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Application and Challenge of Blockchain Technology in Medical Field

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Abstract: Due to its unique security, blockchain technology is widely used in the financial field. Under the background of the rapid development of information technology and the rapid improvement of medical level, it is also a general trend to integrate blockchain technology into the medical field. According to the characteristics of blockchain and the research contents of many scholars on the application of blockchain in the medical field, this paper analyzes and summarizes the problems existing in the current development of blockchain, puts forward corresponding solutions, and looks forward to the further application of blockchain technology in the medical field.

Keywords: Blockchain; application; data storage; privacy protection

1 Introduction

In 2008, Nakamoto published bitcoin: a peer-to-peer e-cash system [1] on the cryptography e-mail group, and proposed the concept of blockchain. A distributed digital ledger supported by cryptography and with time stamp is introduced in detail, forming a new decentralized recording and storage system. Since then, blockchain and related technologies have gradually come into people's vision. In 2013, buterin proposed Ethereum blockchain platform [2] and realized Turing's complete Ethereum virtual machine, making decentralized application a reality. Blockchain is a comprehensive science, including theories and laws of economics, sociology and computer science. In terms of blockchain technology, it includes smart contract, point-to-point network, cryptography, consensus mechanism and other technologies.

Blockchain is an open distributed ledger [3], which is usually deployed in peer-to-peer networks. In distributed ledgers, reliable data transmission is often relied on to solve problems. Blockchain technology integrates cryptography, economics, computer science, consensus technology and other related technologies. It can ensure the consistency and synchronization of the data of each node in the blockchain, make the information traceable and difficult to tamper, create a new decentralized data recording and storage system, and establish an efficient and honest data system. The decentralized characteristics of blockchain change the centralized storage mode of traditional database, distribute the saved data in the ledger of each node in the network, and each node has a synchronized and

replicated database. In order to prevent the blockchain ledger from being attacked, it is necessary to use the consensus mechanism to update and synchronize the distributed ledger. The consensus mechanism determines the rules for forming consensus among all accounting nodes and ensures the synchronization and consistency of the ledger of each node of the blockchain. At the same time, the storage structure of the blockchain also adopts hash algorithm, which greatly increases the cost of crime. In addition, the blockchain can also control access through asymmetric encryption technology, provide corresponding permissions for each user in the system, and realize privacy data protection.

According to the openness of blockchain, blockchain can be divided into public chain, private chain and alliance chain [4]. The public chain is open to everyone, and any node can join or exit freely. The typical consensus mechanism is Proof of Work (PoW) [4]. The private chain is a non-public chain that requires specific authorization to join. The permissions of each node are strictly controlled. The typical consensus mechanism is Paxos mechanism that does not consider Byzantine failure [5]. Alliance chain is a chain jointly managed by multiple institutions or companies. Each institution manages one or more nodes and only allows institutions in the system to read and write. The typical consensus mechanism is Practical Byzantine Fault Tolerance (PBFT) [6].

Blockchain technology is widely used in people's lives, such as traceability of agricultural products, donations during the epidemic, judicial blockchain, electronic medical records, etc. the blockchain platforms involved in these specific applications may be different, but their architectures are basically the same, which are similar to the bitcoin system architecture.

The existing blockchain system consists of six layers, including data layer, network layer, consensus layer, incentive layer, contract layer and application layer [7]. As the bottom layer of the blockchain, the data layer encapsulates the underlying data storage mode and encryption technology of the blockchain. The network layer includes the data dissemination and verification mechanism and distributed point-to-point network required for the operation of the blockchain network. Each node has equal status, can be both a client and a server, and also has the functions of communication, storage and so on. The main function of the consensus layer is to ensure the synchronization and consistency of distributed ledger data, and copy the data of each ledger to each node. The consensus mechanism determines the way to reach consensus in the blockchain network and the content contained in the transaction. The incentive layer mainly provides incentive measures to encourage nodes to participate in blockchain security verification, reward nodes that abide by rules and punish evil nodes. The main goal of the contract layer is to use various scripts, algorithms and smart contracts to provide unique transformation for the application of blockchain technology to the actual scene. The proposal of smart contract makes the blockchain technology enter the programmable era. Application layer refers to the implementation of different application scenarios and cases of blockchain created on the underlying technology. The specific architecture model of blockchain is shown in the Fig. 1 below.

In recent years, the financing of blockchain enterprises has increased steadily. The in-depth combination of blockchain technology and traditional industries will change our lives. At the same time, the concept of blockchain technology optimizing traditional industries is more attractive to early investment institutions. Blockchain technology has been widely used in the field of medical and health care, including electronic medical records, device traceability, drug anti-counterfeiting, medical insurance, clinical trials, transaction records, medical supervision, etc. In short, the innovative application of blockchain technology can effectively alleviate the problem of information asymmetry and reshape the social trust mechanism [7].
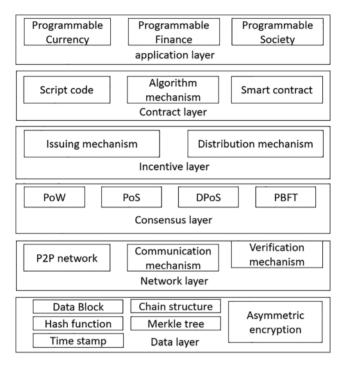
Programmable Currency	Programmable Finance	Programmable Society
application layer		

Script code	Algorithm mechanism	Smart contract
Contract layer		

Issuing mechanism	Distribution mechanism
Incentive layer	

PoW	PoS	DPoS	PBFT
Consensus layer			

P2P network	Communication mechanism	Verification mechanism
Network layer		

Data Block	Chain structure	
Hash function	Merkle tree	Asymmetric encryption
Time stamp	Data layer	

Figure 1: Architecture model of blockchain

2 Application of Blockchain Technology in Domestic Medical Field

2.1 EMR Data Storage and Sharing

The importance of electronic medical record is self-evident. As the core system of hospital information construction, electronic medical record plays an important role in realizing the transformation from general hospital to digital hospital. At present, most medical institutions have implemented the electronic medical record system, but the design mode, work objectives and organizational logic of the electronic medical record system in different hospitals are different. Therefore, in the specific application of electronic medical record, there will be difficulties in data sharing and lack of supervision. Each hospital has its own independent database. Different hospitals do not realize cross agency data interconnection, resulting in repeated inspection of patients in different hospitals, forming a large number of information islands [8]. At the same time, it brings a huge waste of resources, hinders the process of hospital digitization, and also brings economic and physical inconvenience to patients. In order to realize data interconnection and solve the problem of information island, it is necessary to design a series of communication interfaces that meet the requirements. There is no good solution to this problem. In the traditional electronic medical record system, the patient's visit information is stored in the database of each hospital. The centralized database will bring a series of problems, such as data loss, data leakage and so on. Since the patient's personal medical record information is in the hands of medical institutions, patients do not know whether medical institutions will use their own medical data for trading or research behavior, which may have privacy protection problems [9]. Blockchain can solve the pain points in traditional electronic medical records. It is the most ideal way to save patients' personal data. If blockchain technology is used to save electronic medical records, patients will become the owner of personal medical data rather than a hospital organization or institution, which will provide great help for patients' Cross hospital treatment and reduce the

economic burden caused by patients' repeated examination in different hospitals. Blockchain has the characteristics of decentralization and non tamperability [10]. It can transform the problems existing in traditional electronic medical records and realize a new form of data storage. It can not only realize the sharing of medical information among hospitals, but also enable patients to master their own health data alone. The electronic medical record system based on blockchain is shown in the Fig. 2 below.
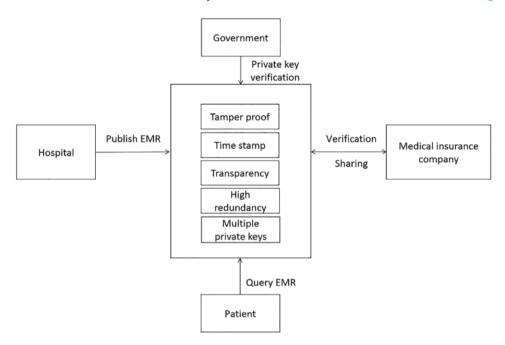

Figure 2: Medical record system based on blockchain

Relying on the existing electronic medical record system framework and the decentralized characteristics of blockchain technology, the patient's medical record information data sharing can be easily realized. The electronic medical record system based on blockchain adopts the protection scheme based on timestamp and tamperability. From the beginning of patient admission authentication, the data generated during patient treatment is entered into the blockchain. Combined with the time source service of the national time service center, the data is stamped with a legally effective time stamp to prove the time effectiveness of the data. Blockchain technology can establish point-to-point trust in the transparent electronic medical record system network. No matter what changes are made by hospitals, governments, medical insurance companies or patients, there will be real-time records. In case of objection, it can be traced to the source to prevent the perpetrator from repudiating. The multi private keys and high redundancy of blockchain technology can help medical insurance companies, hospitals, patients and governments solve the current problem of complete information authentication, so as to realize the access and trusted sharing of electronic medical record information data by different departments. The electronic medical record based on blockchain advances the time point of data management, and monitors and manages it throughout its life cycle from the data generation stage. The content change and information transmission of each patient's medical record information data need to be verified and recognized by other nodes of the system. Each node is both a participant and a supervisor. At the same time, the non tamperability of the blockchain ensures that the electronic medical record information data cannot be modified illegally, and effectively ensures the authenticity and credibility of the electronic medical record system information data.

2.2 Drug Anti-Counterfeiting and Traceability

Drug anti-counterfeiting and traceability refers to the recording and tracking of drug production, processing, transportation and use. This process requires the participation of all parties in the drug supply chain. Blockchain technology can be used for drug anti-counterfeiting and traceability [11]. In 2018, there was a major counterfeit drug case in 21 provinces caused by the "a little sweet" incident of aspirin. This case exposed the loopholes in the drug anti-counterfeiting traceability system, that is, the drug traceability system is imperfect, the existing traceability certification adopts the central accounting mode, and the data may be tampered with in a series of operations such as uploading, storage and query. In addition, there are still deficiencies in the existing drug traceability system. First, the stored data information is incomplete, and second, personal privacy data is easy to leak. Blockchain technology can combine the two characteristics of data non tamperability and transaction traceability, which can solve the problems of easy tampering of data, privacy protection, drug traceability, imperfect information Counterfeit drugs and other issues, so as to save the whole process information of drugs from raw material procurement, processing, transportation and sales. Each participant in the upstream and downstream of the supply chain needs to sign for confirmation, so as to ensure that every link of drugs from production to sales can be traced. When there is a problem with drugs, it can be located to the link causing the problem and traced to the specific responsible subject, Effectively protect the rights and interests of consumers. The specific system flow chart is shown in the Fig. 3 below.
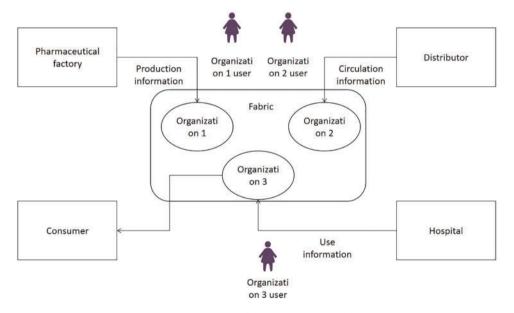

Figure 3: Flow chart of drug anti-counterfeiting and traceability system based on blockchain

The blockchain drug anti-counterfeiting and traceability system mainly includes three parts: fabric network environment construction, chain code development, drug information registration and drug traceability information query. In the first part, the construction of fabric network environment is mainly to deploy the corresponding environment according to the system functions. The system environment includes three organizations, namely dealers, hospitals and pharmaceutical factories. The nodes of each organization join the same channel, and then install different chain codes at the nodes of each organization to realize the corresponding functions. The second part is drug information registration. When drugs leave the factory, the only drug source code will be recorded on the drug

package. When drugs flow through three organizations: pharmaceutical factories, distributors and hospitals, the production information, circulation information and use information of corresponding drugs are uploaded to the farbic blockchain according to the function of installing chain code on each organization node. In the third part, after purchasing or using drugs, consumers can log in to the blockchain anti-counterfeiting traceability platform through the authenticated user account of organization 3, and enter the drug traceability source code to query the information of drugs from production to use.

2.3 Medical Insurance Fund Supervision

Xia Ming (2020) pointed out [12]. At present, China's economy is developing rapidly and the medical insurance system is constantly improving. Medical insurance has become an important part of China's social security system. It reduces the medical cost of the people, effectively ensures people's health and promotes social stability and development. However, in the process of implementing the medical insurance system, there are dishonest behaviors such as fraud, violation of regulations and insurance fraud, resulting in the loss of medical insurance fund. Using the advantages of blockchain technology, we can apply it in the field of medical insurance supervision, realize data sharing among medical institutions, medical insurance institutions and medical consortia, and reduce unnecessary repeated examinations in the case of Cross hospital treatment, which can reduce the medical expenses of the people and the expenditure of medical insurance fund. Zhang jiancong (2021) pointed out [13]. In today's social context, internet medical insurance business will show explosive growth, and the supervision scene of medical insurance fund will be more complex. Traditional information management methods cannot meet the rapid development of internet medical insurance. Therefore, the application of block chain technology can be applied to the Internet plus medical insurance related electronic credentials, identity authentication and other application scenarios, so as to improve the execution efficiency of claims business, improve user experience and reduce operation costs. Blockchain technology relies on distributed architecture and encryption technology to ensure the integrity, accuracy, non tamperability and consistency of transaction data and settlement data on the medical insurance business chain. The specific application process is as follows Fig. 4.
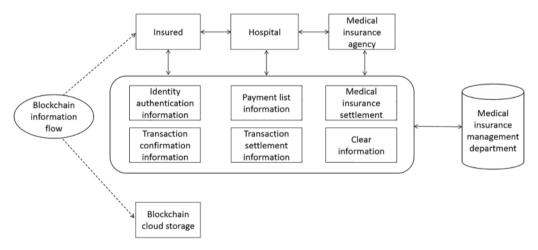

Figure 4: Blockchain medical insurance business flow chart

The blockchain medical insurance business process is shown in the figure above. The key information of the whole medical insurance payment process can be linked, including medical insurance

personal identity authentication information, payment list information, medical insurance settlement information, medical insurance clearing information, etc. the medical insurance management organization supervises the whole application process to ensure the security of the linked information, Ensure the security and data traceability of the insured personal privacy data, support the later audit work, and ensure the security and fairness of the transaction process.

3 Application of Blockchain Technology in Foreign Medical Field

3.1 Personal Electronic Health Data Collection

In terms of electronic health data collection, it mainly relies on medical Internet of things devices, including wearable devices for monitoring heart rate, blood pressure, sleep and other indicators. These devices are vulnerable to attacks by Internet intruders, resulting in the disclosure of user privacy. Bowhead health first combined the medical Internet of things with blockchain, collected and processed patients' health data and eating habit information anonymously through an application software on healthy diet and sleep guidance, and rewarded users with a health token (AHT), which can be exchanged for corresponding gifts in the mall, As a new way to encourage users to live a healthy life.

3.2 Optimize Hospital Process and Operation Arrangement

The traditional operation schedule information is transmitted between the administrative department and the doctor's office, and the integrity and accuracy of the information cannot be guaranteed. In order to make communication more convenient and information transmission more smooth, healthnautica company in Chicago, USA uses a customizable software system to handle procedures for doctors and users. The company's product e orders uses the principle of blockchain technology to optimize the surgical treatment process and program scheduling process to the greatest extent, so as to provide a strong guarantee for the life safety of patients. At the same time, the product reduces the cost by improving the work efficiency of the hospital. All surgical orders in the hospital are more prominently displayed in E orders, which is convenient for both doctors and patients to identify, understand and trace, and cannot be tampered with. In addition, the patient's personal electronic medical record can be obtained before the examination, and the patient's medical history, medication history and relevant information can be understood in advance, which can reduce the process of preoperative examination and reduce the risk of medication. At the same time, it can also reduce the economic burden of patients and ensure the basic medical needs of patients.

3.3 Tracking of Medical Devices and Medical Supplies

With the development of blockchain technology and the popularity of digital medical equipment, a large number of medical devices are used in people's treatment. At the same time, the potential vulnerabilities of some medical devices are gradually exposed. Hackers can obtain the patient's personal electronic health data and relevant personal information through these vulnerabilities, and even affect the patient's treatment process. In 2015, the U.S. Food and Drug Administration (FDA) issued a risk announcement that the hospital medical intelligent pump and symbiq infusion system can be invaded by unauthorized users through the hospital network, so as to control and change the medication dose of patients. In August 2017, FDA announced again that nearly 500000 patients with implanted pacemakers needed to update firmware to avoid the risk of being hacked. At present, with the support of the Scottish government, Napier University cooperates with the National Health Service (NHS) of Scotland to improve the supply chain of medical devices by using blockchain technology, track and study the life cycle of the equipment, monitor the nursing ways of patients and improve the response speed when recalling the equipment.

3.4 Electronic Health Data Processing

With the development of artificial intelligence technology and cloud computing technology, big data healthcare will become the development trend of the medical industry. The natural language processing platform of doc.ai will reduce the burden of doctors and bring more convenience to patients. In August 2017, doc.ai, a digital health start-up, launched a blockchain based natural language processing (NLP) platform to process a large amount of medical data through artificial intelligence analysis, so as to provide users with personalized advice. In the near future, doc.ai will also launch three natural language processing modules based on artificial intelligence, including gene research, physical characteristics research and environmental impact research. Gene research can provide more in-depth support for the diagnosis of cancer and rare diseases. Physical property research can predict the user's age, height, weight, gender and body mass index (BMI) through the face, so as to guide the user to make health decisions. Environmental impact research is based on the study of surrounding environmental data such as air quality and water pollution, Analyze the causes of disease and health deterioration. Based on the above three aspects, personalized medical suggestions are provided for users' health.

4 Problems in the Application of Blockchain Technology in the Medical Field

4.1 The Application of Blockchain in the Medical Field Has Not Formed a Unified Standard

At present, there is no industry standard in the application field of blockchain technology at home and abroad, and its promotion and operation in the medical field will face many challenges [14]. Although blockchain technology has developed rapidly in recent years, it still faces some specific difficulties in its application in the field of medical and health care. On the one hand, the current informatization level in the medical and health field is uneven, and there is also a lack of relevant application standards in the blockchain medical industry. On the other hand, the policies and regulations related to blockchain lag behind the development of new technologies in the medical field. In terms of supervision, blockchain has the characteristics of decentralization, which also brings some difficulties to supervision, which is also one of the key problems to be solved in the medical field.

4.2 Data Security and Privacy Issues

Blockchain has attracted a wide range of users with the characteristics of safe value transfer and safe data storage [15]. Blockchain technology adopts hash algorithm, asymmetric encryption algorithm and other technologies for encryption, but blockchain still has weak links in data security and privacy protection. In terms of privacy protection, the ledger is distributed in different nodes, and the data on the blockchain must be stored in all nodes. Intruders can launch different forms of attacks through the network layer and transaction layer, which can achieve the purpose of stealing users' privacy data. In terms of its own mechanism, it is likely to introduce security vulnerabilities in the preparation of smart contracts. There are also integer overflow, short address vulnerabilities and other vulnerabilities in the underlying source code of the blockchain. Attackers can use these vulnerabilities to spread Trojans, worms and DDoS attacks. These attacks spread rapidly and are very harmful.

4.3 There are Difficulties in the Promotion and Application of Blockchain in the Medical Field

At present, the application of blockchain technology in the medical field is in the process of exploration, and it still faces many challenges in its promotion and application in the medical field. First, the decentralization of blockchain will have a great impact on the existing medical system, leading relevant medical institutions and government departments to be cautious about the application

of blockchain technology in the medical field, which is not conducive to the large-scale promotion and application of blockchain technology in the medical field. Second, blockchain technology is currently mostly focused on the financial field, and its successful experience and application cases in the medical field are relatively few. Experts in the medical field also hold a cautious attitude towards blockchain technology and lack the power to promote the application of blockchain in medical treatment. Therefore, promoting the large-scale application of blockchain technology in the medical field requires joint efforts of many parties.

4.4 Data Storage Space is Growing too Fast

With the continuous development of economy and society, data information is growing explosively, more and more information is stored in distributed ledger, and the storage of blockchain itself is facing challenges [16]. The blockchain database records all the data information since the beginning of the transaction. Each node that wants to participate in the blockchain needs to download, store and update a data packet since the beginning of the genesis block. The block data information is growing. At the same time, after the introduction of blockchain, the distributed ledger needs to be saved, and the storage space overhead is large. Therefore, this will put forward higher requirements for the storage space of blockchain distributed ledger, and also reduce the speed of medical institutions to update data information and patients to obtain personal data.

5 Measures to Promote the Development of Blockchain in the Medical Field

5.1 Government Departments Formulate Industry Unified Standards

Nowadays, there is no unified technical standard for blockchain technology to realize the access and application integration of different systems [17]. Relevant national departments should strengthen the exploration of the application of medical and health blockchain technology, formulate industry unified standards, strengthen the construction of standard system, and promote the application of blockchain technology in the field of medical and health. Encourage the blockchain to participate in the construction of industrial standards, improve the quality of standard quality and technical review, and promote the safe and orderly development of the blockchain. Standards can not only summarize the consensus in the industry, build a good development ecology of the medical industry, but also standardize the development of the industry.

5.2 Vigorously Develop Blockchain Encryption Technology

Digital encryption technology is one of the core technologies in the application of blockchain technology. If the blockchain encryption method is cracked, the patient data security will be threatened. Most of the encryption technologies currently used in blockchain are asymmetric encryption technologies, such as RSA, ECC, ECDSA, etc. Meanwhile, the blockchain encryption technology needs to be constantly updated. The government and enterprises should explore and establish encryption schemes suitable for the medical field to adapt to the application of blockchain in the medical field.

5.3 Actively Explore Appropriate Application Scenarios

At present, the application scenarios of blockchain technology in the medical field mainly focus on electronic medical records, drug anti-counterfeiting and traceability, medical insurance fund supervision and other application scenarios. Shanghai First People's Hospital and Anhui provincial hospital have taken the lead in launching the electronic medical records under the blockchain, completed the adjustment and card opening of Alliance electronic cards, and formulated a unified electronic medical

record display standard, In the near future, a number of businesses such as inspection report and conclusion review will be launched [18]. Nowadays, there are few blockchain medical and health application scenarios, and there is still much room for development. How to solve the difficulties in the promotion and application of blockchain technology in the medical field. First, strengthen the development of blockchain core technologies, such as underlying performance, smart contract security, etc. Second, the government needs to correctly understand the blockchain, see the advantages of blockchain technology in the application of medical field, promote the application of blockchain technology and promote the development of blockchain industry.

5.4 Optimize Blockchain Storage Technology

Blockchain is a completely decentralized distributed system, which stores data in multiple independent devices [19]. The distributed ledger uses the consensus algorithm to replicate data between nodes. Distributed ledger reduces audit costs and improves work efficiency. The current blockchain storage technology still has some shortcomings, such as generating a large amount of redundant data, consuming resources and so on. Therefore, we need to take corresponding measures to promote the development of blockchain storage technology. First, optimize the consensus mechanism and reduce the time required for distributed ledger update. Second, increase the storage space of distributed nodes to meet the demand of medical data growth. In addition, it can also be optimized for the problems of low storage space utilization and low query performance of the blockchain, such as using erasure codes to reduce the storage space overhead of the blockchain, and using indexing and other technologies to improve the query efficiency of the blockchain system.

6 Prospect of Application of Blockchain Technology in Medical Field

6.1 Hospital Information Sharing Platform

With the rapid development of hospital business, more and more medical institutions are accelerating the implementation of information construction. Traditional hospital information management system, electronic medical record management system, medical image management system and other systems adopt system software developed by different companies. It is difficult for data information to be interconnected in subsystems. In fact, many "information islands" have been formed, and data and information cannot be integrated into valuable information [20]. Therefore, more and more hospitals are implementing hospital information sharing platform based on interconnection, integrating hospital businesses and realizing data sharing, so as to improve hospital service level. Blockchain has the characteristics of decentralization, distributed storage and tamper proof, which can break the information island and realize data interconnection. The information sharing platform based on blockchain enables each independent system data information in the hospital to be connected with each other with unique security technology to realize resource integration and sharing. Blockchain technology can solve the problem of data fragmentation caused by the integration of different software systems, integrate corresponding data and information, and improve the use efficiency of medical data.

6.2 Research on Population Health Information

Population health data is a kind of medical data information for a specific population, such as the health risk data for obese European men aged 30–40. This data is usually published anonymously and is usually used to analyze the risks between different age groups and different types of population groups. In the process of population health management, data security is one of the main challenges. Patient information is usually isolated, unsafe and easy to lose, and the data stored in different hospital information systems cannot be connected with each other, resulting in a shortage of available and

diverse population health data. Blockchain technology can solve these specific challenges. Applying blockchain technology to population health data research can improve data security and resource sharing efficiency. In addition, people participating in population research can also sell their data to medical institutions to obtain economic benefits.

6.3 Personalized Medicine

Blockchain technology can make personalized medicine the mainstream of future diagnosis and treatment services. Personalized medicine is defined as a private customized medical service based on personal health data. In the era of data interconnection, it will be very convenient for blockchain to obtain and use personal medical records (RHP) and relevant population health data. Medical service providers are expected to provide routine and personalized diagnosis and treatment services for people soon [21]. In the near future, we can use the block chain to realize data sharing, provide several treatment options, and then use deep learning technology to extract features, get comprehensive information about etiology, incidence rate, medication effect and so on. We will analyze these data comprehensively, provide reference for patients' disease diagnosis and rational drug use, and predict patients' recovery time and other information.

7 Conclusion

Blockchain technology is considered to be one of the fastest growing emerging technologies. Blockchain technology can be combined with cloud computing, Internet of things, artificial intelligence and other technical solutions to solve the problems existing in the development of traditional industries. Blockchain has the characteristics of security, traceability and decentralization, which is conducive to the application of blockchain in finance, economy, medical and other related fields and promote the rapid development of the industry.

At present, blockchain technology has been gradually applied to the medical field. Major enterprises, hospitals, investment institutions and other relevant institutions at home and abroad are rapidly deploying the application of blockchain technology in the medical industry. In China, the application of blockchain technology in the medical field mainly focuses on the storage and sharing of electronic medical record data, drug anti-counterfeiting and traceability, medical insurance fund supervision and other main directions. In terms of electronic medical record data storage and sharing, relying on the existing electronic medical record framework and decentralization, the blockchain electronic medical record system can easily realize the data sharing of patients' medical record information, reduce the risk of data loss and better protect patients' privacy. In terms of drug anti-counterfeiting and traceability, blockchain technology can participate in all links of the drug supply chain, save the whole process information of drugs from procurement, processing, transportation and sales, track the responsible subjects of relevant links, and protect the rights and interests of consumers. In the process of medical insurance fund supervision, dishonest behaviors such as fraud and insurance fraud are easy to occur, resulting in the loss of medical insurance fund. Blockchain technology can be applied to the field of medical insurance supervision to realize data sharing among medical institutions, medical insurance institutions and medical consortia, and reduce unnecessary repeated inspection and inspection when patients are transferred to hospital, which not only reduces the expenditure of medical expenses of ordinary people, It also reduced the expenditure of medical insurance fund to a certain extent. In foreign countries, the application of blockchain technology in the medical field mainly includes personal electronic health data collection, optimization of hospital processing flow and operation arrangement, tracking of medical devices and medical supplies, electronic health

data processing and so on. In the process of personal electronic health data collection, blockchain technology is combined with the medical Internet of things to collect patients' health data and eating habits information by rewarding health tokens, so as to encourage users to live a healthy life. In terms of optimizing hospital process processing and surgical arrangement, the blockchain principle can optimize the surgical treatment process and program scheduling process to the greatest extent, provide a strong guarantee for the life safety of patients, and can also trace all surgical orders in the hospital, and the surgical orders cannot be tampered with. In terms of medical devices and medical user tracking, the blockchain technology is used to improve the medical device supply chain, track and study the life cycle of the device, and then monitor the patient's nursing way to improve the response speed when recalling the device. In terms of electronic health data processing, doc.ai company proposes a natural language processing platform based on blockchain to process medical data through artificial intelligence, so as to provide users with personalized advice.

In the medical industry, blockchain can connect the data of various platforms, break the data island, improve efficiency, realize access control of patient information and protect patient privacy. However, the application of blockchain in the medical field is still in the exploratory stage, and the development and promotion of various technologies have encountered many difficulties, such as strict government supervision and immature related technologies, which are important factors restricting the promotion of blockchain technology in the medical field. Therefore, although blockchain technology has developed rapidly, we should also clearly realize that the application of blockchain technology in the medical field is still in its infancy. On the one hand, accelerate the application research of blockchain technology in the medical field and promote the development of traditional medical industry. On the other hand, we also need to see the shortcomings of blockchain technology at this stage, evaluate and weigh the impact of blockchain technology on the existing medical field, and promote the healthy development of blockchain technology in the medical field.

Nowadays, blockchain technology is imperceptibly changing traditional medicine. With the gradual maturity and implementation of this change and application, they will bring us a new lifestyle, life concept and life attitude, just like the Internet. The future of medical blockchain is expected by medical institutions, patients and their families.

Conflicts of Interest: The authors declare that they have no conflicts of interest to report regarding the present study.

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