Health Information Chain

——HIC

White paper

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1. Abstract

At a certain stage of development of the globalization, information technology and application of the rapid and health information large computing storage and application of rapid development of hardware and software, but health information asymmetry and poor liquidity has been difficult to solve, restricting the development of medical and health undertakings, the following simple overview of the global health information problems are as follows:

2. Project Background

2.1. Current status of medical health information

In today's world, users expect real-time and seamless flow of data. Many industries have adopted or started to use the necessary technology to ensure users' expectations of instant messaging. But there is a serious asymmetry in health information. Medical institutions around the world, in general, will be based on their own interests appeal to establish their own health information software and hardware purchase, record their own symbol, the information, due to the different formats and standards contained in each system of medical health data is isolated incompatible, there is no unified version of the truth, and the data automatically remove storage years alone. In short, the current health data information is asymmetrical and not suitable for the immediate needs of modern users.

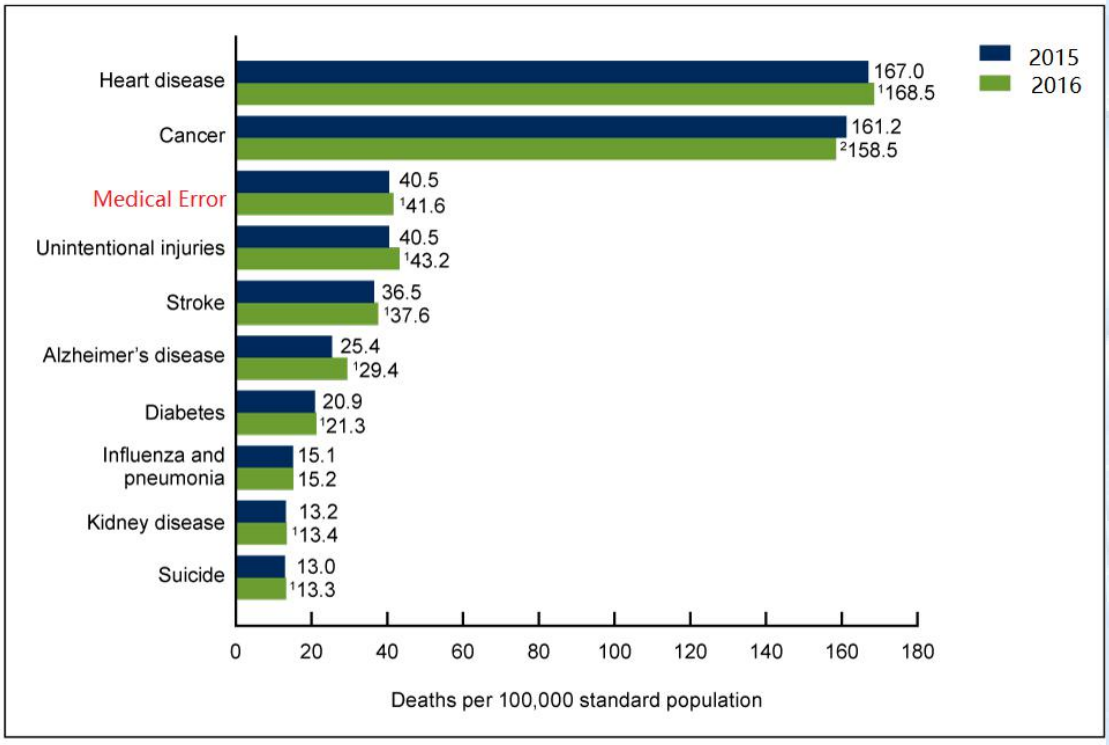
2.2 The harm of asymmetric medical information.

For a long time, the relationship between medical professionals and patients around the world has been paternalistic. Clinicians rely on surveys and tests to determine the patient's diagnosis and possible treatment plans. Traditionally, investigations or tests should only be required and arranged, if this leads to a different possible diagnosis or alternative treatment plan. Unfortunately, even if the results of investigation or test back, these are rarely widely Shared with all health professionals involved in patient care,

often is isolated, or their agencies in the initial requirements. The quality of care for patients is therefore affected. Other institutions are unaware of the patient's complete history, which in turn may lead to faulty decisions, delays, and unnecessary costs for patients or health institutions. In the worst cases, these medical errors can be fatal.

Here's a set of data showing that the 2016 Johns Hopkins university study showed a yearly mortality rate due to medical information problems. Most mistakes are systemic, including incongruent care:

Figure 3. Age-adjusted death rates for the 10 leading causes of death in 2015: United States, 2014 and 2015



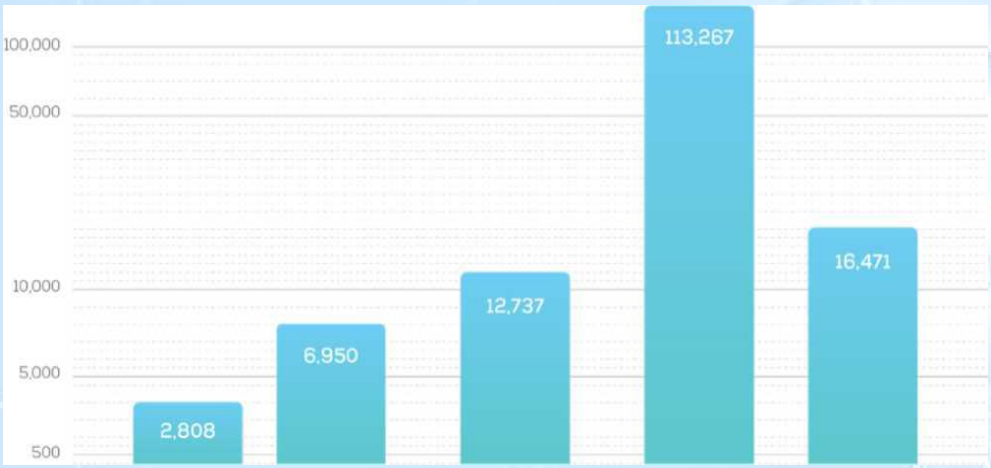
[1]Statistically significant increase in age-adjusted death rate from 2014 to 2015 ($p < 0.05$).
[2]Statistically significant decrease in age-adjusted death rate from 2014 to 2015 ($p < 0.05$).
NOTES: A total of 2,712,630 resident deaths were registered in the United States in 2015. The 10 leading causes accounted for 74.2% of all deaths in the United States in 2015. Causes of death are ranked according to number of deaths. Access data table for Figure 3 at: http://www.cdc.gov/nchs/data/databriefs/db267_table.pdf#3.
SOURCE: NCHS, National Vital Statistics System, Mortality.

Great changes are taking place in today's society. The democratization of medicine, the patient's more power is the trend and the future. Patients should have their own medical options equal to human rights. Even in a single payment system such as the national health service, patients have the right to choose when

and where to receive treatment. Therefore, with the mobility of patients, the establishment and promotion of information fluidity also need to advance with The Times.

2.3 Safety risks of medical health information

Currently, electronic health records (EHR) are stored in a centralized database, where medical data remains largely unportable. Centralization increases the impact of security risks and requires trust in a single authority. In addition, centralized databases do not ensure security and data integrity, without the need to identify and control access requirements. In most countries, a centralized health database is a legitimate requirement and necessity, so a new layer of technology is needed to improve portability and security.



As cybercrime has grown worldwide, the health information system has become a target, as has the recent ransom attacks. The technologies that power these systems are being attacked on an unprecedented scale. In fact, there are more data breaches in the healthcare industry than in any other industry, and medical records are stolen and sold on the black market, 10 times more than the value of credit card data. In other words, your medical information is 10 times higher than your credit card number on the black market.

In the spring of 2017, over 12 NHS hospitals and GP surgeries in the UK, more than 300,000 machines in 150 countries have been targeted by Wanna Cry. The attack led to the uncertainty of millions of patients cancel appointments and paralyzed the national health

insurance system. Wanna Cry is a racketeering software with a mysterious origin that highlights the vulnerability of the world's health data to potential threats, and provides a sobering warning about the current lack of infrastructure. Wanna Cry is just the latest in a string of online criminal records.

Inside the organization, privacy is often compromised. The medical records of 26 million patients have been exposed because the systems used by thousands of global positioning systems are not safe. Thousands of strangers can get records in 2,700 practices, and patients don't know that their privacy has been compromised.

Many people are trying to solve this problem, which is also the top priority for many governments and the source of frustration for doctors and patients. An important component of the challenge is data security. Safety is the most important, because health information is very sensitive.

2.4 Medical health information is applied to medical insurance

2.4.1 Insurance claim problem

For patients and professionals, current health information is slow, inflexible and very opaque.

These issues are visible throughout the claim process. When patients need services (from general clinics, pharmacies or nursing homes), health plans are used to determine how much they will pay. To determine this cost, the health plan must verify the protocol between the service received from the provider and the patient and health plan, and then share their findings with the provider. This only happens when the provider "network" and health plan are in place. For a supplier that is considered to be a network, it is necessary to negotiate a complex agreement, which will greatly increase the management cost of the supplier. Part of these costs are bills and insurance related (BIR) costs, including activities such as maintaining a welfare database and keeping records of the services delivered. The cost of BIR is expected to reach $315 billion by 2018, with an average of 3.8 hours for each doctor to navigate.

In general, this whole process takes one to two weeks, and it takes three to five weeks to do it electronically. In addition, this process is full of misunderstanding and misunderstanding. To actually happen, many people need to check multiple outdated

protocols, not multiple records. The result is an inefficient and opaque process that confuses and discredits stakeholders and ultimately patients.

2.4.2 Insurance fraud

Whether you are a government or employer health insurance, or you buy insurance, medical insurance fraud inevitably translate into higher premiums and out-of-pocket spending of consumers, as well as reduce the welfare and insurance coverage. For employers, this increases the cost of providing insurance benefits to employees, thereby increasing the overall cost of the business. In addition, the reality of many patients is that the increased cost of fraud may mean the difference in providing health insurance.

Through design fraud, false information is represented as fact. A common form of medical fraud involves the use of patients, through their EHR errors, to diagnose conditions they don't have, or to exaggerate the conditions they actually have. This is done to enable fraudulent insurance claims to be submitted for payment. According to the U.S. department of public health statistics, losses from insurance fraud are estimated at more than $40 billion a year. Unless the discovery is made early, these false or exaggerated diagnoses will be part of the patient's medical record in the medical insurance company's records.

2.5 Medical health information been tampered

Medical records should not only be used as medical documents but also as legal documents. To rewrite the record after passing through the same period as the crime is a criminal offence, any change in the traceability must be clearly marked, dated and signed, and the reason of these changes clearly recorded.

Changing existing medical records, deleting records, or

increasing false records will expose medical professionals to the risks of medical legal consequences. When a claim is filed, the actual and original clinical records must be disclosed, and if not, the claim will be untenable.

The quality of care for patients is therefore affected. Other institutions are unaware of the patient's complete history, which in turn may lead to faulty decisions, delays, and unnecessary costs for patients or health institutions. In the worst cases, these medical errors can be fatal.

2.6 Telemedicine

As society struggles to cope with an ageing population and a rising burden of chronic diseases, global health care costs are on the rise. Current models of care, particularly in places such as the us and UK, are not sustainable. One trend is the rise of digital health services. The global digital health market is worth $80 billion. The dollar in 2015 is expected to increase to $200 billion by 2020, compared with 21% for CAGR.

It is very important to solve telemedicine, improve medical efficiency and reduce cost. The range of telemedicine includes reference, second opinion, education, follow-up care, monitoring, diagnosis and treatment. For example, remote cardiology, remote radiology, psychopathology, telepathy, etc. Obviously, this is a big market, which is dominated by North America and Europe, but India, China and Japan will be the fastest growing regions in the next few years.

In 2017, the global telemedicine market is estimated to be worth $23.8 billion and is expected to exceed $55 billion by 2021.

Unfortunately, most modern telemedicine systems are not integrated with the core financial and clinical systems used by medical institutions. The data is still in the remote health application and needs to be manually entered in later health records.

2.7 User demand

Need for treatment of patients need repeat passive tests in different health or medical institutions and medical, and many precious patient specialist professional doctors fail to read, understand and study, missed a lot of chance to cure intractable diseases, waste a great deal of manpower and financial resources. The need for health care or medical treatment of

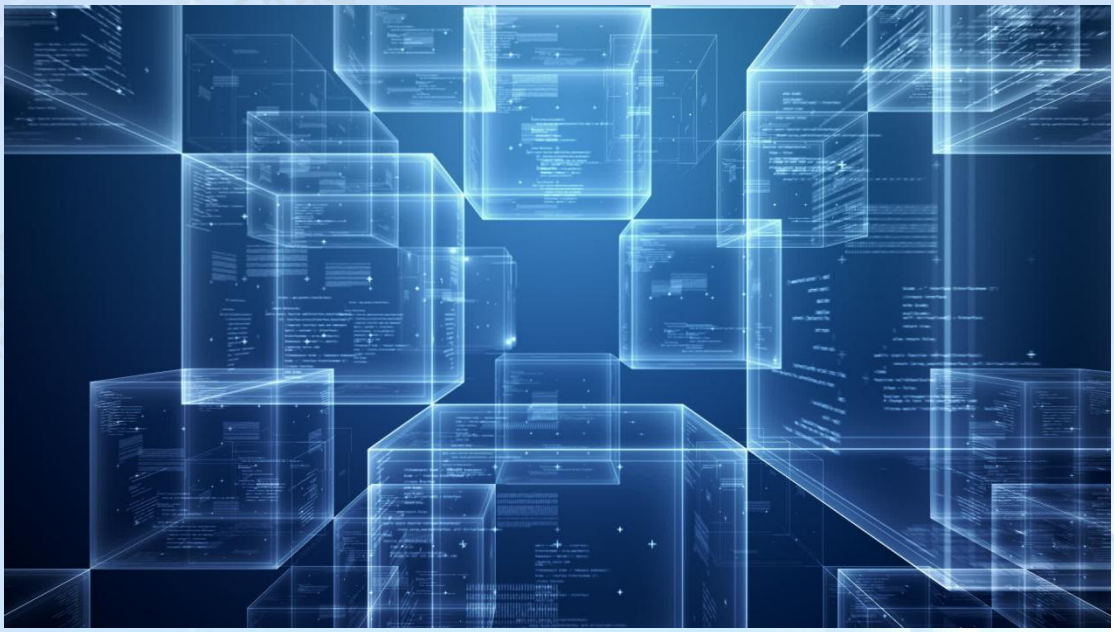
patients with hope to establish a health information system based on its own, the system detailed record their doctor or health care records, whatever he chooses to all over the world can be any hospital under their authorization for the doctor out and input your own health data;At the same time, registered doctors from all over the world can upload, study and rescue medical and health information under the authorization of patients.

Digitization has great potential, but adding an extra silo without adding information adds value.To be successful, systems, devices, and data need to be seamlessly integrated.Privacy and security legal issues must consider data management in non-traditional formats (for example, audio and/or video) and Shared data responsibilities.

In order to reduce the privacy/security risks of remote medical accidents, providers need reliable methods to verify and verify the identity of patients and practitioners.The blockchain solution is a great tool for solving these problems.

3. Health Information Chain - HIC

3.1 What is Blockchain?



Essentially blockchain is a distributed accounting technology, data can be recorded and stored in a distributed, encryption, and security of information sharing in the ledger, access to set of general tools, you can take it as a simple database, the database and the database, it is not held by one party, but everybody involved in bookkeeping, based on blockchain "write can only add a" principle, namely the data in the database once upload and accept, cannot be deleted or changed, then, because some signature private key technology and mechanism of consensus, and ensure that the data is not tampered with, each "block" in the chain in the building will be marked with time and contains the previous block with a chain link, so you can clear record every upload time and sequence. It is both open and transparent and provides privacy protection for the data inside.

3.2 Mission-statement of HIC Team

"Redistribute the value of personal medical health information, improve the quality of medical access and service, and accelerate the decentralization of personal health information."

The HIC team aims to centralize personal medical and health information according to the professional knowledge in the medical field. HTC will health information management system to realize the

medical institution oriented into patient oriented, HTC current health information system does not have the interchangeability of, symmetry, transparency, and security.HTC to store, on the basis of the medical and health information platform for the development of a variety of high quality health care services, at the same time for all the participants on the platform provides a unique opportunity to get a reward.

3.3 New Health Information Management System

Many countries in the world have tried to overcome the problems existing in the current health information system, but there is still no perfect solution.It is bound to be restricted to solve the problem in a centralized medical environment with different interests.In order to solve these problems and further realize the development of medical field, we must explore and develop a new medical health information management system.

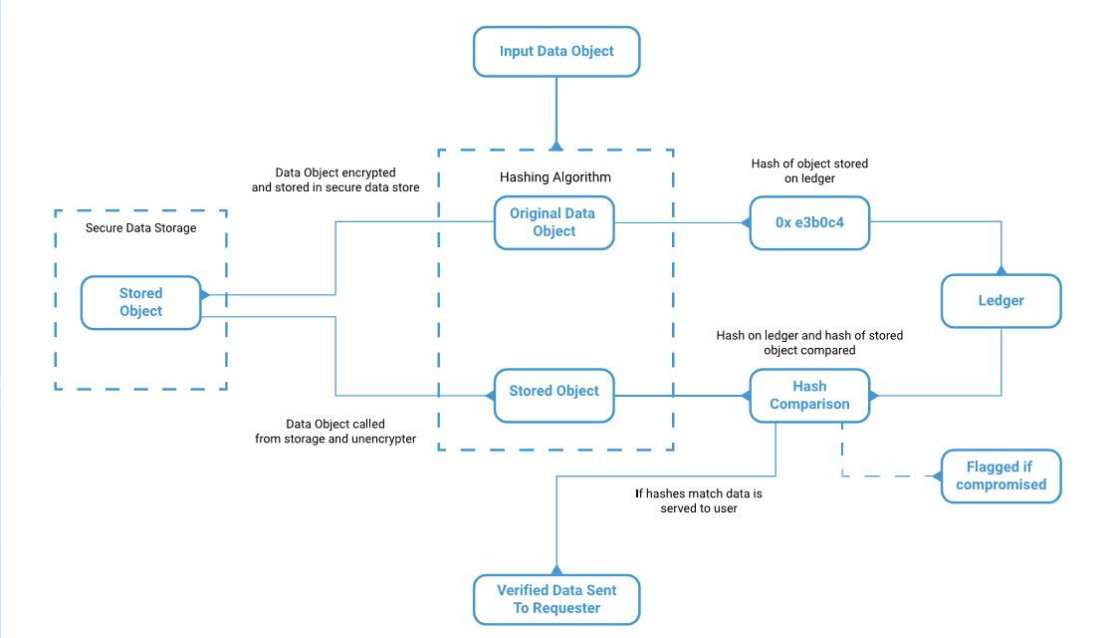
3.3.1 HIC information management system

HIC uses the block chain technology to realize the patient oriented comprehensive medical health information management system that the existing medical information system cannot realize.In other words, through the establishment of an ideal type of personal health information management platform, satisfy the health information system reliability, transparency, and safety of all the requirements, to achieve reliable health information security exchange.HIC is not a single service, but a health information management platform.The API and SDK provided by the

platform make it easy for applications and services to easily access medical health information on the platform and to develop new services. In addition, the platform will issue an encrypted currency called "HIC currency", which will form a patient-oriented medical health information economic ecosystem through currency circulation. This provides a unique opportunity for all participants in the platform to receive corresponding economic rewards based on their contribution. Using blockchain technology, smart contracts and our cryptographic currency, the medical chain provides infrastructure for digital health applications and services. These applications and services will be provided seamlessly by the user's health data. Allowing third parties to develop on the HIC platform, we hope to foster a thriving application and service ecosystem to provide value, reduce costs, and ultimately improve people's lives.

3.3.2 Encryption Password

To ensure privacy, the health information management system (HIMS) is encrypted using symmetric key encryption. The records will be encrypted and stored in the data store within the appropriate administrative permissions. The symmetric key will be encrypted using a public key with a 2048 bit RSA key pair. Each entity is allowed to enter the patient's records:



1. The system is decrypted with the owner's private key.

2. The symmetric key is encrypted with the public key of the authorized user.

In this case, the participant's access is deleted.

Health information management system:

1. The symmetric key is decrypted by the private key of the HIMS owner.

2. Decrypt HIMS using symmetric key.

3. The record is reencrypted with a new symmetric key.

4. Symmetric key USES all remaining authorized user public key encryption.

If the user is authorized to access HIMS and request access, the following procedure will occur:

1. Request the user's private key to decrypt the symmetric key of HIMS.

2. The decrypted symmetric key is used to decrypt the patient's HIMS.

3.3.3 Information exchange

Any interaction with the health information management system is recorded as a transaction on the network. Transactions are visible only to the participants associated with the transaction.

Here are some examples of transactions on HIMS.

Patient grant access

- the patient can obtain the authorization of HIMS to practitioner A.
- the ID of doctor A is added to the authorized asset of patient A in the ledger.
- the ID of patient A is added to the authorized asset of practitioner A.
- the symmetric key of HIMS is decrypted by the private key of patient A.
- symmetric key is then encrypted using the public key of practitioner A.

Patient revocation visit

- the patient withdrew access from practitioner A.
- the ID of doctor A is removed from the authorized asset of patient A.
- the ID of patient A is removed from the authorized asset of practitioner A.
- the private key of patient A is used to decrypt the symmetric

key of HIMS to decrypt HIMS.

• use the new symmetric key to encrypt HIMS.

• the new symmetric key is encrypted using the public key of patient A and the public key of all the licensed other ids.

The doctor says the patient

• practitioner A updates permission to allow doctor B to visit the patient's HIMS.

•Chain code will check whether the practitioner A has obtained the permission of HIMS.

• practitioner A decrypts the symmetric key of HIMS using its private key.

• executor B's public key is used to encrypt the symmetric key.

• the ID of practitioner B is added to the authorized asset of patient A.

• the ID of patient A is added to the authorized asset of employee B.

3.3.4 Data structure

The modeling language of HIC will be used to define the domain model of the network. Here are some examples. The CTO file will define the model and store it on the chain. According to different regulations and requirements, these contents may change to make the medical chain platform HIPPA compatible with HIMS.

3.3.5 Permission definition

The HIC contains an access control language (ACL) that defines access to the CTO domain model elements. By defining ACL rules, we can control which resource participants can access the domain model of the network. Some examples of these access rules are as follows:

```
rule PatientAccessPractitionerPublicProfile {
    description: "Patients can access practitioners public profiles"
    participant: "org.acme.medicalchain.Patient"
    operation: READ
    resource: "org.acme.medicalchain.PractitionerPublicProfile"
    action: ALLOW
}
```

```
rule PractitionerCanReadPatientIfAuthorized {
    description: "Allow Practitioner read access to all granted patients"
    participant(p): "org.acme.medicalchaindev.Practitioner"
    operation: READ
    resource(r): "org.acme.medicalchaindev.Patient"
    condition: (r.authorized && r.authorized.indexOf(p.getIdentifier()) >
-1)
    action: ALLOW
}
```

```
rule PractitionerCanUpdatePatientViaTx {
  description: "Allow Practitioner update access to all granted patients"
  participant(p): "org.acme.medicalchaindev.Practitioner"
  operation: CREATE, UPDATE
  resource(r): "org.acme.medicalchaindev.Patient"
  transaction(tx): "org.acme.medicalchaindev.UpdateRecord"
  condition: (r.authorized && r.authorized.indexOf(p.getIdentifier()) > -1)
  action: ALLOW
}
```

3.4 Uniqueness of HIC

3.4.1 Absolute Security

According to the HIPAA law, all medical health information should be kept encrypted. In the current medical system, manage the health information and encryption is the body of the medical service provider, medical institutions generally consists of a group of people, so even if health information is stored in encrypted, there may be some people can decrypt. In fact, according to a recent survey, the main reason for the leakage of health information is not because of hacking, but because of intentional or incorrect internal staff. In order to minimize the possibility of personal information leakage, HIC will transfer access to medical health information from the medical service provider to the patient. Only patients can decrypt their data, set access to medical information freely and record it on the block chain. This will not only minimize the way of medical information leakage, but also greatly reduce the space for others to intervene. At the same time, it eliminates the possibility of revealing a large number of patients' personal information through a medical institution, and ultimately eliminates the occurrence of large-scale medical information leakage.

3.4.2 Strong Stability

HIC stores medical health information in distributed data storage space.HTC in order to prevent data loss, continuous creation and maintenance of the backup data, for data are recorded, the hash value will be recorded in the chain of blocks in order to verify the integrity of the data when the data has been forced to modify or forge, the backup data will be used to restore the original data.This makes it impossible for me to change the saved medical health information freely even with the ownership and management of information, which greatly guarantees the integrity and reliability of medical health information.Only by HTC platforms "2" healthcare provider certification system certification of medical staff have access to generate the health records of others, will record the creator through the specified together with chain blocks, further enhance the reliability of the data generated in health.Health care providers also need to complete a certification process if they want to see other people's health information, and can only view it once they have obtained the consent of the information owner.

3.4.3 High-level of Transparency

All medical records and other people viewing information on the HIC platform will be recorded on the block chain.Current health information system of medical institution oriented, unable to track personal health information when and in what purpose is to use, but HTC is completely transparent to personal information management and control in when, where and in what purpose is to use.All access to health records on HIC is recorded on the block chain and managed by myself, which prevents malicious access to health information from others at the source.

3.4.4 High operability

HIC advocates open platform, and the data and information stored on the platform can be freely connected with various applications.Medical image information and genetic information already have uniform standards, so they can easily be exchanged and traded easily through HIC.Due to the medical record, the record of management and inspection results recorded and there is no a unified standard, HTC has adopted a way to enhance the interoperability, support a variety of formats and implement various support format conversion between, rather than make their own standards and specify a format.Therefore, HTC support HL7CDA architecture not only widely used, such as standard, will also provide a variety of standard API and SDK, if necessary, even for

individual medical institutions or individuals to provide personalized solutions and data formats required API and SDK or possible development environment. With such high degree of freedom and extensibility, HIC health information system will have the strong interoperability that the existing medical information system can not match.

3.4.5 High Accessibility

By storing all of the health information in a distributed database, HIC can connect to the Internet anytime and anywhere to facilitate access. At present, most of the medical institution does not allow the network log in access to health information, only a few provide the service of medical institutions will be depending on the situation only provides restricted access. By introducing does not depend on any specific data system of medical institutions, HTC to reduce dependence on a single medical institution, which allows a user to access and the management of medical information more conveniently.

3.4.6 Personal Health Information Management System (HIMS)

HIC is used to manage and integrate data with distributed and decentralized blockchain technology. HIC not only integrates, stores and manages medical records created by medical institutions, but also includes medical health data created by patients themselves. No matter what device is used, the medical data generated by the user directly outside the medical institution can be easily stored on the HIC. These integrated medical health information will be widely used in general hospital care and personalized mobile medical services.

3.4.7 HIC Health care Provider Credential System

HIC platform has a medical service provider qualification authentication system to distinguish between medical service providers and ordinary users. In order to ensure the value of medical information recorded on the HIC platform, the data generator must be certified as a doctor. If it is a medical institution, it is necessary to confirm whether it has passed the qualification certification. Medical records filled out by certified health care providers also naturally have higher value.

HIC uses a hybrid certification system, which combines a centralized authentication method directly certified by a trusted authority and a decentralized authentication method from a

certified P2P. In order to improve the P2P authentication credibility, when the person is involved in certification certification need to pay a certain amount of MP integral as a deposit, honestly to complete the task in the process of certification of the user will be rewarded, otherwise it will be confiscated as part of the deposit as penalty. The results of the P2P certification will ultimately be decided by the certification participants. The process will not publish the results of individual evaluators, and will be evaluated in the manner of an anonymous authentication protocol.

4. HIC User Experience

4.1 HIC user control

In the current medical system, patients' health information is distributed in multiple systems, hospitals, networks and potential countries. Multiple clips from the same patient, in different organizations, have snapshots of their health as they interact with patients, such as blood tests, images and clinic letters. The HIC will arrange all these records in chronological order and filter them into specific categories above to help with data processing. Such a classification would make the records easier to understand and understand by the patient, and would also help researchers look for information that could fully control who was accessing their data and their access. Patients will be able to improve data security by setting a time limit gateway to grant their EHR privileges to other users and revoke access.

4.2 The user-centered model of HIC

In the current medical system, patients' health information is distributed in multiple systems, hospitals, networks and potential countries. The same patient had multiple episodes, recording the health of the patients in different organizations, such as blood tests, imaging and clinic letters. The HIC will sort and filter all of these records in chronological order and in the particular category above to help with data processing. Such a classification would make the records easier to understand and easier for researchers to find important information about them.

4.3 HIC health data revolution

Bold companies such as 23 and itbit, apple, Nest and Qardio are rapidly innovating to expand the frontiers of their collections. We have obtained significant access to anatomy, biology, the environment, genome, phenology, and physiological data. New ideas and new technologies will only further advance this field. If we can relate these different sources of data, then caregivers and researchers will have an unprecedented understanding of the patient's life. Ultimately, this will lead to lower costs, better patient outcomes and better research.

HIC wants to be at the forefront of this revolution and seeks to integrate as many health data sources as possible into its platform. The HIC will start with integrating apple's Health Kit and common wearable devices, and then start adding support for diagnostic tests, the Internet of things and other digital Health. Patients and their doctors will be able to view the data and their electronic health records.

4.4 Patient safety

HIC also developed a backup system for emergencies to ensure patient safety.

Patients can usually approve or deny medical staff access to their records. However, in cases of emergency and incapacitation of patients, it is necessary to be able to view certain information in order to provide the best treatment.

The most important information in an emergency is the patient's name, their close relatives, medications, allergies and any advanced decisions they might make. Patients using the HIC platform will be able

to pre-select which areas of their records they will be able to record in an emergency. In an emergency, clinicians don't need to know more.

In cases where the patient is incapacitated or unconscious and unable to obtain their records, the emergency bracelet worn by the patient will be scanned to unlock the information. Two clinicians must agree that this information can be obtained without the patient's explicit consent in the case of the patient's greatest interest. It should be clear that none of the patient's records will be unlocked, but only vital information in an emergency, and the patient agrees to share it in advance.

To unlock this information, two doctors need to scan the emergency bracelet worn by the patient, or their wearable device, which will unlock key parts of their medical records.

This will allow clinicians to provide the best treatment for the patient in an emergency, and to avoid errors, for example to give the patient history of drug allergy drug or based on their known and the treatment of taboo.

As access to emergency information increases, medical chains make it easier for clinicians to communicate. As an authorized medical professional update the patient's health records, the system will be updated on HIC records. Any clinician authorized to access the user's records will see the update in seconds.

When health records are updated to all authorized parties through HIC, the patient data is not required to be manually transferred from the system to the system.

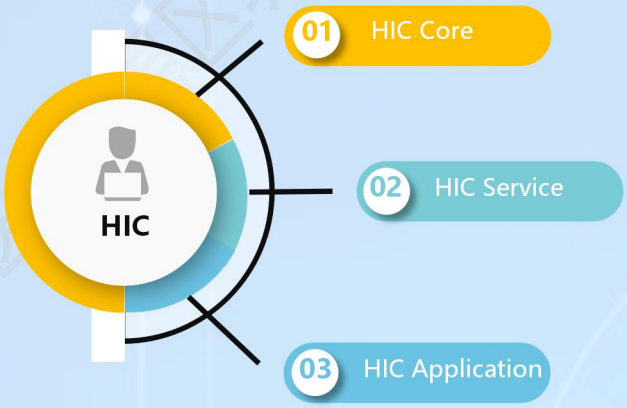
HIC can be used on any computer. As a result, any doctor with a browser and Internet connection can access the documents they share. Issues related to interoperability are now resolved, and this approach and costs are related to the transportation of notes currently carried out by primary clinicians or administrators.

4.5 Borderless health and social care

With the use of data-compatible storage nodes and the use of unbounded blockchain technology, users will be able to transfer their records to them as they travel. Medical services have become borderless because telemedicine allows users to communicate with clinicians in other countries. This will be particularly beneficial for both men and women who travel, and those who do not want to send their records to new health care providers.

5. HIC Technical detail

HIC consists of three layers: core, service and application.



5.1 HIC Platform Structure

First level: HIC Core

The core layer is a distributed database that can use the latest encryption technology in the HIC health data network to protect data. Because the amount of data that can be stored on the block chain is very limited, a separate storage space is required to effectively store medical data, and the core layer provides this functionality. In HTC application to generate and transmit medical health data usually through HICSDK again after the application layer encryption transmission, this makes the besides can decrypt data holder himself, no other people will not be able to read the raw data. The core layer can be accessed through the service layer of the HIC. In addition, the core layer of HIC provides backup and recovery systems for stored data so that data can be safely stored without being lost.

Second level: HIC Service

The service layer provides all core functions including connecting the HIC application with the core layer and managing user information. The service layer is driven by the block chain, based on the information stored in the block chain, and the input/output function of the data is performed through the connection with the core layer of the HIC. Internally, the service layer can be divided into a smart contract based on the EVM and a part of the application layer

and core layer. Smart contracts include account information with MED currency information and links to health data on the core. In HIC, reducing the amount of data stored in the blockchain containing intelligent contracts reduces the cost of operating the platform.

Third level: HIC Application

The HIC application layer refers to the general term for all applications used for medical information management and utilization through the platform, which includes all forms of applications in mobile and web environments. These applications can access data from the platform through the service layer. Using the upcoming SDK makes application development easier and faster, so it's easy to develop applications that connect to the HIC platform. Even if you don't use the SDK, you can develop applications that connect to the HIC platform if you follow the upcoming API and development protocols. Some practical application and service examples based on HIC development will be explained in more detail in the following service example.

5.2 HIC Storage space

Although the clinical record of electronic document form is generally difficult to exceed a few megabytes, medical image data is often hundreds of megabytes or more. The size of the genetic data varies according to the data processing phase, but the required capacity is likely to exceed several thousand megabytes. It is not desirable to store all these data in block chains. So, HTC use decrypted only have user in the form of a private key to encrypt data and stored in a storage space, outside the chain block and just put the hash value of data stored in the block in the chain. As mentioned above, the storage space will be built using IPFS based file systems and internal data network constructs.

In addition to using personal devices (mobile phones, computers, etc.) as the main data storage space, users can store medical information in storage space outside the chain of HIC core layer. Based on this data, users can easily access a variety of personalized digital medical care services. A hash value stored in the block chain verifies the integrity of the stored data.

For various reasons, users may lose data on their personal device management. Smartphones and computers that store data may fail or lose, and data can be deleted or partially lost. In order to cope with these emergencies, HIC provides a data backup system internally and will provide 1GB of medical information storage space to users for free. The average user can barely use up the storage space even if he has stored all his clinical records and medical image data. However, these

capacities may be difficult to meet the needs of a small number of users who have genetic data or frequent hospital visits, as well as users who produce more medical records through various services. In this case, HIC will provide additional storage space at very low prices. For all of these storage Spaces, HIC will comply with the international medical information management standards set by the HIPAA and other bills.

5.3 HIC Search System

HIC provides the data search function through the service layer, and as one of its core functions, users who want to obtain medical information of people who meet certain conditions can use this data search function. To this end, HIC operates its own search system alone. All users have the ability to manage personal information and determine whether or not they can be searched by the public. Therefore, the search system is basically only for those users who are allowed to be searched.

Users can set search criteria, including search licenses and search license options. If a user is allowed to be searched, the HIC search system stores index information about user data. Medical researchers can retrieve users of the data they want through the search system and trade data in peer-to-peer (P2P) forms through data owners and smart contracts.

In order to minimize exposure of user information, HTC use Intel software protection extension system (SGX), so that even the HTC search system administrator cannot understand the registered user information in the system. By storing and managing sensitive user information in a sealed space, it is possible to minimize the possibility of user information exposure, thus making the storage of personal information more secure.

If the user does not want to directly retrieve data by HTC search system, but still willing to sell or donate qualified data, you can participate in the transactions of the data in a slightly different way. Users want to get the data from someone else, simply enter the required data in the HTC network search conditions and provide data information such as the pay, you can find data through HTC real-time search system. The user can determine whether his data meets the requirements from a personal device, and the transaction of participating data such as notification function. Users don't even have to actively participate, and all of these features can be done automatically in the background.

6. Token Model

6.1 Function and value

The Health Information Chain (HIC) is a token based on the Ethereum, which is an important part of the new market. Ethereum is an open source, blockchain based distributed computing platform for smart contracts. Ethereum is an effective distributed virtual machine that allows end users to build smart contracts for transactions. A smart contract is a state application stored in an Ethernet block chain. These contracts are secured by encryption algorithms that can validate or enforce contracts. The token contract is the standard feature of the etheric square ecosystem. The etheric fang has been used for mobile payment system, distributed exchange, linked to commodities and legal tender tokens, market clearing mechanism, distributed computing resources of micro payment system, commodity and stock exchange, the raise, and legal documents.

In our platform, we will publish the HIC token (HIC). When the tokens are created, a fixed number of tokens will be issued, and then no tokens will be created. Tokens will immediately be available for the network system we launch before the public offering.

The HIC currency can be traded between platform users and can be moved to the outside of the platform. HTC currency constitutes the backbone of social economic ecosystem HTC platform, can be used to pay the exchange of data and information, and all connected to the service platform, can also be used to lure customers have not yet joined HTC platform of medical and health service providers to participate. The numerical information related to the token mechanism may be changed according to the subsequent simulation process.

It can be predicted that the demand for HIC will increase continuously during the growing process of HIC platform, and the total HIC will remain unchanged. Increasing the value of a single HIC will be an inevitable result.

6.2 Generation and sale of tokens

The issuance of HIC COINS is designed to support the development of HIC platform and the creation of medical information ecosystem based on it. By default, quantum chain (Qtum) can also be used to participate in the platform. It will also support BTC and ETH, which will be announced through official channels (the company's home page, Slack, facebook, twitter) before the HIC is released. The number of

HIC COINS used to pay for the generation of HIC COINS is about 50% of the total initial circulation. 20% of total circulation is for HIC development, 20% for HIC team, and 10% for consultants and early investors.

The ICO of HIC will be a capped sales, raising $10 million ($10 million), which is equivalent to the upper limit of the donation of ETH and/or BTC and white listed. HIC will issue 100 million (100 million) ERC20 tokens, known as HIC, to create a new blockchain based health care system.

In this hundred million tokens...

•50% of the shares will be available before and during the sale.

•30% will be retained by the company, team and consultant. In this 30%...

•10% of the equity is unlocked.

•10% one-year lock-up period.

•10% two-year lock-up period.

• founder :10% (5% two-year lock)

• incentive bonus :10%.

HTC will use these tokens to help foster an ecosystem on block chain, through education, others support node holders, partners to platform, guide the industry trend, and fund industry leading events. HIC tokens can support the entire life cycle of our health care information platform (HIC).

After the ICO, founder and the project team will receive 40% of the HTC tokens, the tokens are assigned to the founder and team, all unsold HTC tokens will be destroyed, the intelligent has been written into the contract.

In the open sales phase.

Initial investor -25%, 1ETH= (100,000+20000) HIC.

Public sales stage -25%, 1ETH= (100,000+10000) HIC.

If the total amount sold exceeds 30% of the total HIC, the unsold tokens will be destroyed at the end of the ICO.

Regardless of the amount of size, all the booking or formal ICO phase, by sending the ETH to intelligent contracts to buy HTC tokens, without any limitation, at the end of the ICO is free to transfer, this time HTC online exchanges platform to buy and sell at the market price.

7.0 Cost Analysis

7.1 User

Usually get their medical records for patients, they need to pay all applicable to the service provider and the relevant administrative fees for the release, the user will provide agree they represent their retrieval of data, and store the HTC nodes for free.Once made, the patient will use read HTC application standardization, a single point of access to these records at their discretion, no longer require additional management fees should they lose this data, or need to send a copy of the original physical at any time, on the contrary, they will be authorized to access the data for any request.

Permanent if patients can get their own data, they should participate in consulting or need from their health care providers usually seek medical help, they become the means of transfer of these records, in order to reduce the risk of lack of patient data in the process of consultation.

Using HIC's remote consulting platform, users will significantly reduce waiting time, which will save money, considering the need to reduce working hours.In addition, if no physical appointment or consultation is required, the patient will completely eliminate the need for travel expenses and from any physical location, including all relevant parking costs.

7.2 Clinician

For clinicians on the platform, they can immediately communicate with any user on the platform. This will provide them with additional revenue streams, which means they can operate outside computers without a network connection.

This availability reduces the chance to cancel appointments because the patient is unable to consult physically. Reducing this variable can save on equipment costs, overhead costs, and additional staff.

7.3 Medical service providers

Health care providers have many benefits. First, a fuller understanding of the patient's health benefits them. HIC's single real record will be the only local provider looking for patient data, providing inner peace and reducing the time spent on collecting records. In addition, suppliers will benefit from the need for continuous investment upgrades or maintenance of their health record systems.

7.4 Researchers

Researchers will be able to access global patients through the HIC health data market. This will increase the potential sample size for research and improve the accuracy of the results. As long as the information extracted from participants' health records, and with their permission, can reduce the cost, rather than through the establishment of research team and through the cumbersome process of health service providers to obtain health data.

7.5 Insurance Company

Verifiable, immutable data, means that the insurance company will need to spend less time to check the data, they can be trusted to provide their data, either from the data of patients to, or from the signature of the medical professionals.

Similarly, if an insurance company wants patients to be completely transparent, they can provide accurate premiums based on their medical records. They provide medical vouchers and/or lower premiums as incentives for transparency.

8. Team Members

The Founder:

James Collins

Founder of HIC project.
Graduated from UBC university of Canada in information data analysis major;Worked for the head of global data at allianz.
Canada PGHD project leader

Alan Shang

Project co-founder and technical supervisor.
University of UBC, university of southern California (USC) Master of Computer Science.

Rabi Chaudhry

Co-founder of HIC project.
MBA from the university of Toronto, head of the north American division of the international Red Cross, and a member of the WHO north American information investigation team

HIC project consultant

Edelmann Frank

HIC project consultant
Dr. SHL, a doctor of medical sciences at Hebrew university in Jerusalem, SHL European regional director, SHL global customer data analysis CRO.

9. Risk and disclaimer

8.1 This document is only used to convey information to a particular object that is actively requesting information about the project, and does not constitute any future investment guidance or any form of contract or commitment.

8.2 Once participants participate in the TOKEN distribution plan, they express their understanding and acceptance of the project risk, and they are willing to bear all the corresponding consequences.

8.3 The project team makes clear that it does not promise any return and does not bear the direct or indirect losses caused by any project.

8.4 The TOKEN involved in this project is a cryptographic digital code used in the transaction process, which does not represent the project equity, profit or control.

8.5 There is much uncertainty due to digital currency itself (including but not limited to: treat digital currency regulatory environment to stimulate competition, industry, technology of digital currency itself holes), we are unable to guarantee the project will be successful, the project has some risk of failure, the objective of the TOKEN also have zero risk.

8.6 Although team will try to solve the project in the process possible problems, but the uncertainty of the future there is still a policy, we must understand all aspects of the chain block before support, on the premise of fully understand the risk rational participation