administrative structures to teamwork and leadership models. As digital systems become the norm, traditional hierarchies are blending with network-based approaches that rely on constant information exchange.

3.2.1 Electronic Health Records as Organizational Infrastructure

One of the biggest milestones in healthcare's digital journey has proved to be the introduction of Electronic Health Records (EHRs). These systems support standardized documentation, quick access to patient data, and easier information sharing between providers at different levels (Jha et al., 2009).

EHRs change the way clinical work is done, embedding information management right into the daily routine. Diagnosis and treatment now often depend on digital systems for retrieving and entering patient information. This system makes care more continuous and coordinated, cutting down on repeated tests and helping different departments work together.

However, research also shows that rolling out EHRs can initially bump up the paperwork and change how doctors use their time (Kruse et al., 2016). Many physicians find themselves spending a lot more hours on documentation, highlighting that technology alone doesn't guarantee efficiency. As Kellermann and Jones (2013) point out, IT works best when it's paired with thoughtful changes in how organizations operate.

3.2.2 Interoperability and Integration of Healthcare Information Systems

One of the biggest hurdles for digital transformation in healthcare is interoperability—the ability of different systems to talk to each other and share data. Hospitals often use a mix of specialized software for clinical, admin, and finance tasks. When these systems can't communicate, information gets fragmented, and the benefits of digitalization are lost.

But when information systems are integrated, they make it much easier to coordinate care—whether a patient is moving from their GP to a specialist or between hospitals (WHO, 2021). Interoperability enhances continuity of care and supports more accurate clinical decision-making by providing access to consistent and comprehensive patient data across multiple systems.

The development of interoperable infrastructures is shifting healthcare from institution-centered models to more coordinated networks, where information sharing and interorganizational collaboration are increasingly significant.

3.2.3 Data-Driven Management and Organizational Decision-Making

Digitalization also lets hospitals and clinics manage themselves in new ways—using data to keep close tabs on how things are running. Administrators can monitor patient flow, resource use, treatment efficiency, and quality in real time with digital dashboards (OECD, 2019).

This shift is changing how decisions get made. Instead of relying on old-fashioned reports, managers now use real-time analytics and data from across the organization. Porter and Lee (2013) explain that value-based healthcare depends on reliable digital systems to measure outcomes and performance. Using data can help hospitals be more transparent and accountable by comparing results between teams or departments. Still, focusing too much on numbers can lead to over-standardization and may ignore important human and non-quantitative aspects of care.

3.2.4 Emergence of Smart Hospitals

In more advanced settings, digitalization is giving rise to so-called smart hospitals. These are places where clinical care, logistics, and administration are all tightly connected through digital tools. Automated scheduling, digital monitoring, and predictive analytics are just some of the ways these hospitals try to boost efficiency.

This approach supports patient flow management, reduces wait times, and improves resource allocation. Digital monitoring can also help with infection control, equipment tracking, and emergency response. As Shaw et al. (2019) note, these smart infrastructures are a step toward organizations that can adjust quickly to changing needs.

Of course, building a smart hospital isn't just a matter of buying new tech. It takes major investment and a preparedness to rethink how the organization works. Success depends as much on staff readiness and culture as it does on technology.

3.2.5 Transformation of Interprofessional Cooperation

Digitalization is also changing how healthcare professionals work together. Collaborative electronic platforms make it easier for doctors, nurses, lab staff, and administrators to communicate and make decisions as a team.

A lot of this teamwork now happens online rather than in person. Teams can all access the same records, test results, and treatment plans at once, which means everyone is on the same page and communication is faster (Greenhalgh et al., 2017).

But as information becomes more widely available through digital systems, it can also blur traditional roles and hierarchies. Organizational responsibilities may shift as information is democratized within teams.

3.2.6 Organizational Culture and Change Management

Technology doesn't exist in a vacuum—it always interacts with the organization's culture. Healthcare has a long tradition of professional autonomy and judgments based on experience, which can at times clash with standardized digital processes.

When staff resist new technology, it's often because they worry about disrupted routines, more oversight, or losing control over their work (Heeks, 2006). To succeed, digital transformation needs careful change management and active involvement of health professionals at every step.

Training, involving staff in designing new systems, and strong leadership are all key to getting buy-in for digital changes. Research shows that when organizations put users at the center of their plans, technology is used more widely and changes last longer (Gagnon et al., 2016).

3.2.7 Institutional Resilience inside Digitally Mediated Healthcare

As healthcare becomes more dependent upon digital systems, resilience—being able to bounce back from difficulties—is critical. Outages, cyberattacks, or technical failures can directly threaten the delivery of care.

To build digital resilience, organizations need backup plans, strong cybersecurity, and explicit procedures to keep information flowing—even if something goes wrong. In this way, the stability of healthcare is now tied directly to how strong and dependable the technology is, underlining the need for smart governance.

Section Summary

To summarize, digitalization is turning healthcare organizations from top-down, hierarchical setups into connected, data-driven networks that value coordination, openness, and adaptability. Real organizational change is essential for making the most of new technology, proving that digital transformation is first and foremost a social and institutional journey—not simply a technical upgrade.

3.3. Impact of Digitalization on Physicians' Professional Practice and Clinical Decision-Making

Digitalization is changing what it means to be a doctor. It's shifting how clinical work is organized, how decisions are made, and even what "expertise" looks like in modern medicine. Today's physicians work within settings where digitalized systems, formal protocols, and algorithmic systems are part of daily practice. As a result, medical care is moving from a model based mainly on experience to one that blends professional judgment with digital decision support (Topol, 2019).

Digital transformation isn't about replacing doctors—it's about changing how clinical authority is exercised in a tech-supported environment. Perceiving these shifts is key to seeing the bigger social impact of healthcare digitalization.

3.3.1 Digital Clinical Work Environment

Modern clinical work now happens in digital situations where doctors, nurses, and other staff constantly interact with electronic systems. Tools like EHRs, diagnostic databases, and digital messaging platforms are part of daily practice.

Physicians turn to these integrated systems to get patient histories, lab results, scans, and treatment suggestions. This makes it easier to follow cases and make evidence-based decisions (Bates et al., 2001). But with so much information available, there's also a risk of overload, making it harder to focus on what matters most in each case.

As Greenhalgh et al. (2017) point out, digital tools work best when they fit smoothly into clinical routines. If technology disrupts established ways of working, efficiency can actually drop even though the tools are advanced.

3.3.2 Clinical Decision Support Systems and Algorithm-Assisted Medicine

One of the most striking changes brought by digitalization is the rise of Clinical Decision Support Systems (CDSS). These systems assess patient data and offer diagnostic or treatment suggestions based on guidelines and big medical databases.

CDSS can help reduce errors, improve adherence to evidence-based guidelines, and boost patient safety (Bates et al., 2001). Algorithms make it possible to consider more complex variables than any single doctor could manage alone.

Still, there are real concerns about depending too much on automated advice. Cabitza et al. (2017) warn that if doctors take algorithm outputs at face value, without critical thinking, new types of clinical risk can emerge—especially if the technology system isn't fully understood. That's why it's important for physicians to stay in charge, using digital recommendations as support, not as substitutes for judgment.

The new model is one of human–AI collaboration: doctors act as interpreters and supervisors of digital analysis, not simply as mere recipients of automated decisions (Shaw et al., 2019).

3.3.3 Transformation of Professional Autonomy

Digitalization has triggered debate about what happens to physician autonomy. Digital protocols, automated alerts, and performance monitoring might occasionally appear to limit a doctor's ability to make independent decisions.

But research shows that digital tools don't always limit autonomy—they change what it looks like. Instead of relying only on individual experience, doctors now use their expertise to interpret and apply digital information in context (Topol, 2019).

This shows a bigger shift toward collaborative, data-driven care. Doctors are still ultimately responsible, but decision-making is now shared between people, technology, and organizational systems.

3.3.4 Administrative Workload and Time Redistribution

Digital documentation systems have changed how doctors spend their time. Electronic records make information easier to access and standardize, but research shows they often add to the administrative workload (Kruse et al., 2016).

Doctors now spend a lot of time at the computer, which can mean less face-to-face time with patients. This is a dilemma of digital efficiency: tools meant to speed things up can end up creating more work at first.

With time and good system design, these effects can be reduced. As Kellermann and Jones (2013) note, real productivity gains from digital tools tend to show up only after workflows are adjusted and users get comfortable with the system.

3.3.5 Digital Competencies and Medical Professionalism

The spread of digital health technologies means doctors now need new skills. Digital competence continues to become a core part of medical competence—covering everything from reading and using data to using systems and critically evaluating algorithmic advice.

Medical schools are starting to teach more about health informatics and digital tools, recognizing that tomorrow’s doctors need to work confidently in tech-heavy environments (Meskó et al., 2017). Being a good doctor now means being skilled with technology as well as with patients.

If these skill gaps aren’t addressed, it can slow down digital adoption and lead to displeasure or resistance among healthcare professionals.

3.3.6 Interprofessional Communication and Collaboration

Digital channels are also changing how healthcare professionals communicate. Shared records make it easier for teams to work together, since everyone has access to equivalent information.

Digital tools permit real-time consultations between different departments or even different hospitals. As Agarwal et al. (2010) note, better information flow leads to stronger team decisions and more efficient organizations.

At the same time, relying more on digital channels can change team functioning—formal data sharing can sometimes take the place of informal, in-person conversations.

3.3.7 Physician Well-Being and Occupational Implications

Digital transformation is also having a big effect on doctors’ well-being and job satisfaction. More hours in front of screens, more paperwork, and the “always on” feeling of digital systems can all result in fatigue and an increased risk of burnout.

Poorly designed digital tools are a major source of stress for healthcare professionals (Shaw et al., 2019). But when technology is well-integrated and user-oriented, it can reduce repetitive work and help doctors organize their tasks more efficiently.

All of this stresses why it is essential for medical staff to be actively involved in the design and implementation of digital systems—making sure that new technologies support, rather than hinder, their well-being and occupational practice.

Section Summary

To conclude, digitalization is changing what it means to be a doctor. Rather than taking away from medical expertise, it’s reshaping professional practice into a hybrid model—one that brings together human assessment and digital support in new ways.

3.4 Transformation of the Physician–Patient Relationship in Digital Healthcare

Digitalization has brought major changes to the classic doctor–patient relationship, which has always been central to medical care. With new digital health technologies, interactions, communication, and even expectations are changing rapidly. As healthcare moves further into the digital epoch, the way patients and doctors connect is increasingly controlled by technology—changing how they communicate and how trust is built (Lupton, 2014).

The relationship, once rooted in face-to-face visits and the doctor’s specialized knowledge, is now shifting toward a more participatory model, where both sides have access to more information thanks to digital tools.

3.4.1 Telemedicine and Remote Healthcare Interaction

One of the most visible changes in digital healthcare is the growth of telemedicine. Thanks to electronic platforms, patients and doctors can connect remotely for consultations, check-ups, and even ongoing management of chronic conditions. Telemedicine has been especially valuable for people in remote areas or with limited mobility (Ekeland et al., 2010).

The rapid adoption of telehealth during global crises, like the COVID-19 pandemic, made remote care more common and showed the manner in which digital tools are able to help keep healthcare running even throughout difficult times (Hollander & Carr, 2020).

Of course, telemedicine sessions also change how doctors and patients communicate. It’s harder to read nonverbal indicators or do physical exams online, so physicians need to change their communication technique to keep interactions clear, empathetic, and understandable.

3.4.2 Patient Empowerment and Access to Health Information

Digital tools have greatly expanded patient access to medical information through websites, patient portals, and health apps. More and more, patients are taking an active role in their care: checking test results, tracking their health, and learning online.

This new access to information is moving care away from the old, paternalistic model. Now, patients and doctors are more likely to make decisions together, with patients becoming partners in their treatment plans rather than just following orders (Lupton, 2014).

Empowering patients in this way can lead to better treatment results and satisfaction, but it's not without challenges. Online information is often unreliable or confusing, so doctors now spend more time helping patients separate fact from fiction and make sense of online health advice.

3.4.3 Trust in Digitally Mediated Healthcare

Trust is still at the heart of good healthcare, but digitalization has expanded what trust means. Now, it's not exclusively about depending on a doctor—it's also about trusting the technology that handles sensitive medical information.

Patients now depend on digital systems to store, send, and analyze their personal medical data. Anxieties with respect to privacy or the performance of these systems can make some people hesitate to use digital health services (WHO, 2021). That's why accurate communication and strong network security are key for retaining trust.

As Greenhalgh et al. (2017) note, people are more likely to use digital health tools if they see them as reliable and legitimate. Building trust now entails not just the doctor and patient, but also the technology itself.

3.4.4 Digital Inequality and Availability Challenges

Although digital technologies can make healthcare easier to access for many, they can also create new inequalities. Not everyone has the same digital skills, income, or access to technology—meaning some people are left behind.

Older adults, people with less tech experience, or communities without reliable internet can struggle to access digital healthcare. This so-called “digital divide” is a real social challenge for the future of medical care (OECD, 2019).

To avoid making things worse, health systems need to keep non-digital options available and invest in digital education. Otherwise, new technologies could end up deepening health inequalities instead of solving them.

3.4.5 Humanization and Depersonalization of Care

There's a vigorous debate about whether digital tools help or hurt the human side of medicine. Some critics worry that relying too much on screens and apps reduces personal connection and makes care feel less human.

On the other hand, digital tools may help keep patients and doctors in touch, assist ongoing monitoring, and even free up time for deeper, face-to-face conversations by automating administrative work (Topol, 2019). Whether care feels more or less human often depends on how the technology is used, not the technology itself.

The best results come from using digital systems in a balanced way, combining tech efficiency with real, interpersonal connection.

3.4.6 Changing Expectations Toward Healthcare Interaction

Digital changes are also raising patient expectations. People used to instant service in other parts of life now want quick communication, online scheduling, and round-the-clock access to their own health data from their doctors, too.

Healthcare organizations have to adapt to these new expectations—but without losing sight of safety and quality of care. The doctor–patient relationship is evolving along with society's greater shift toward instant, digital connections.

Section Summary

Overall, digitalization is changing how doctors and patients relate—by adding new ways to communicate, raising patient involvement, and changing how trust is built in healthcare. These changes show that digital transformation isn't just concerning efficiency; it's also about the core relationships at the heart of medicine.

3.5 Ethical, Legal, and Governance Challenges of Healthcare Digitalization

As digital technologies become an everyday part of healthcare, they bring a whole new set of ethical, legal, and governance challenges. These issues go way beyond just rolling out new software—they touch on privacy, professional responsibility, legal regulations, and impartiality in access to care. For digital transformation to last, it's not enough to have the right technology; strong systems for managing risks and social impacts are also essential (WHO, 2021).

Digital health sits at the crossroads of medicine, IT, and public policy, so ethical and compliance questions are central to how healthcare is modernized.

3.5.1 Protection of Health Data and Patient Privacy

Health data are among the most sensitive types of personal information out there. Digital medical systems collect, store, and share this data on a massive scale—sometimes across countries. While this can help keep care continuous and support better analysis, it also creates new risks for privacy violations and unlawful access.

EHRs, telemedicine, and remote monitoring all generate a constant stream of patient information that must be handled securely. Worries with respect to data privacy and misuse are still some of the biggest reasons patients hesitate to use digital health (OECD, 2019).

Laws and regulations are intended to protect this sensitive information, but technology often progresses more rapidly than the rules can keep up. That's why patient trust relies on accurate communication and strong cybersecurity from healthcare organizations.

3.5.2 Responsibility and Answerability in Technology-Supported Decision-Making

Digitalization makes it harder to know who's responsible for medical decisions. When doctors use algorithmic recommendations or automated analysis, issues relating to accountability become more complicated.

Traditionally, the doctor is fully responsible for diagnosis and treatment. But now, decisions are controlled by input from software developers, hospital policies, and software systems. As Cabitza et al. (2017) point out, mistakes in algorithms or bad data can affect care—even when doctors are still involved.

This shared responsibility raises tough questions about who is liable if something goes wrong. Lacking definite legal guidelines, some doctors may be reluctant to use the latest digital tools.

3.5.3 Algorithmic Disclosure and Bias

Bringing AI and predictive analytics into healthcare also elicits concerns about impartiality and clarity. Many algorithms are complex and hard to explain, making it difficult for doctors and patients to understand how decisions are made.

If doctors can't see how an algorithm works, they may not trust its recommendations or want to use it. And if the data used to train these systems is biased, it can lead to unfair results for certain groups of patients (Topol, 2019).

To keep things fair, digital healthcare needs constant testing of algorithms, different data, and ways for real people to check the results. Good governance is needed to manage these ethical risks.

3.5.4 Digital Health Governance and Institutional Regulation

Real digital transformation only works if there's a coordinated plan for managing technology along with broader health policy goals. Governance in digital health means not just regulation but also ongoing oversight, technology evaluation, monitoring, and risk management (WHO, 2021).

More and more, hospitals are setting up multidisciplinary committees to review technology before it's used. These groups help ensure that new tools meet clinical needs, fit the organization, and meet ethical standards.

Nambisan et al. (2017) stress the value of collaborative governance—bringing together policymakers, healthcare professionals, and tech providers. If regulations are fragmented, it's much harder to get consistent, efficient results.

3.5.5 Cybersecurity and System Dependability

Since healthcare relies more on digital infrastructure, cybersecurity threats are a real danger. Hackers can steal patient data, shut down hospital systems, or even delay emergency care.

That's why hospitals need to make cybersecurity a key part of their risk planning. Digital resilience—being able to keep operations going even when there's a cyber incident—is now absolutely essential.

Protecting digital systems isn't just an IT problem anymore—it's a matter of public safety.

3.5.6 Ethical Consequences of Digital Inequality

Digitalization also brings up ethical issues in terms of fairness and equal access. Even though digital tools are able to make healthcare available to more people, not everyone gets the same benefits—sometimes, they can even make disparities worse.

People without digital skills, access to technology, or enough money can get left out of digital healthcare (OECD, 2019). That’s why ethical digital health means designing for everyone, not just the tech-savvy.

Medical systems need to harmonize progress with social responsibility to make sure new technology doesn’t leave anyone behind.

Section Summary

To summarize, digitization in healthcare isn’t just about new gadgets or software. It’s a deep, systemic change that needs rules, oversight, and an obligation to justice and clarity. For digital transformation to last, it has to harmonize novelty with accountability and equity.

3.6. Socio-Technical Challenges of Digital Health Implementation

Even though medical systems are seeing major technological advances and more investment in digital health, putting these new solutions into practice isn’t easy. Real-world experience shows that success isn’t just about having the most recent technology—it depends on how well technology, organizations, and people work together. That’s why digitization in healthcare can be best seen as a socio-technical process, where results depend upon aligning innovation alongside real social and organizational contexts (Heeks, 2006).

The difficulties that arise when trying to implement digital health highlight just how complex and challenging it is for organizations to adapt in a lasting way.

3.6.1 Resistance to Organizational Change

One of the biggest obstacles to digital health is resistance to organizational change among medical professionals. Medicine has always valued traditional routines, autonomy, and experience-based decisions, so new digital systems have the potential to disrupt the familiar flow and make roles feel uncertain.

Most of the time, this resistance isn’t about hating new technology—it’s about worries over more work, workflow disruptions, or lack of training (Gagnon et al., 2016). Staff may also see digital systems as outside, administrative “add-ons” rather than tools that actually help in clinical care.

Research shows that including healthcare professionals in designing new systems leads to better acceptance and improved sustainability use (Greenhalgh et al., 2017). Getting staff involved helps them feel less like they’re losing control and more like they’re part of the change.

3.6.2 Misalignment Between Technology and Clinical Workflow

Too often, digital health tools are created with a technical or administrative focus and don’t take enough account of how care is actually delivered. If systems are hard to use, require too much data entry, or just aren’t intuitive, they can slow things down rather than speed them up.

This difference between how technology is designed and how professionals work is a main challenge. As Kruse et al. (2016) point out, information systems in healthcare frequently fail when tech priorities don’t fit with day-to-day clinical work.

That’s why user-centered design is becoming more important—tools that fit with clinical workflow are easier to use, less mentally taxing, and more likely to become a real part of daily medical work.

3.6.3 Digital Competency Gaps Among Medical Professionals

Going digital means the medical staff needs new skills. Digital competence, the skill to interpret data, and knowing the limits of technology are now key elements of effective healthcare.

But not everyone is equally prepared. Different generations and job roles frequently have different levels of digital skills. Without proper training, digital rollouts can stall, and staff can lose confidence or get frustrated (Meskó et al., 2017).

That’s why updating education to include health informatics and electronic communication is so important for making digital change stick.

3.6.4 Fragmentation of Digital Infrastructure

Many hospitals and clinics use lots of different digital systems that were brought in at different times. If these systems can’t “talk” to each other, information gets fragmented, staff have to enter the same data more than once, and it’s harder to find what you need.

This kind of fragmented digital infrastructure means that the efficiency and safety promised by digitalization can be lost. Making things work across the whole system takes national coordination and clear standards (WHO, 2021).

So, for a truly digital healthcare system, it's not only about using new tech—it's about connecting everything together across organizations.

3.6.5 Economic and Resource Restrictions

Going digital also costs a lot—buying infrastructure, paying for upkeep, training staff, and keeping systems secure all add up. For many hospitals, especially those with tight budgets, these costs are a real barrier to getting started.

Early on, the costs frequently outweigh the benefits, making some organizations hesitant to invest in big digital changes. According to OECD (2019), real efficiency gains often show up only after a long period of adjustment.

That's why long-term planning and stable funding are essential for digital transformation to succeed.

3.6.6 Managing Innovation and Patient Safety

Healthcare isn't like other fields—trying out new technology here can directly impact patient safety. Rolling out systems too quickly, before they're fully tested, can bring unexpected risks or disrupt how care is delivered.

That's why organizations have to manage innovation alongside continuous risk assessment cautiously. Rolling out changes gradually and constantly monitoring results can help spot problems early, but still allow for progress (Topol, 2019).

Striking this poise shows just how much more complex digital transformation is in healthcare than in other industries.

3.6.7 Socio-Technical Adaptation as an Ongoing Process

All these problems show that digital transformation isn't a one-off upgrade—it's an ongoing process. Technology and organizational culture have to evolve together through trial, error, and learning over time.

Digitalization works best when new technology fits with professional values, strong leadership, and what patients actually need. If that alignment isn't there, even the best tools might go unused.

To summarize, the challenges of implementing digital health show that it all rests on people, organizations, and institutions adapting together. Lasting change calls for attentive change management, professional involvement, together with dedication to governance that brings together technology and people.

4. Discussion

This review shows that digital development in healthcare is much more than simply a tech improvement—it's a deep, ongoing transformation that blends technology, organizations, and people. Looking across many studies, it's clear that digital tools are changing hospitals, professional roles, and social relationships in healthcare all at once. The main takeaway? Technology alone isn't enough. For real change, you need organizational adaptation, professional buy-in, and strong governance.

A major finding is the way digital infrastructure is helping healthcare move away from isolated, institution-centered models and toward integrated networks based on data sharing and coordinated care. Other studies show the same trend: data-driven management and value-based approaches are only possible when organizations change how they work (Porter & Lee, 2013; OECD, 2019). In short, organizational transformation is the foundation for getting the most out of new technology.

For doctors, digitalization isn't about being replaced by machines. Instead, technology is changing what it means to be a medical expert. Decision-making now happens in hybrid settings, where human assessment works alongside algorithmic support (Topol, 2019). Physicians are becoming integrators of complex information, still responsible for context and ethics.

This shift signals bigger changes in what it means to be a health professional. Digital skills are now part of being a good doctor. At the same time, the review notes that higher administrative demands and new expectations can create stress—reminding us that technology works best when it fits real clinical routines and supports well-being.

Digitalization is also changing how doctors and patients relate. With more medical information and remote services, healthcare is moving away from the old "doctor knows best" model toward more collaboration and patient participation (Lupton, 2014). This enables patients, but also means doctors have new roles as interpreters and guides in the digital world.

Trust has become more complex in digital healthcare. It's about more than just the doctor-patient relationship—confidence in systems, data protection, and institutional oversight are all part of it. If digital systems fail, it can hurt both care and general trust. That's why good governance and network security are essential (WHO, 2021).

Digitalization also brings new ethical and social dilemmas—like privacy, bias in algorithms, and digital inequality. Even though more people can access services, not everyone benefits equally. Accessible policies are needed to make sure digital healthcare is fair for all (OECD, 2019).

From a governance angle, digital transformation needs clear and coordinated rules to harmonize innovation alongside accountability. Fragmented or piecemeal means often waste resources and leave systems underused. True progress relies on collaboration among policymakers, institutions, tech developers, and professionals (Nambisan et al., 2017).

One theme comes up again and again: implementation challenges are mostly about people and organizations, not technical flaws. Resistance to digital change is usually a sign that organizational culture or leadership needs attention. Involving staff and having strong leaders leads to more successful, lasting results (Greenhalgh et al., 2017). Digital transformation is really a process of study and adjustment, not simply a one-time event.

In the end, digitalization is best seen as a progressive evolution—one that's steadily reshaping healthcare as a core part of society. Technology delivers new opportunities for efficiency, collaboration, and patient engagement, but real success depends on keeping innovation aligned with professional values, organizational culture, and what society expects from healthcare. Sustainable change needs constant collaboration between tech-focused and human-centered care.

5. Conclusions

Digitalization is one of the most important changes happening in healthcare today. As this review has shown, digital tools do not form just the technical side of care, but also how organizations work, how professionals do their jobs, and how people relate to one another in the healthcare system. So, the shift to digital healthcare should be seen as a deep, systemic transformation—not simply a technical upgrade.

Digital health is giving rise to data-driven organizations, where coordination is better, information is easier to access, and care decisions are more evidence-based. Digital infrastructure is also helping healthcare move toward integrated models of care, making it easier to provide continuous treatment across several institutions.

For professionals, digitalization is changing what it means to be a doctor. Technology is now part of daily clinical thinking and practice. Rather than replacing medical expertise, digital tools add new responsibilities—like managing information, evaluating algorithmic advice, and working with colleagues across disciplines. As a result, digital skills are now a key part of being a modern healthcare professional.

Digital transformation is also changing doctor–patient relationships. Patients have more information and better access to care, but trust and the human side of medicine are still vital—and need active attention as healthcare goes digital.

This review also shows that for digitalization to really work, there must be strong governance—covering data protection, cybersecurity, accountability, and equity. Technology alone can't deliver better results without organizational readiness, training, and integrative strategies. Ignoring the social and organizational side means missing out on the full benefits of digital innovation.

Digitalization should be seen as an ongoing, adaptive process that calls for constant reflection and teamwork between clinicians, policymakers, and tech experts. Real, lasting change depends on finding an equilibrium between invention, safety, professional independence, and equal access to care.

Going forward, healthcare will increasingly blend human expertise with digital intelligence. To build effective and responsive care systems, it's essential to understand not just the technology, but also the organizational and social changes that go with it. Ongoing interdisciplinary research will be vital to making sure digital healthcare grows in a responsible and sustainable way.

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