


Chapter 9

A Study on Blockchain's Transformation of Healthcare Systems

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ABSTRACT

Blockchain technology has emerged as a transformative force in the healthcare sector, and this chapter explores the emerging applications of blockchain technology in the global healthcare system through a series of case studies. The case studies cover a wide range of use cases, such as electronic health records, clinical trials, patient privacy and consent management, pharmaceutical supply chain management, and medical research. The findings underscore the potential of blockchain to revolutionize healthcare by improving data security, enhancing transparency and accountability, enabling patient-centric care, and fostering collaboration among stakeholders. However, challenges such as scalability, privacy concerns, regulatory frameworks, and interoperability need to be addressed for widespread adoption. The chapter concludes with a call for further exploration and adoption of blockchain technology in healthcare to improve patient outcomes.

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INTRODUCTION

Blockchain technology is developing as a game-changing answer as the healthcare industry experiences a digital revolution. Blockchain, which was first connected to digital currencies like Bitcoin, has potential uses in a range of markets, including healthcare, making it a viable technology for managing and delivering healthcare (Sundaramoorthy et al., 2024). Blockchain is a decentralised ledger that keeps track of transactions and guarantees immutability, security, and transparency. By allowing direct peer-to-peer interactions without middlemen, it proposes a paradigm shift in healthcare. This decentralised strategy can address issues with supply chain management, interoperability, patient privacy, and data security (Singal et al., 2020).

Through case studies, this chapter examines the potential of blockchain technology in the global healthcare system, demonstrating its ability to revolutionise the sector and tackle urgent concerns. It addresses a range of use cases, including the administration of pharmaceutical supply chains, clinical trials, patient privacy, and medical research (Soltanisehat et al., 2020). Electronic health records (EHRs) management in the healthcare industry is difficult due to data silos, fragmented information, and a lack of interoperability. By utilising decentralised control and cryptographic methods to guarantee data security and integrity, blockchain-based EHR systems can address these problems. By easing data transmission between healthcare providers, this standardised platform enhances patient outcomes and care continuity (Sater, 2018).

In healthcare, especially during clinical trials, the smart contract capability of blockchain can simplify informed consent and data access control. Participants are given the ability to control their data and grant or withdraw access based on predetermined rules thanks to these self-executing agreements with predefined conditions and rules. This improves data management's transparency, security, and trust, which yields more accurate and effective research results (Aloini et al., 2023). Patient privacy and consent management are essential in the digital age. Blockchain technology provides a method for patient-controlled health data sharing that enables safe information exchange between medical professionals and researchers. By allowing access to data only with express consent and giving a transparent, auditable record of transactions, this provides privacy and control. This improves data security and patient privacy in the age of digital health (Chakrabarty & Mukherjee, 2022).

Blockchain technology has the potential to drastically improve pharmaceutical industry supply chain management (Soltanisehat et al., 2020; Wong et al., 2018). By offering a tamper-proof, transparent record of each step in the supply chain, allowing stakeholders to track and verify drug provenance and movement, blockchain-based solutions can help address the risks of counterfeit drugs and a lack of transparency in the pharmaceutical supply chain, lowering those risks and improving patient safety.

By securely and decentralizedly distributing data among stakeholders, blockchain technology can change medical research and data sharing, accelerating scientific advancement and enhancing patient outcomes. It makes assurance of the data's provenance, reproducibility, and integrity, which improves the reliability of the results. Blockchain-based reward mechanisms foster collaboration and advance medical knowledge by encouraging individuals and organisations to contribute data (Abouelmehdi et al., 2018). The case studies in this chapter examine actual blockchain deployments in the healthcare industry while examining its advantages, drawbacks, and potential future applications. It demonstrates blockchain's promise in the healthcare sector by highlighting how it may address issues including data security, interoperability, patient privacy, and supply chain management (Manimuthu et al., 2019; Omar et al., 2021).

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