EDITORIAL/DISCUSSION

Blockchain's Transformative Potential in Healthcare

Geetika Jain, PostDoc, PhD[1] ⓘ, Nishant Kumar, PhD[2] ⓘ, and Colin Rigby, PhD[3] ⓘ

[1]Digital Transformation, Keele Business School, Keele University; [2]Department of Business, Christ University, Bangalore, India; [3]Entrprise Lead, Keele Business School, Keele University

Corresponding Author: Geetika Jain, Email: g.jain@keele.ac.uk; geetikajain02@gmail.com

Abstract

Blockchain's transformative potential, its current applications, and the path forward for its integration into the healthcare ecosystem are all explored in the journal Blockchain in Healthcare Today. The healthcare industry is facing significant challenges and opportunities after COVID-19. As we navigate the complexities of increasing healthcare costs and technological updates for better patient outcomes, innovative technologies are emerging as pivotal tools for healthcare transformation. Healthcare digital platforms have witnessed revolutionizing the dynamics of healthcare systems using disruptive technologies. However, while these technologies have garnered extensive attention for their transformative potential, there remains a critical gap in our understanding of the impact of digital technology on the healthcare industry. Population health management has critical challenges in data protection, sharing, and interoperability, where personalized medicines and wearable devices are highlighted as a concern. Patients and medical personnel need a safe and simple way to record, transmit, or access information through networks without concern for their safety. Using blockchain technology can help address these problems. Blockchain technology enhances medical data security by providing a decentralized, immutable ledger that ensures data integrity, transparency, and privacy. It enables fine-grained access control, improves interoperability, and resists cyber-attacks. Streamlining regulatory compliance allows patients and medical personnel to safely record, transmit, and access sensitive information across networks.

Among emerging technologies, blockchain technology stands out, offering significant potential to revolutionize various aspects of healthcare. Blockchain in healthcare has been classified as patient-based and entity-based applications. The patient-focused approach aims to provide authorized entities access to patient data and manage prescription history while upholding data privacy and security. From an entity's perspective, accurate data management is crucial for avoiding patient misidentification, preventing duplicate medical records, and ensuring data provenance.[1] In addition, traditional healthcare systems have traditionally lagged in terms of innovation and growth potential. Blockchain is not limited to financial solutions related to data handling, data exchange, and patient data.

Here are several future opportunities that are popular and audacious regarding the actual application of blockchain: patient-oriented data management structures, smart contracts that have been integrated with trials, and blockchain for genomic data.

In as much as blockchain has been proposed and implemented in various aspects of healthcare delivery, this technology is also associated with many challenges, including scalability issues, regulatory issues, and widespread issuances, which are critical barriers that need to be met. Progress requires the collective work of healthcare professionals, technology developers, and agencies regulating the healthcare industry to come up with the formats for implementing blockchain technology. These partnerships can help ensure blockchain technology is effectively integrated into healthcare systems and workflows.

Furthermore, a collaborative process between industry and regulators is necessary to establish regulatory requirements that are operationally and commercially viable for the use of blockchain technology in healthcare.[2] This collaboration can help address any regulatory challenges and

ensure that blockchain technology is implemented in a way that complies with existing regulations. Collaborative efforts between healthcare providers, technology developers, and regulatory bodies are crucial for successfully implementing blockchain technology in healthcare. By working together, these stakeholders can overcome data security, privacy, and regulatory compliance challenges and unlock the full potential of blockchain technology to transform the healthcare industry.

The complexity of healthcare processes and ongoing concerns about patient records give a clear indication of the lack of standardized processes and also the ability to create a unified approach. The integration of the concepts is expected to improve data security and the organization of healthcare services. Thus, to establish full-fledged authorized guidelines for the administration and cyclical prevention of diseases, there is currently a focus on a series of comprehensive measures that need to be adapted and implemented in the global network of healthcare facilities based on modernizing the integrated Internet of Things (IoT) networks by using blockchain technology.[3]

It is, however, important in this process to standardize these protocols so that there can be development of formats for a consistent approach to the processing of this information and programming of various systems.[4] In general, the commented approach to the utilization of blockchain technology in the healthcare industry carries a significant potential to enhance the corresponding processes and provide high protection of data. Nonetheless, it is crucial to establish the standard techniques for the development of health information exchange and integration models.[5]

It may be effective to coordinate with others when it comes to different aspects of the health care procedures, and by using blockchain technology, new standards and processes can be created for developing different solutions better suited to patient centricity. The recent traction of blockchain solutions related to the tokenization of healthcare records has created an economic business model where the incentives mechanism could be placed to make healthcare services more approachable and friendly. Despite technological advances, there is a great knowledge gap, and bridging this gap by having the consultation of different stakeholders holistically.

While technology can bring solutions to improve the efficiency and effectiveness of each process, regulatory bodies must come forward to develop clear guidelines on technology intervention—a highly crucial aspect. For blockchain to truly thrive in healthcare, it is crucial that healthcare professionals, developers, and regulators come together. Healthcare professionals understand the real challenges and privacy concerns, guiding the development of solutions that matter most. Developers bring the technical know-how to create secure, efficient systems.

Regulators ensure these innovations are safe, legal, and trustworthy, safeguarding patient data and public confidence. By collaborating, these groups can build a strong blockchain framework that not only enhances data security and communication but also fosters innovation in healthcare, leading to better outcomes for patients and the industry as a whole.

Moreover, ongoing research related to ethical aspects is necessary to refine blockchain applications and demonstrate their value at scale. Investment in education and technological innovation could bring exponential growth to the healthcare industry. By fostering a collaborative approach, investing in research, and addressing the highlighted challenges could pave the way for futuristic healthcare solutions. While the potential of blockchain technology is promising in healthcare, the integration of blockchain technology in healthcare processes is still being done by understanding every aspect. The healthcare industry is highly patient-centric, where better health outcomes and satisfaction are of utmost priority.

References
1. Treiblmaier H, Rejeb A, Gault M, et al. Harnessing blockchain to transform healthcare data management: a comprehensive research agenda. Blockchain Healthc Today. 2024;7. Available from: https://blockchainhealthcaretoday.com/index.php/journal/article/view/301
2. Krishnasamy S, Gopalakrishnan BN. Moving beyond proof of concept and pilots to mainstream: discovery and lessons

from a reference framework and implementation. Blockchain Healthc Today. 2023;6. Available from: https://blockchain-healthcaretoday.com/index.php/journal/article/view/280

3. Kharche A, Badholia S, Upadhyay RK. Implementation of blockchain technology in integrated IoT networks for constructing scalable ITS systems in India. Blockchain Res Appl. 2024 Jan 6:100188. Available from: https://www.sciencedirect.com/science/article/pii/S2096720924000010

4. World Health Organization. Global strategy on digital health 2020–2025. 2020 [cited 2022 Nov 12]. Available from: https://www. who. int/docs/default-source/documents/gs4dh-daa2a9f352b0445bafbc79ca799dce4d. pdf

5. Anon. Reimagining health information exchange in India using blockchain [Internet]. PWC. 2019. Available from: https://www.pwc.com/gx/en/healthcare/pdf/reimagining-health-information-exchange-in-india-using-blockchain.pdf