


Chapter 2


Patient Data Security Using Blockchain

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ABSTRACT

Having a patient privacy, integrity, and access to the data have become primary concerns of the healthcare industry as a result of huge and continuous digitalization of patient health information. Conventional technology in health care lacks adequate access controls and governance that can be used to block illegal access of health records or any other form of tampering. Blockchain is a decentralized system that cannot be changed without permission, a solution to these problems may lie in such a powerful architectural framework. This chapter explores how blockchain technology can improve patient health information management, secure storage, open access control system, and facilitate effective sharing of healthcare providers, patients, and research companies. This could equally elaborate on how this new technology would enable prevention of any form of breach of health care information by protecting patients from potential medical identity theft in addition to giving them their ownership of their personal health information.

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INTRODUCTION

The safeguarding of patient information has now become a pressing issue in contemporary health care systems because of the fast implementation of electronic health records (EHRs), telemedicine, and cloud-based storage services. Although these technologies enhance access and efficiency, they also pose a higher threat of data breaches, unauthorized access and cyberattacks. Conventional centralized systems keep patient information in one place, exposing them to a single point of failure and massive security breaches. Originally introduced by cryptocurrencies, like Bitcoin, blockchain technology has become a potent means of decentralized and secure data management in various sectors, including healthcare (Nakamoto, 2008).

In contrast to conventional systems, blockchain is a distributed ledger in which the information is held in many nodes such that no one node can have full control of the information. Such a decentralized characteristic greatly increases the data security and system reliability. Immutability is one of the most prominent aspects of blockchain and it implies that once information is logged in, it cannot be changed or erased without the agreement of the network. This guarantees the integrity and authenticity of patient records over time. Also, blockchain employs cryptographic methods to protect sensitive information, ensuring that only the authorized users can access medical data (Zheng et al., 2017). The consensus mechanisms also authenticate transactions and eliminate unauthorized alterations, building trust between the members. Blockchain enables the secure sharing of patient data among hospitals, laboratories, insurance providers, and researchers in the healthcare sector, with the necessary privacy and control.

It improves interoperability by providing a unified view of patient records among various systems. In addition, access control and consent management based on technologies like smart contracts allow patient data to be accessed only by predetermined conditions (Buterin, 2014). Although it has several benefits, blockchain implementation in healthcare encounters a number of challenges, such as issues of scalability, compatibility with current systems, regulatory compliance, and ethical concerns (Buterin, 2014). These issues will have to be tackled to ensure the effective implementation of blockchain-based healthcare solutions. In general, blockchain offers a strong system to improve the security of patient data with the synergies of decentralization, transparency, and sophisticated cryptographic protection systems.

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