A Survey on Healthcare Record System powered by Blockchain

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Abstract: *In this survey paper we have explored the adoption of blockchain-based healthcare record sharing platforms. By enabling safe and decentralised exchange of medical records, blockchain technology has the potential to improve data security, privacy, and interoperability in the healthcare industry. The paper gives a summary of the present research on blockchain-based systems for exchanging medical records, including any possible advantages and drawbacks. The different uses of blockchain technology in healthcare, including supply chain management and clinical trials, are also highlighted. The survey examines and analyses the characteristics, benefits, and drawbacks of the many blockchain-based healthcare data sharing systems that have been created so far. Lastly, the article addresses the difficulties and constraints of blockchain technology in healthcare, such as scalability problems and regulatory challenges, and investigates potential solutions.*

Keywords: Blockchain, EHR, Healthcare, Medical information sharing, Blockchain-based EHR, Healthcare Record Management

I. INTRODUCTION

A health record is a compilation of medical information on a patient's physical and mental health that has been acquired from various sources. The contents of a patient's health record include their medical history, examination findings, diagnosis, and treatment, as well as any alerts they may have, such as allergies. Both manual and electronic management of these medical records is possible. Most hospitals still use the manual technique, which involves paper and books, as their standard procedure for keeping records. By creating a decentralised digital health infrastructure, or by incorporating Blockchain technology into the healthcare system, these issues can be resolved.[1] By tracking and verifying authorised access to private medical records, blockchain can ensure the security of sensitive data. Blockchain can be used as a distributed database to protect medical records from manipulation and make them more secure. Public key cryptography and hashing techniques are used by blockchain technology to maintain the confidentiality, integrity, and availability of patient records while keeping account of historical transactions.[2] This will guarantee that records are not lost, improperly altered, falsely accessed, or forged.

Hospitals all across the world have adopted EHR systems because of its advantages, particularly the increased security and cost-effectiveness. They are regarded as an essential component of the healthcare industry because they give healthcare a lot of functionality. The main goal is to offer medical records that are safe, stable, and transferable between various platforms. The major goal is to use "Blockchain Technology" to provide patient medical record confidentiality. One of the most important foundational principles of medicine is the secrecy or confidentiality of patient information. In addition to being morally right, protecting a patient's personal information is crucial to building trust between the patient and the doctor

II. METHODS AND MATERIAL

This paper has been completed on the basis of the information gathered from various sources. Internet, various research papers and articles have been surveyed for the purpose of gathering and understanding information.

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III. BACKGROUND

We have discussed blockchain technology and Electronic health records, in brief, to help readers understand the rest of the paper.

3.1 What is a Blockchain?

A blockchain can be thought of as a shared (or distributed) database that is spread across multiple sites and participants. For new data to be added to a blockchain, they are first compiled into a block, which is simply a collection of records to be added to the database. The block is then combined with some data (a hash key) from the previous block through a cryptographic technique called hashing before it is added. As it combines the previous block's hash key, each new block is tied to all its predecessors in the form of a chain, hence the term blockchain.[3]
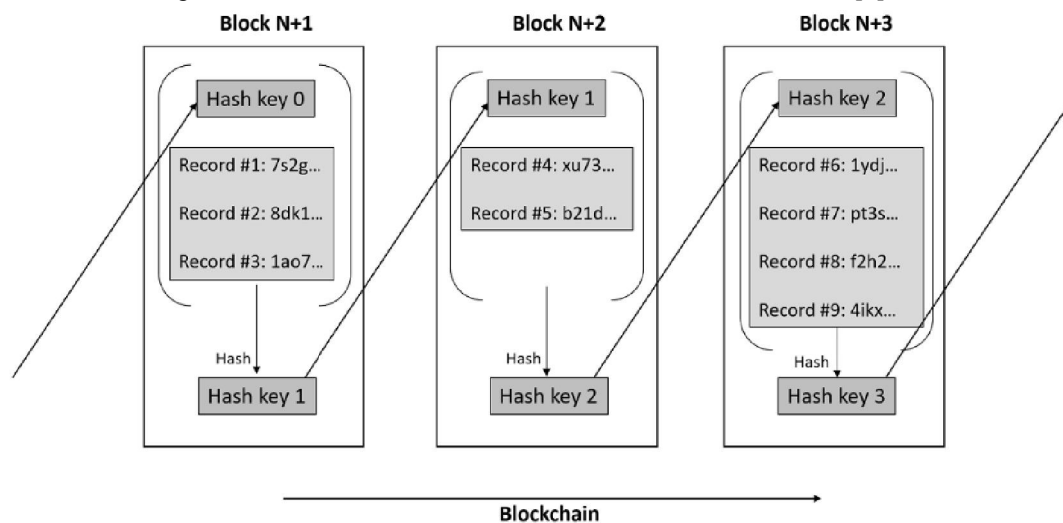

Figure: Blockchain [3]

3.2 Electronic Health Records

EHRs contain critical and highly sensitive private information for diagnosis and treatment in healthcare. These data are a valuable source of healthcare intelligence. The sharing of healthcare data is an essential step toward making the healthcare system smarter and improving the quality of healthcare service. An EHR is a structure in digital format of a patient's health data that is created and maintained throughout the patient's life and is typically stored by and spread among multiple hospitals, clinics, and health providers.[4]

EHR should comply with three essential attributes: confidentiality, integrity, and availability. EHR must only be accessible by authorized users with proper access control mechanisms. Implementation of EHR systems can reduce the loss of medical history, data malfunction, etc. However, ensuring the privacy and security of these critical data is challenging.[5]

IV. LITERATURE REVIEW

A. Azaria, A. Ekblaw, T. Vieira, and A. Lippman, have proposed MedRec. It is a blockchain-based healthcare record sharing system developed by researchers at the Massachusetts Institute of Technology (MIT). MedRec uses a blockchain-based platform to enable the secure and seamless exchange of patient health information between different healthcare providers and organizations. Implementation of MedRec blockchain addresses the four major issues highlighted here: fragmented, slow access to medical data; system interoperability; patient agency; improved data quality and quantity for medical research. [6]

Physicians are faced with a large amount of information that is so hard to deal with them. A blockchain solution can facilitate this responsibility and also engaging the patient in their care. Medicalchain is a blockchain-based healthcare record sharing system that uses blockchain technology to provide patients with more control over their health

information. Medicalchain enables patients to grant access to their health information to specific healthcare providers or organizations, and they can also revoke access at any time. It uses blockchain to make a user-centralized electronic health record and keep a single real report of the user's data. As a prime project, Medicalchain has coped with summaries of hospital discharge, which contains a summary of cure and essential follow up care.[7]

In healthcare, suitable interoperable EHR systems provide greater efficiency, lower operating costs and save time in service delivery. Interoperability is the process of communication, data exchange, and the use of data exchange between different information technology systems and software applications. The data exchange scheme and standards allow data to be shared among different stakeholders, such as a clinician, laboratory, hospital, pharmacy, and patient, regardless of application or application vendor. In health systems, interoperability is the ability of health information systems to work together, both inside and outside the organization.[8]

S. Khezr, M. Moniruzzaman, A. Yassine, and R. Benlamri have discussed about adopting Blockchain technology in healthcare. This comprehensive review paper provides a detailed analysis of the current state of blockchain applications in healthcare.In the last couple of years, the upsurge in blockchain technology has obliged scholars and specialists to scrutinize new ways to apply blockchain technology with a wide range of domains. The dramatic increase in blockchain technology has provided many new application opportunities, including healthcare applications.

This survey provides a comprehensive review of emerging blockchain-based healthcare technologies and related applications. The authors identify the various use cases of blockchain technology in healthcare, including health record management, drug supply chain management, and clinical trials. They also discuss the challenges and limitations of blockchain technology in healthcare and explore potential solutions to overcome these barriers.[9]

V. CONCLUSION

In this paper we have seen current research on health data management and how blockchain will empower patients and stream line the sharing process of health data. The blockchain allows for health records to be time-stamped so that no one can tamper with them after becoming part of the distributor ledger. The patients will have the right to decide who can and cannot access their data and for what purpose. However, there are still several open challenges that require further investigation. For example, cross-border sharing of health data where different and often conflicting jurisdictions exist may hinder the benefit of blockchain's data sharing.

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