

An ethical challenge: Towards digital healthcare

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Abstract. The progressive and continuous advancement of new technologies and digital ecosystems, together with a growing expertise in analyzing and interpreting big data, artificial intelligence, and machine learning tools, increasingly enables personalized and effective therapeutic responses. This evolution holds promises of more targeted treatments tailored to individual needs. However, the significant technological challenges of today and the future demand an ethical approach capable of ensuring that as technology evolves, it is applied in a manner that respects humanity, which should remain the 'end' and not the 'object' of innovation. The concept of 'techno-humanism' emerges as a bridge, a vital connection between the potential of technology and the intrinsic value of humanity. This philosophy can ensure a responsible translation of technology into practice, upholding principles of fairness in accessing medical innovations and ethical considerations in decision-making processes.

Key words: work and organization, digitalization, emerging technologies, digital transformation, personalised healthcare, artificial intelligence, AI ethics

Introduction

New technologies, particularly those related to digitalisation, have taken on a strategic role in various sectors, including industry, education, commerce, and notably within the healthcare sector (1-3).

The Covid19 pandemic itself has contributed to giving a strong acceleration to digitalisation processes and digital transformation, marking a real point of no return in this path of change (4-6).

During this global emergency, the urgency to implement increasingly connected care models closer to citizens has become more apparent. These models aim to swiftly connect healthcare professionals, stakeholders, and patients, providing remote assistance as well (7). The first experiences of virtual hospitals date back to the early months of the pandemic, such as the one inaugurated in Sydney in February 2020. Through this hospital, remote care for infected patients became possible by using a chip capable of transmitting data to the pediatric hospital's doctors via an app (8).

Another example is the Humber River Hospital in Toronto, the first fully digital hospital in North America. Here, through monitors, real-time access to patients' vital signs, bed availability, and operating room workloads is possible (9).

Evolving healthcare digitalization must overcome the notion of mere development of Information and Communication Technologies (ICT), which is technology-oriented, focusing on technologies and products. This approach fails to grasp the actual managerial and organizational developmental needs of the healthcare system. More importantly, it doesn't fully harness the potential that such information technologies could bring to the overall evolution of both regional and organizational healthcare systems. Paradoxically, a sector with incredibly high innovation intensity, such as ICT, applied to one of the most dynamic and technologically innovative sectors, healthcare, has not fully realized the enormous innovation potential in past years. It has remained anchored to almost 'conservative' positions (10).

This context is reflected in the limitations of national and regional system policies on the evolution of healthcare ICT systems, primarily focused - up to now - on infrastructures, defining specific peripheral-to-central information flows, and centralizing IT purchases (11).

The orientation for the future aims at a healthcare system that should be:

Preventive: The primary emphasis will be on promoting health and preventing diseases. The focus will be on keeping individuals in an optimal state of health for as long as possible, anticipating the timing of diagnoses and therefore also minimizing the impact of treatment and subsequent rehabilitation, as well as the outcomes (principle of beneficence).

Data-driven: The data will be adequately valued at every stage of the patient's journey. Observations and collection of the patient's signs and symptoms must be integrated with those collected in the general population, thus allowing a more precise and targeted evaluation by comparing them. However, this should not diminish the importance of the patient's history and experience (principles of beneficence and vulnerability).

Collaborative and Integrated: Healthcare professionals and various involved facilities will interact synergistically, exchanging information and data within an integrated system. This collaboration will enhance the quality of care provided (principles of appropriateness and justice).

Predictive: Advanced algorithms will provide predictions on individual health status and the probability of developing certain pathologies. This will enable early intervention, including through adequate information and empowerment of the assisted person, to modify the course of events (principle of autonomy).

Connected: The devices will continue collecting data continuously and passively, either through personal sensors or integrated into the surrounding environment, allowing for a more efficient and constant data collection.

Ubiquitous: Healthcare services won't be confined solely to hospital or local facilities but will extend to where the patient is located—be it at home, work, or school. This will enable more convenient and timely access to care (principle of justice).

Customized: Similar to other sectors like tourism or entertainment, healthcare services will be designed to be more accessible and tailored to individual needs and even the moods of patients, providing an appreciable user experience (principle of autonomy). Additionally, this new approach will focus on the patient, ensuring a personalized service oriented towards their specific needs and preferences, always placing the individual and their well-being at the center (principle of vulnerability).

Contextualization of digital healthcare

The increasingly widespread implementation of digital solutions in the healthcare sector has highlighted the possibility of significant improvements in the provision of social and healthcare services. This transformation has allowed easier access to treatment, quicker diagnoses, and a more personalized therapeutic approach, increasingly favoring the provision of care at home or within local healthcare settings rather than inappropriate hospital admissions (12, 13).

Additionally, the transition towards a data-driven healthcare model, based on the collection and analysis of health data to provide targeted and personalized services, enables a more efficient use of resources and ensures a stronger assurance of the quality and effectiveness of the care provided (14). This approach puts the citizen in the foreground as the protagonist of social and healthcare assistance and provides more adequate support to healthcare professionals in patient management as well as the prospect of more appropriate and valuable planning by healthcare facilities (15). This will enable healthcare organizations to adopt more precise strategies in allocating human resources, ensuring an adequate number of professionals to manage demand for care. More accurate planning will significantly reduce waiting times for patients, improving access to

treatment, and optimizing the overall efficiency of the healthcare system (16-18).

For all this, and more, healthcare organizations are currently undergoing a profound transformation. This transformation is not only linked to the construction of digital health but also to the implementation of data and infrastructure protection systems. It's associated with compliance with European regulations such as GDPR for privacy protection and cybersecurity measures to address increasingly frequent hacker attacks and ensure information security. Consequently, it's imperative to support these changes within healthcare organizations - which demonstrate an impressive ability to quickly and effectively adapt to new technologies - by providing methodological, managerial, organizational, and training guidance regarding the path of digital innovation, implementation, and enhancement of digital experiments. Equally important is the ethical approach towards these innovations (19).

Innovative and cultural transformation

Innovation is radically revolutionizing the work landscape in the healthcare sector, introducing tools from highly specialized fields such as robotics, artificial intelligence, augmented reality and virtual reality. These technologies not only enhance the quality of care provided but also change the way healthcare professionals operate, necessitating the acquisition of new and specific skills to utilize these technological resources. Integrating these tools into their own knowledge and skill set becomes essential (20, 21).

The Mission 1 of the National Recovery and Resilience Plan (NRRP), approved on July 13, 2021, addresses the theme of digital health, promoting the strengthening of technological and digital infrastructure with the goal of overcoming fragmentation across various levels of healthcare in the country. The objective is to ensure equitable access to high-quality care by redefining and enhancing territorial networks (22, 23).

The NRRP represents a crucial opportunity to transform the national healthcare system by focusing on human resource development, training, and innovation. However, this path requires a profound cultural change involving managers, professionals, and citizens.

The perspective presented implies the need to rethink traditional services, pathways, and organizational models, constructing a digitized e-health ecosystem. This new paradigm is based on an ethical approach centered around the individual, placing individual well-being at the core of healthcare service digitalization.

The ethical dimension

Innovation is an indispensable goal, achievable only when aiming to eliminate every disparity (not just digital) - a fundamental prerequisite to ensure equitable access to care, as protected by our Constitution. However, the integration of such technologies also raises several ethical issues that deserve careful consideration (24-26).

Creating and implementing new medical solutions must consider not only the technological aspect but also their impact on existing disparities, such as socioeconomic or geographical disparities. It's crucial to ensure that access to care is not limited by digital barriers or other forms of discrimination. This commitment requires a careful assessment of the ethical implications associated with the use and distribution of these technologies in the healthcare context (27). Preserving equitable access to healthcare aligns with fundamental ethical principles, ensuring that innovation doesn't exclude anyone and is available to all, regardless of their economic, social, or geographical situation. In this context, ethics play a critical role in guiding the responsible development and use of healthcare technologies, ensuring that progress is driven by values of justice and equality.

The ethical issues surrounding the integration of healthcare technologies encompass a range of dimensions that require careful consideration involving a variety of knowledge disciplines. This is essential to ensure the respect of fundamental human rights and protect the interests of the people involved (28).

Such reflection inherently involves evaluating fundamental ethical principles such as autonomy, justice, respect for human dignity, vulnerability, and non-maleficence. Additionally, it necessitates a careful analysis of the practical implications of ethical decisions in the real world, considering the consequences

of technologies on people's lives, their rights, and disparities in access to care. Ensuring the respect of individuals' rights means not only protecting data privacy and security but also ensuring that healthcare technologies are accessible to everyone, regardless of socio-economic or geographical differences. This requires policies and regulations that consider the diversity of contexts and the needs of different communities.

The current vision demands an integrated and synergistic system where processes and systems operate within a unified, dynamic, and efficient governance. Italian healthcare companies and hospitals are steadfastly committed to this goal, recognizing that healthcare innovation and digitalization are not an end in themselves but tools aimed at promoting even more widespread participatory health. However, this transformation goes beyond the technological scope; it represents a true cultural revolution within our National Health System, always placing the citizens' well-being at the forefront.

The integrated approach aims to overcome the traditional compartmentalization between hospitals and territorial services, strengthening a cohesive and coordinated management that fosters synergy between human resources and new technologies. Healthcare companies are embracing this transformation, recognizing that digital innovation is not an end in itself, but a powerful tool to improve healthcare and actively involve citizens in the care process.

This change is not just technological; it implies a profound cultural reform. It's about creating a more participative healthcare environment centered around the patient, where technology supports and promotes a humanistic approach focused on individual needs. The goal is to bring healthcare closer to people, facilitating access to services, enhancing the overall experience, and promoting a shared culture of health that actively engages citizens in managing and caring for their own health.

In an increasingly specialized, multi-professional, and digitized field, the challenge for managers and professionals will be to reconcile technology with the human dimension, aiming to always prioritize fundamental values such as empathy, human connection, proper resource utilization, and ethics.

Facing the challenges for the future of the National Health Service today requires holding firm

to the principles of universality, equity, and solidarity, which are the pillars of our healthcare system. Simultaneously, it entails making the best possible use of new knowledge and digitalization technologies, with a firm awareness that tackling these challenges necessitates the involvement and a shared vision among managers, professionals, policymakers, and citizens.

Ethics must thus form the foundation upon which all decisions are made. In the context of rapid technological evolution, it's essential to consider the moral implications of every innovation, ensuring that the adoption of technologies always respects moral principles and professional integrity.

Training

The rapid evolution of digital healthcare demands a continuous commitment to training and updating skills (29). Healthcare professionals must become familiar with new technologies, understand their practical application, and learn to use them effectively and ethically in clinical settings. Training in digital healthcare involves not only learning about new technologies but also acquiring cross-cutting skills. It's about understanding the intersection between technology, clinical practice, ethics, data security, and patient communication.

This challenge implies understanding how these technologies impact patient privacy, data transparency and security, the doctor-patient relationship, and disparities in access to care. Only a multidisciplinary approach allows healthcare professionals to successfully integrate new technologies into their daily work (30, 31). This requires a thorough understanding of fundamental ethical principles, as well as the ability to apply them in real contexts, ensuring that decisions are always aligned with the patient's well-being and respectful of ethical values (32, 33).

Certainly, healthcare facilities must invest in staff training and implement processes that encourage the effective and secure use of digital technologies. But it is also crucial to adopt strategies and policies that break down barriers between disciplines and competencies related to technology management.

The goal is to develop a renewed cultural approach that harmonizes the interaction between technology

and healthcare needs, enabling the use of high-value tools oriented towards the real needs of individuals while respecting the dignity and autonomy of patients' decision-making.

A comprehensive educational journey should not only promote an open mindset toward the potential of new technologies but also foster critical awareness of their limitations, risks, and potential implications. This awareness extends beyond the mere professional sphere, involving also the cultural, epistemological, and ethical paradigms of society. Training should, therefore, be structured to encourage critical and reflective thinking that not only explores the opportunities offered by new technologies but also analyzes their broader implications. This includes risk analysis, ethical and social implications, as well as assessing potential effects on professional practice and society.

This critical mindset should be fostered not only among healthcare professionals but among all involved in the context of digital health, including engineers, computer scientists, and other stakeholders involved in the development and implementation of healthcare technologies. Furthermore, education should promote an interdisciplinary approach that encourages dialogue between different knowledge areas. This integrated approach allows for examining new technologies from multiple perspectives, enabling a more comprehensive understanding of their implications and impacts on our lives and society as a whole, ultimately offering a true capacity for E-leadership.

Education in this perspective acts as a driver of innovation, but it's not solely about academic training; it requires personal development, allowing for the acceptance of surpassing traditional organizational models by reimagining them digitally. It's a cultural and social challenge because it will improve access to services and therefore the community's well-being. Hence, it's a challenge for managers and professionals but also for every citizen (34).

Conclusions and future directions

The path towards an ethical digital healthcare requires a careful and conscious approach to emerging challenges. Collaboration among stakeholders,

the development of ethical guidelines, and active engagement of communities are fundamental in responsibly developing and implementing digital health technologies.

A 'healthy' community presupposes, indeed, the active involvement of all stakeholders within a territory and system, actively engaged in a shared responsibility to construct and provide integrated services to the entire population, capable of promoting overall and local health. It's a collective commitment that requires an inclusive approach and ongoing dialogue among different disciplines to provide a solid and transparent ethical framework that protects and respects human well-being and dignity. Only through a collective commitment is it possible to realize the potential of digital technology in healthcare, while ensuring the respect of ethical values and human dignity at the same time.

In conclusion, it's vital to foster a cultural evolution that appreciates the convergence of technology and humanism, ensuring that innovation in healthcare isn't merely technological progress but also human advancement, respectful of individuals' needs and rights.

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