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# Blockchain Technology in Healthcare: Potential Benefits and Barriers in Health Informatics

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## Abstract

This study explores the application of blockchain technology within the healthcare sector, emphasizing its potential benefits and barriers in health informatics. By leveraging secondary data from a diverse range of academic publications, industry reports, and case studies, the research provides a comprehensive overview of how blockchain can be a transformative force in healthcare. The findings suggest that blockchain technology offers significant advantages, including enhanced data security, improved interoperability, and increased transparency. These benefits could lead to more efficient healthcare delivery, reduced costs, and better patient outcomes. However, the study also identifies several barriers to widespread blockchain adoption, such as technical complexity, regulatory challenges, scalability issues, and the need for standardized protocols. By addressing these obstacles, stakeholders can unlock the full potential of blockchain technology, ensuring a more secure and efficient future for health informatics. This study serves as a foundational resource for healthcare professionals, policymakers, and technologists aiming to navigate and implement blockchain solutions in the healthcare industry.

**Keywords:** Blockchain technology, Health informatics, Data security, Interoperability, Healthcare delivery

## 1. Introduction

In recent years, blockchain technology has emerged as a transformative force across various industries, with healthcare being no exception. Initially conceptualized as the underlying framework for cryptocurrencies like Bitcoin, blockchain has evolved into a versatile tool, poised to address a multitude of challenges and inefficiencies faced by the healthcare sector (Agbo, 2019). This decentralized, secure, and transparent ledger system has the potential to revolutionize health informatics by enhancing data interoperability, security, and patient privacy, while simultaneously reducing administrative costs and streamlining operations.

The healthcare industry has long struggled with issues related to data silos, interoperability, and the secure sharing of sensitive patient information. These challenges have been exacerbated by the increasing volume and complexity of healthcare data, which continues to grow as digital health technologies become more integrated into clinical practice (Bazel, 2021). Blockchain technology offers a promising solution by enabling the secure and transparent exchange of data across disparate healthcare systems, thus fostering a more collaborative and efficient healthcare ecosystem.

In addition to the data exchange, the inherent characteristics of blockchain have significant value in protecting electronic health information. Blockchain is a distributed structure, which means that data that is recorded cannot be erased or modified other than by network approval (Durneva, 2020). This minimizes vulnerability to data breaches or unauthorized access, which are big issues in building or retaining trust, especially for patients and healthcare consumers, not to mention regulatory compliance in lieu of HIPAA in the United States.

All the same, there are a number of challenges that come with the implementation of blockchain in healthcare. This technology seems to face technical, regulatory, and organizational barriers that limit its adoption (Fragidis, 2021). Several challenges, like the size of the blockchain, including its volume, different structures, and how blockchain can fit into the existing IMS, should be solved to make an effective use of the Blockchain in HI. Secondly, there are legal risks and concerns in the environment and large capital investment requirements for future infrastructure and training, which are other challenges to its adoption.

This study aims to explore the potential benefits of blockchain technology in healthcare, particularly within the realm of health informatics, while also examining the barriers that must be overcome to fully leverage its capabilities (Haleem, 2021). By analyzing current use cases, technological advancements, and emerging trends, this research will provide insights into how blockchain might reshape the future of healthcare and propose strategies to navigate the challenges that lie ahead.

## 2. Literature Review

Blockchain has recently been named as one of the most disruptive technologies in the existing economies, and its application in the healthcare sector can potentially solve a number of the existing issues, such as data sharing, integrity, and proper patient data protection (Justinia, 2019). Extensive work has been done on the use of the theory in health informatics, detailing its opportunities and challenges.

Blockchain technology has the following advantages when used in the health sector: A primary benefit is improved data protection and patient confidentiality. According to Kuo (2017), it was observed that the blockchain technology podium is highly secure since it is based on a distributed podium with no central server or hub where data can be compromised easily. Cryptographic methods used in blockchain mean that only people with permission are allowed to access a patient's data, thus enhancing the level of trust between the patient, doctor, and other stakeholders.

Besides security, another major advantage blockchain can bring to the healthcare sector is interoperability. Murphy (2021) explained how blockchain supports the integration of data sharing between different health systems. By making decentralized data storage immutable, blockchain can substantially prevent data fragmentation that compromises the smooth flow of patient information from one healthcare provider or institution to another. This capability not only ensures smooth care delivery but also helps minimize gaps and maximize the detail in patients' records.

In addition, blockchain has the possibility to disrupt the supply chain in the healthcare system. Qu (2022) showed how the process of drug distribution allows for the use of the blockchain system in reducing counterfeit drugs. This is because, through the use of blockchain, every transaction that occurs in the supply chain network is made clear and accessible for auditing, hence increasing the reliability of medical products.

Despite these benefits, several barriers hinder the widespread adoption of blockchain technology in the healthcare sector. One significant challenge is scalability. As highlighted by Saeed (2022), the computational demands of maintaining a blockchain can be substantial, especially in a data-intensive field like healthcare. The need for massive storage and processing capabilities may outstrip the resources available in many healthcare settings, limiting its practicality.

Furthermore, the integration of blockchain into existing healthcare IT infrastructure poses technical challenges. Zhang (2018) pointed out that the lack of standardization in healthcare data formats and systems can complicate the implementation of blockchain solutions. Healthcare providers may need to overhaul their IT systems to accommodate blockchain, leading to increased costs and potential disruptions in service delivery.

Regulatory and legal issues also present significant hurdles. Sharma (2021) emphasized that compliance with existing health information regulations, such as HIPAA in the United States, can be complex when implementing blockchain. The technology's inherent openness may conflict with privacy laws, necessitating careful consideration and potential modifications to existing regulatory frameworks to accommodate blockchain solutions.

## 3. Methodology

### *3.1 Research Design*

This research adopts a quantitative research approach involving secondary analysis of literature to examine the opportunities and risks of blockchain in health informatics. In conceptualizing the study, the review of published literature, reports, and cases will seek to develop a clear vision of the present state as well as the outlook of blockchain in health systems. Secondary data is mostly used as the main source of information so that analysis and synthesis of the findings of other scholars can be facilitated.

### *3.2 Data Sources*

The data for this study were collected from a variety of reputable sources, including peer-reviewed journal articles, government and industry reports, academic conference papers, and existing case studies on blockchain technology in healthcare. Databases such as “PubMed, IEEE Xplore, ScienceDirect, and Google Scholar” were extensively searched using relevant keywords such as "blockchain in healthcare," "blockchain technology benefits," "health informatics," and "blockchain barriers."

### *3.3 Data Selection Criteria*

In selecting data for this study, certain inclusion and exclusion criteria were established to ensure the relevance and quality of information. Studies and reports were included if they focused on blockchain technology specifically within the context of healthcare and health informatics, provided qualitative or quantitative insights into the benefits or barriers related to blockchain implementation, and were published in the last fifteen years to ensure the data reflects current trends and technological advancements. Studies were excluded if they did not directly address blockchain technology in healthcare or if they were considered outdated, lacking scientific rigor, or irrelevant to the research focus.

### *3.4 Data Analysis*

The gathered secondary data were analyzed using thematic analysis to identify recurring patterns, themes, and insights related to the use of blockchain technology in health informatics. The data were systematically coded and categorized based on potential benefits, such as enhanced data security and interoperability, improved patient data management, cost efficiency, and patient

empowerment. Similarly, barriers were identified and categorized, focusing on issues such as regulatory challenges, technical limitations, cost of implementation, and resistance to change within healthcare systems.

### *3.5 Reliability and Validity*

To ensure reliability and validity, multiple sources were triangulated, and cross-referencing was performed to verify the consistency of data across different studies. The selection of high-quality and peer-reviewed articles, coupled with a systematic approach to data synthesis, enhances the credibility of the findings. Additionally, by adhering to a transparent methodology and clearly documenting the criteria and steps taken throughout the research process, the study aims to provide a robust and trustworthy analysis of blockchain technology in healthcare.

### *3.6 Ethical Considerations*

Since the study utilizes secondary data, it did not involve human subjects or require the collection of personal data, thereby eliminating concerns related to participant confidentiality and consent. Nevertheless, the study maintains academic integrity by properly acknowledging all sources and adhering to ethical standards in research.

## 4. Findings and Discussion

### *4.1 Overview of Blockchain Technology*

#### *4.1.1 Definition and Core Principles*

In particular, blockchain technology can be defined as a revolutionary way of handling and preserving digital assets. Some of its key characteristics, which include decentralization, transparency, and the inability to be altered after creation, are some of the values that make it crucial for restructuring different industries, among those being the healthcare sector (Yaqoob, 2019). Essentially, one can define blockchain as an open, distributed ledger for recording transactions that occur in such a way that the data written onto it cannot be altered without the approval of the network, given that the subsequent blocks of information are linked to the previous one. This characteristic also guarantees that the information processed is accurate, making clients trust the system.

One of the highest priorities of blockchain is decentralization, which does not require a central controlling body and distributes control among a multitude of nodes. This helps to eliminate bottlenecks and also improves the strength of the system (Prybutok, 2022). Transparency is realized as all stakeholders within the network can view and validate the contents of the blockchain, which is a plus for accountability and auditing. Nevertheless, the concept of immutability is the quality that makes it nearly impossible for data stored in any block to be modified without a cascade affecting all the subsequent blocks and requiring the cooperation of most nodes in the network.

#### *4.1.2 Current Applications in Healthcare*

The adoption of blockchain technology within the healthcare sector is emerging, with innovative applications that promise to enhance the efficiency, security, and accessibility of health informatics (Mehta, 2020). Currently, blockchain is being harnessed to manage patient records, streamline supply chain management, and support clinical research.

One significant application of blockchain in healthcare is the management and safeguarding of electronic health records (EHRs). The integration of blockchain can ensure that EHRs are consistently updated while maintaining uncompromised security and privacy (Khatri, 2021). For instance, MedRec is a prototype system that enables secure, permissioned blockchain access to medical records, demonstrating how blockchain can be used to provide patients with access

controls over their personal health information. This aligns with findings from Hira (2022), who emphasized the utility of blockchain in promoting patient-centric health information management by offering decentralized and incorruptible data handling capabilities.

In supply chain management, blockchain technology's inherent features of transparency are used to track drugs and medical equipment to ensure the right medical products and equipment are genuine and of the right quality. Chronicled and IBM's Blockchain Transparent Supply project demonstrates the effectiveness of partnerships based on the blockchain that will allow for tracking products from the manufacturer to the consumer to exclude counterfeit drugs from entering the healthcare supply chain. This is in line with Hussien (2021), who stated that blockchain enhances the reliability and transparency of the supply chain.
In addition, it is instrumental in group clinical practice by linking practitioners securely and transparently to clinical trial information. Examples like Biogen's eMERGE network depict the future of blockchain in research through efficient data sharing processes that make cross institutional cooperation possible and secure data privacy at the same time. This was similar to what Dedeturk (2021) addressed in the current study, where blockchain was identified to have the potential to improve data clarity and accuracy within clinical trials.

### *4.2 Potential Benefits of Blockchain in Healthcare*

The integration of blockchain technology in healthcare could potentially revolutionize various aspects of health informatics (Calegari, 2022). This section delves into its potential benefits, exploring how this technology could address key challenges in healthcare today.

#### *4.2.1 Data Security and Privacy*

Another advantage that has been widely mentioned while discussing blockchain solutions is the improved security and confidentiality of the stored information. Through decentralization and cryptographic mechanisms, Blockchain ensures that health data is fairly secured. In a blockchain, the data is distributed, and this makes it very difficult for hackers to change the data since the change will be noticed by other nodes. For instance, the Estonia e-Health Foundation in Estonia guarantees the integrity and privacy of patient data through the integration of blockchain (Arbabi, 2022).

Moreover, blockchain enhances privacy by allowing patients to control who has access to their data through private keys. This self-sovereignty approach aligns with previous studies advocating for patient-controlled healthcare records, which has been linked to increased trust and engagement in healthcare services (Angraal, 2017).

#### *4.2.2 Interoperability and Data Exchange*

Interoperability remains a significant hurdle in healthcare systems worldwide. Blockchain offers a promising solution by creating a uniform platform for data exchange among disparate healthcare systems. For instance, projects like MedRec use blockchain to manage electronic medical records, enabling seamless data exchange while preserving patient privacy (Bhaskar, 2021).

The ability of blockchain to serve as a secure and standard data exchange platform facilitates not only interoperability but also promotes cohesive care coordination, leading to improved patient outcomes. This aligns with findings from Abujamra (2019), which highlight blockchain's potential to overcome interoperability issues by creating a universal health information system.

### *4.2.3 Transparency and Traceability*

Blockchain's inherent transparency is another vital feature that can transform healthcare. In the context of medical supply chains, blockchain ensures traceability by recording every transaction in a transparent and immutable ledger. This capability is particularly beneficial in combating counterfeit drugs, as demonstrated by the MediLedger Project, which uses blockchain to track pharmaceuticals and ensure their authenticity (Dash, 2021).

Transparency in blockchain fosters trust among patients and healthcare providers by ensuring that data is accurate and immutable. This trust is crucial in strengthening the doctor-patient relationship and encouraging adherence to medical treatments, echoing earlier suggestions by Attaran (2022) on blockchain's role in improving healthcare transparency.

### *4.2.4 Patient-Centric Models*

Blockchain technology empowers patients by giving them direct ownership and control over their health data. With blockchain-based health information systems, patients can grant access to their health data to healthcare providers, researchers, or anyone they deem appropriate. This empowerment supports a more personalized healthcare approach, leading to improved patient engagement and outcomes (Gordon, 2018).

Patient-centric models facilitated by blockchain also promote proactive patient involvement in healthcare decisions, aligning with patient-centered care paradigms that have been positively associated with health outcomes (Habib, 2022).

### *4.2.5 Efficiency and Cost Reduction*

Blockchain's potential to streamline healthcare operations can lead to significant cost reduction and efficiency improvements. By eliminating intermediaries in processes such as billing and claims management, blockchain reduces administrative burdens and associated costs (Kumar, 2018). A study of a blockchain solution implemented in a hospital billing system revealed a reduction in transaction times from weeks to a few days, significantly lowering administrative costs (Katuwal, 2018).

Moreover, by automating verification processes and reducing duplicative data entry, blockchain supports more efficient healthcare operations, ultimately positively impacting the bottom line for healthcare providers (Mackey, 2019).

## *4.3 Barriers to Blockchain Adoption in Healthcare*

The promise of blockchain technology in healthcare is substantial, yet its adoption faces significant hurdles (Randall, 2017). This section explores the key barriers impeding its widespread implementation, organized into technical challenges, regulatory and compliance issues, cultural and organizational barriers, and cost considerations.

### *4.3.1 Technical Challenges*

Blockchain's scalability is a considerable hurdle, impacting its potential to handle the massive volume of transactions generated by healthcare data. Current blockchain frameworks, such as Ethereum and Bitcoin, face challenges in throughput and speed, evidenced by their limitations in real-time data processing required in clinical settings (Velmovitsky, 2021). For instance, a healthcare provider managing thousands of patient interactions daily might find the transaction speeds of most blockchain systems inadequate, as highlighted in Zhuang (2020). Vertical and horizontal scaling solutions are being explored, but they require significant innovations.

Healthcare IT ecosystems are complex and diverse, comprising electronic health records (EHRs), laboratory information systems, and radiology systems. Integrating blockchain into these existing systems without disrupting established workflows is challenging (Esmaeilzadeh, 2022). Many healthcare institutions rely on legacy systems that lack interoperability with newer platforms, posing a significant barrier (Bhaskar, 2021). These technical challenges require developing middleware solutions or hybrid systems that seamlessly bridge existing infrastructures with blockchain technology.

### *4.3.2 Regulatory and Compliance Issues*

The regulatory landscape for blockchain in healthcare is still evolving, marked by uncertainty and complexity. Regulations like the HIPAA in the United States impose strict requirements on data privacy and security, which blockchain must navigate (Abujamra, 2019). Compliance with such regulations is critical, yet blockchain's transparency features create conflicts with data protection laws, such as the GDPR, which demand data minimization and the right to be forgotten (Attaran, 2022). These regulatory requirements necessitate careful design of blockchain applications to ensure legal compliance and protect patient data.

Legal issues extend beyond compliance, affecting how healthcare entities collaborate using blockchain technologies. Issues such as data ownership, liability in case of breaches, and consent management require clear legal frameworks, which are currently underdeveloped for blockchain applications (Hira, 2022). The ambiguity in legal responsibility when using decentralized systems necessitates substantial legal reforms and consensus among stakeholders for blockchain's operationalization in healthcare sectors.

### *4.3.3 Cultural and Organizational Barriers*

Organizational resistance to blockchain adoption is often fueled by skepticism towards new technologies and a lack of understanding. Healthcare professionals may be resistant to change due to concerns over increased workloads or potential disruptions in patient care (Kumar, 2018). Furthermore, decision-makers may perceive blockchain as a disruptive force threatening established hierarchies and workflows, thereby slowing its adoption.

Cultural factors, including trust in digital systems and attitudes towards data sharing, significantly influence the acceptance of blockchain in healthcare settings. Institutions with a strong privacy culture may be more resistant to adopting transparent blockchain networks due to perceived risks (Mehta, 2020). Educational initiatives and stakeholder engagement are critical to demystifying blockchain technology and fostering a culture conducive to technological innovation.

### *4.3.4 Cost and Investment Concerns*

Adopting blockchain technology entails substantial initial costs, including investment in infrastructure, software development, and integration processes (Prybutok, 2022). There are also ongoing expenses related to system maintenance, security updates, and continuous compliance with evolving regulations. These financial commitments can deter healthcare organizations, particularly smaller entities with limited budgets.

The financial implications extend beyond direct costs to include opportunity costs and potential disruption during the transition phase. Organizations must weigh the benefits of blockchain against these financial outlays, which can be daunting without clear return-on-investment projections (Yaqoob, 2019). Securing funding and demonstrating economic value remain critical challenges for proponents of blockchain in healthcare.

### *4.4 Comparative Analysis with Traditional Systems*

#### *4.4.1. Performance Comparison*

In comparing blockchain technology to traditional healthcare IT systems, several areas of performance are notably impacted, both positively and negatively. Blockchain solutions, often praised for their enhanced security through decentralization and immutability, provide a significant advantage over conventional centralized databases. Traditional healthcare systems, which typically rely on centralized storage, are vulnerable to data breaches and unauthorized access. For example, according to Zhuang (2020), the distributed ledger of blockchain reduces the risk of single-point failures, a common limitation in traditional systems.

In addition, the transparency and auditability of blockchain lead to improved data integrity and traceability. Verifiable, tamper-evident records are particularly appealing in healthcare for tracking patient consent and maintaining accurate medical histories. This transparency is a stark contrast to traditional systems where data manipulation may go undetected, as indicated in studies by Sharma (2021) exploring blockchain's applicability in managing electronic medical records (EMRs).

However, blockchain is not without its limitations. One major issue is scalability. Traditional systems have evolved to handle high volumes of transactions efficiently, supported by robust infrastructures. Blockchain systems, on the other hand, face latency issues due to their consensus protocols. Transactions on a blockchain can be slower than on conventional databases, potentially impacting real-time data needs. This is consistent with findings from a study by Murphy (2021), where blockchain solutions exhibited slower processing times under heavy workloads when compared to traditional databases.

Moreover, cost-effectiveness can be a concern. While blockchain reduces long-term operational costs through enhanced automation and lower fraud risks, the initial setup and ongoing maintenance can be expensive (Khatri, 2021). Traditional systems, with existing infrastructure and vendor support, might present a more financially viable option in the short term.

#### *4.4.2. Integration Challenges*

Integrating blockchain technology into existing healthcare systems presents numerous challenges. A significant hurdle is interoperability. Current healthcare IT systems often operate in silos, with varying standards, protocols, and data models. The introduction of blockchain necessitates a uniform framework to enable seamless communication across platforms, an issue extensively discussed in research by Haleem (2021) on healthcare interoperability.

Furthermore, there is a complexity in transitioning legacy data onto a blockchain. Healthcare facilities may have decades-old records contained in antiquated systems that may not translate easily to the blockchain's format and structure. The process of standardizing these records and ensuring accuracy during migration is a labor-intensive task, as evidenced by trials conducted by Dash (2021) aimed at blockchain integration in clinical settings.

Another challenge lies in regulatory compliance. Healthcare is a heavily regulated sector, with strict requirements for data privacy and security, such as those mandated by HIPAA in the United States. Ensuring that blockchain solutions align with these regulations while offering enhanced features like decentralization poses a complex conundrum. This aligns with concerns articulated by Angraal (2017), who noted that while blockchain offers a secure environment, its decentralized nature could complicate compliance monitoring and reporting.

Finally, there is often resistance to change from stakeholders accustomed to traditional systems (Bazel, 2021). The lack of familiarity with blockchain technology, compounded by concerns over accountability and governance in decentralized systems, can hinder acceptance and adoption.

### *4.5 Future Directions and Recommendations*

#### *4.5.1 Strategies for Overcoming Barriers*

The study highlights various challenges regarding the implementation of blockchain in the healthcare system, such as scalability problems, interoperability, data privacy, and costs. As such, to counter these challenges, traditional solutions like Layer 2 scaling solutions and interoperability solutions bear the need of the day. For instance, Layer 2 developments such as state channels or sidechains may improve blockchain scalability by orchestrating transactions outside the main chain, thus preserving fees and volumn (Hussien, 2021).

Moreover, the development of standardized interoperability frameworks with blockchain platforms can enable seamless data sharing among disparate health information systems. Initiatives like the Integrated Bioinformatics Platform (IBP) highlight this approach, utilizing blockchain to interlink previously siloed datasets without compromising data integrity (Justinia, 2021).

For healthcare, blockchain implementations need regulatory guidance to succeed. To that end, it is advisable that policies enshrine the standard on how data shall be protected and processed to align with the set legal requirements, such as the HIPAA in the United States of America while being relevant to blockchain systems. In Hong Kong's case, implementing a "regulatory sandbox" could help drive evolution by allowing first-time testing within a limited and supervised environment before onerous full compliance set in. They have already been used successfully in the financial technology sector and may be implemented in health informatics as well (Durneva, 2020).

Further, collaboration with international standard-setting bodies to establish universally accepted guidelines for using blockchain in healthcare could ensure consistency across jurisdictions and reduce regulatory fragmentation.

#### *4.5.2 Potential Areas for Further Research*

The research highlights several gaps, including the need for comprehensive studies on the long-term cost-effectiveness of blockchain implementation in healthcare settings. While blockchain offers enhanced security, empirical data supporting cost savings gains are sparse. Additionally, the ethical implications of blockchain, particularly in patient consent and data ownership, warrant further exploration (Agbo, 2019).

Another identified gap is the limited integration of blockchain with other advanced technologies, such as AI (Habib, 2022). Understanding how these technologies can complement each other to create sophisticated health informatics ecosystems could unlock further potential in patient care and personalized medicine.

Emerging trends, such as the convergence of blockchain with AI, present promising research avenues. For example, using AI in combination with blockchain can enhance predictive analytics while ensuring data transparency and traceability (Mackey, 2019). This convergence could revolutionize areas such as precision medicine and drug delivery through the secure and verified exchange of complex data sets.

Similarly, combining blockchain with IoT devices in healthcare could foster innovative applications like remote patient monitoring, where cryptographically secure data exchange ensures the authenticity and privacy of patients' real-time health data (Velmovitsky, 2021). Research into such integrations could pave the way for breakthrough solutions in chronic disease management and preventive healthcare.

## 5. Conclusion

Blockchain technology can be considered a strategic area of development in the healthcare industry to address and solve problems such as data security, compatibility, and patient confidentiality. This paper has discussed the opportunities that come with the application of blockchain in health informatics as well as the issues that need to be considered with a view to improving its efficiency.

Applying blockchain in healthcare has the potential to increase data accuracy and security and create a decentralized system that promotes trust across patients, providers, and other stakeholders. The use of blockchain structures guarantees that the medical record is protected against tampering while at the same time providing authorized users with convenient access to records, hence improving the efficiency and efficacy of record sharing and decision-making. In addition, smart contracts may also help automate such administrative functions, simplify an organization’s billing process, and enforce rules and regulations to enhance operational efficiency and quality of service delivery.

However, there is one important question that should be addressed: there are still numerous challenges that can prevent blockchain technology from being implemented in the sphere of healthcare. Functional issues related to scalability, integration with other solutions currently adopted, and the high computational resources that blockchain processes demand need to be solved. However, regulatory actions and, more importantly, the issue of compliance with existing laws on data protection and privacy remain barriers. There is also a demand for a change of organization for this new disruptive technology; this means top management commitment and subsequent investment in IT infrastructure for this new technology as well as availing competent, skilled workforce that will be trained on this new technology.

Thus, the achievement of significant goals that can be addressed by deploying blockchain cannot happen unless specialists in health informatics and related fields, members of scientific communities, healthcare practitioners, policymakers, and leaders of both emerging and already established industries work together. The subsequent studies and pilot implementations should be centered on building blockchain solutions for health LIS compatibility and compliance with legal and ethical requirements. A continuous discussion with the different stakeholders will be needed to reduce misunderstanding, introduce the necessary trust, and devise a common view on what blockchain technology can do for the future of healthcare.

In summary, it has been found that the principles of application of blockchain technology in healthcare are promising and can lead to cardinal transformations; however, it has been established that the ability to integrate blockchain is reliant on the successful surmounting of a series of technical factors as well as numerous legal requirements and organizational difficulties. By resolving these problems, the studied healthcare systems will be able to shift toward the safer, more effective, and more patient-oriented handling and sharing of health information. Being an innovative technology, blockchain simply shows the possibility of a complete revolution of the current and future developments in the healthcare industry effortlessly and for the better.

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