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EDITORIAL
Use of Technologies in Healthcare:
Advances and Challenges

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ABSTRACT

The advent of digital health has introduced a new paradigm in healthcare, characterized by the integration of advanced technologies into medical practice, research, and administration. Following recent reports from the Organization for Economic Co-operation and Development (OECD), four critical themes have emerged in the discourse on digital health: (1) the relationship between Artificial Intelligence (AI) and the health workforce (Almyranti et al., 2024); (2) the real value and cost of digitalization; (3) the implementation and use of electronic health records (Slawomirski et al., 2023); and (4) the collective ethical responsibility in the use of AI in healthcare (Anderson & Sutherland, 2024).

THE IMPACT OF ARTIFICIAL INTELLIGENCE ON THE HEALTHCARE WORKFORCE

Artificial Intelligence, particularly in the form of large language models (LLMs) and machine learning algorithms, has demonstrated significant potential in enhancing diagnostic accuracy, optimizing treatment plans, and improving hospital management efficiency. However, concerns regarding its implications for the healthcare workforce remain pertinent. While current AI applications lack the capability to replace human professionals outright, the long-term potential of AI remains uncertain (Almyranti et al., 2024). Rather than viewing AI as a threat to employment, healthcare professionals must consider it as a tool to augment human expertise, allowing for improved decision-making, reduced workload, and enhanced patient care.

Moreover, AI's integration into healthcare highlights the necessity for interdisciplinary collaboration, where clinicians, data scientists, and regulatory bodies work together to ensure that AI-driven tools complement rather than replace human judgment. It is crucial to recognize that the therapeutic relationship between healthcare providers and patients remains an irreplaceable element of medical practice. The holistic nature of patient care necessitates human empathy, moral reasoning, and interpersonal skills—traits that AI, regardless of its sophistication, cannot replicate.

Despite these promising benefits, there are also challenges related to the adoption of AI in healthcare settings. Many healthcare professionals lack the necessary training and confidence to work alongside AI-driven technologies effectively. There is a pressing need for structured educational programs and continuous professional development initiatives to equip healthcare workers with the knowledge and skills required to navigate this evolving landscape. Institutions must invest in reskilling and upskilling their workforce to ensure a smooth transition into AI-integrated healthcare environments.

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THE ECONOMIC AND ETHICAL DIMENSIONS OF DIGITALIZATION

The cost-effectiveness of digitalization in healthcare is another central issue. While technological advancements can enhance efficiency and reduce long-term expenditures, the initial investment required for the development, implementation, and maintenance of digital systems remains substantial. The financial burden is particularly significant in lower-income healthcare systems, where budget constraints may hinder the adoption of AI-based solutions. Policymakers and stakeholders must carefully evaluate the return on investment, balancing short-term costs with long-term benefits.

Furthermore, ethical concerns associated with AI in healthcare necessitate careful regulatory oversight. The deployment of AI must prioritize patient safety, data security, and equity in access to digital healthcare services. Regulatory frameworks should evolve in tandem with technological advancements to address emerging challenges, such as algorithmic bias, data privacy risks, and accountability in AI-driven diagnostics. The protection of human rights in AI applications is paramount, as highlighted by Hashiguchi (2020) in the OECD.AI Policy Observatory, emphasizing the necessity of human oversight in AI-driven processes.

A particularly important aspect of ethical AI implementation is ensuring transparency and explainability. Patients and healthcare providers must understand how AI-driven decisions are made, what data is used, and what potential biases may be present. Black-box AI models, which operate with limited human interpretability, pose a risk to informed decision-making (Chinu, 2023). Ethical AI design should therefore incorporate explainable AI (XAI) principles, ensuring that systems are both effective and trustworthy.

IMPLEMENTATION OF ELECTRONIC HEALTH RECORDS AND DATA TRANSPARENCY

Electronic Health Records (EHRs) have been widely recognized for their potential to improve healthcare delivery by facilitating seamless information sharing, reducing medical errors, and enhancing patient management (Slawomirski et al., 2023). However, their implementation poses challenges related to interoperability, data standardization, and cybersecurity threats. Ensuring that EHR systems are user-friendly and secure is vital in maximizing their benefits while mitigating risks associated with data breaches and unauthorized access.

Additionally, issues of data ownership and transparency must be addressed. Patients should have clear rights regarding their health data, and healthcare institutions must establish protocols for ethical data usage. Algorithmic transparency is crucial in AI-driven healthcare, ensuring that decision-making processes remain interpretable and accountable to both practitioners and patients. The integration of blockchain technology has been proposed as a possible solution to enhance security and patient control over their medical data.

ADDRESSING UNMET HEALTHCARE NEEDS AND DIGITAL HEALTH READINESS

Despite the progress in digital health, significant disparities in healthcare access persist. Recent OECD (2023) reports highlight digital health readiness as a determinant of healthcare quality, yet certain populations continue to experience unmet needs. For instance, Estonia (8.1%) and Greece (6.4%) report relatively high levels of unmet healthcare needs, particularly in dental services, which are predominantly privatized in countries such as Portugal and Latvia (exceeding 16%). These disparities underscore the importance of equitable access to digital health solutions, ensuring that technological advancements benefit all demographic groups rather than exacerbating existing healthcare inequalities.

Bridging this gap requires targeted policy interventions. Governments and healthcare organizations should prioritize investment in digital infrastructure and initiatives aimed at increasing healthcare accessibility. Telemedicine, mobile health applications, and AI-driven diagnostic tools can help extend healthcare services to remote and underserved populations. Additionally, education campaigns are necessary to ensure that digital health tools are adopted effectively by both healthcare providers and patients.

THE HUMAN-CENTERED APPROACH TO AI IN HEALTHCARE

Fundamentally, AI should be regarded as a tool that enhances human capabilities rather than diminishes them. Intelligence remains a distinctly human trait, characterized by reasoning and free will—concepts deeply rooted in Natural Law, as defended by St. Thomas Aquinas and contemporary Christian philosophers (Posada, 1997). The moral and ethical dimensions of healthcare demand that AI applications align with human values, reinforcing rather than undermining the dignity of the person.

Comprehensive training programs for healthcare professionals are essential to facilitate the ethical and effective integration of AI technologies. These programs should encompass AI literacy, ethical considerations, and strategies for human-AI collaboration. Regulatory bodies must also establish clear guidelines on data ownership, algorithmic transparency, and accountability to safeguard patient interests.

The transformation of healthcare through digitalization and AI presents both opportunities and challenges. While technological advancements have the potential to revolutionize diagnostics, treatment, and healthcare management, the ethical, economic, and workforce-related implications must be carefully navigated. A balanced approach—one that integrates AI while preserving the fundamental human aspects of healthcare—is essential. Through interdisciplinary collaboration, regulatory oversight, and a commitment to patient-centered care, digital health can be harnessed to improve healthcare outcomes while maintaining ethical integrity and social responsibility.

Additionally, ongoing research and dialogue among policymakers, healthcare professionals, and technologists are necessary to refine AI applications in healthcare. The path forward should emphasize sustainable implementation strategies that ensure inclusivity, transparency, and continuous evaluation. In doing so, AI can serve as an instrument of progress, reinforcing rather than disrupting the essential values of human-centered healthcare.

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