Blockchain in Healthcare: A Systematic Review

Abstract

The healthcare industry has faced various challenges, including data security, supply chain inefficiencies, and patient engagement barriers. Blockchain technology has emerged as a promising solution to address these issues. This systematic review aims to explore the current applications of blockchain in the healthcare domain, highlighting its potential benefits and limitations.

Introduction

The healthcare industry generates a vast amount of sensitive data, including patient records, medical histories, and pharmaceutical supply chain information. Ensuring the security, privacy, and integrity of this data is of paramount importance. Traditional centralized data management systems have been susceptible to data breaches, leading to concerns about patient data privacy and trust in the healthcare system.

Blockchain technology, with its decentralized, secure, and transparent nature, has the potential to revolutionize the healthcare industry. By providing a distributed, tamper-resistant ledger, blockchain can enhance data security, improve supply chain traceability, and foster patient engagement.

Methodology

This systematic review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. A comprehensive search was performed across multiple databases, including PubMed, IEEE Xplore, and ACM Digital Library, to identify relevant studies

published between January 2015 and August 2023. The search terms included “blockchain,” “healthcare,” and related keywords.

Results

The search yielded 321 articles, of which 42 were deemed eligible for inclusion in the systematic review after applying the selection criteria. The included studies were analyzed to identify the key applications of blockchain in healthcare, as well as the associated benefits and limitations.

Secure Health Data Management

Blockchain’s decentralized and cryptographic nature can enhance the security and privacy of patient health data. Studies have shown that blockchain-based solutions can provide secure data storage, access control, and audit trails, reducing the risk of data breaches and unauthorized access.

Supply Chain Optimization

Blockchain can improve the traceability and transparency of the pharmaceutical supply chain. By recording every transaction and movement of drugs and medical supplies on the blockchain, healthcare organizations can better monitor the provenance of these products, detect counterfeit goods, and optimize inventory management.

Patient Engagement Enhancement

Blockchain-based applications can empower patients to have greater control over their health data, enabling them to securely share information with healthcare providers and participate in clinical trials. This can lead to improved patient engagement, better-informed decision-making, and enhanced patient-provider collaboration.

Discussion

The systematic review highlights the significant potential of blockchain technology in addressing various challenges in the healthcare industry. By providing secure data management, supply chain optimization,

and patient engagement enhancement, blockchain-based solutions can contribute to improved healthcare outcomes, increased trust in the system, and more efficient resource utilization.

However, the adoption of blockchain in healthcare is not without its challenges. Factors such as scalability, interoperability, and regulatory compliance must be addressed to ensure the widespread and successful implementation of blockchain-based healthcare applications.

Conclusion

This systematic review demonstrates the growing importance of blockchain technology in the healthcare industry. The identified applications of blockchain, including secure health data management, supply chain optimization, and patient engagement enhancement, highlight the transformative potential of this technology in improving healthcare delivery and patient outcomes. As the field continues to evolve, further research and collaboration between healthcare stakeholders, technology providers, and policymakers will be crucial to fully harness the benefits of blockchain in the healthcare domain.

References

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