

MEDIBOND - FACILITATING HEALTHCARE ON THE BLOCKCHAIN

BEN STEFFENS, JAMES BILLOT, ALBRITO MARQUES, DIVYA GAWAS, OMKAR HARMALKAR

ABSTRACT

The whole process of healthcare from getting a prescription from the doctor to getting the drugs from your pharmacy to getting it all covered by insurance is a complex and challenging process for the patient. The same could be said for the industrial parties involved on the other end of facilitating this process. This confusing process often leads to claim backs, fines, and bills for services that should have been covered by insurance.

Generally, every health plan has different co-pays, deductibles, out of pocket maximums, and exclusions. With several different plans, its hard to know which costs you are responsible for and which costs are covered by your plan. These details are even more difficult for pharmacies to deal with as many times they bill the insurance for medication dispensed to customers but later find out that the insurance has refused to pay for it. Pharmacies also have to deal with prescription fraud and the burden is upon them to verify that every prescription is legitimately prescribed by the doctor. At the same time, primary care physicians also have to deal with issues of their own. There have been far too many cases, especially in the United States, recently exemplified in the opioid epidemic drug bust by the Department of Justice where several doctors were caught prescribing medication that was unnecessary for patients out of pressure and greed to make an extra buck.

Currently several corporations and governments are spending a significant amount of time, money, and resources setting up and managing traditional databases loaded with users personal information. With the introduction of the Affordable Health Care Act in the United States, extensive data about patients is being collected and compiled by multiple government agencies, including the IRS the Department of Health Human Services. These systems require extensive resources and personnel to continuously update, backup, and maintain.

The current solutions that have been implemented by the healthcare sector in dealing with patient data and the transfer of such across intermediary networks have not been successful. They have been vulnerable to exploitation by hacking, expensive to set up, and confusing to use. This has resulted in a difficult choice for all involved in the healthcare process to work out a solution that is secure, scalable, and affordable.

INTRODUCTION

However, even in the midst of these difficulties, opportunities for innovation exist. We're at a stage where large-scale incumbent healthcare providers, hospitals, technology firms, insurance companies, and pharmaceutical companies are competing to control patients data in a centralized system, much to their own gain.

This directly reduces portability of data for patients while also empowers the big players on their grip on patient data. MediBond envisions the future of healthcare data on a decentralized, Blockchain-based system where the patient retains as much control of his or her data as possible. This maximizes security and privacy over one's own medical data. We also envision a system where we can reduce the workload for pharmacies, insurance companies, and doctors in verifying the legitimacy of prescriptions and reduce intentional fraud and coincidental mistakes that take place far too often in healthcare today. Furthermore, we want to help specialists and primary care physicians help quickly diagnose a patient given their systems. From our discussions with several medical professionals in the industry, the best way to determine the best treatment for a person is to look and see at what has worked in the past and for whom it has worked. This same principle can be applied to diagnosing illnesses as well. We want to be able to leverage all of the medical data that we can on our blockchain, whether it be blood test, MRI results, X-Rays, echocardiograms, and the like. Anything that can be transformed to alphanumeric data will be fed into our artificial intelligence powered neural network so that it can be trained to help medical professionals quickly diagnose and recommend treatment plans for individuals based on their personal medical profile and symptoms. These endeavors are at the heart of what we strive to accomplish at MediBond.

MEDI BOND

Our MediBond Blockchain will be perfectly designed to promote security and privacy, along with being transparent in the functions that it executes. Customers, whether they be insurances, pharmacies, individuals, or medical doctors will be able to make use of MediBond tokens to pay for space to store medical data, or to employ contracts on the network between intermediaries, or to make use of computing power of the blockchain to process requests of assistance from our neural network. We plan to make use of some of the tokens allocated to our development fund to help market MediBond's platform to various market players for participation in the platform at launch. The rest of the development fund tokens will be used to further fund development of MediBond as well as to reward those who jump on board with our vision early on.

We plan on bringing revolutionary technology delivered on the blockchain to the medical field. These are expanded upon in our detailed descriptions below.

Verification system: Medibond will dramatically reduce fraud by allowing pharmacies, insurance companies, and doctors to work together to verify every prescription, claim, and order on our secure ledger. We will do this through the implementation of a trinary multisignature protocol that will require all involved parties to sign off to complete the transaction on each part. This will greatly mitigate both general mistakes and malfeasance in healthcare. Multi-signature is a very clever to the solution to the problem of trustless escrows and organizational limits on the blockchain. Our multi-signature protocol scheme shall enable groups of signers (pharmacies, insurances, and hospitals/doctors) a compact, joint signature on a common contract. One of the main beneficial uses of this will be in fraud prevention as already mentioned. Too often pharmacies face uncertainty about whether to fill a prescription in fear that the insurance may reject the claim, thus causing them to loose money. On the other hand, insurances need to be certain that the prescripion being dispensed has actually been authorized by a medical professional and is not an abuse of the system. Doctors also are checked by the system we plan to implement in that they will be required to publicly sign off on the contract between all three parties so that the prescription can be dispensed. This transparent process will incentivize honest behavior across the market place. Existing schemes other than multi-signature protocols impose public key infrastructure which make them impractical such as a distributed key generation protocol amongst potential signers. Others require concurrent zero-knowledge proofs of knowledge of secret keys done to the certificate authority at key generation. We however plan to model our multi-signature procotol off the pay-to-script hash as implemented in the Bitcoin protocol, providing a better scheme that's proven secure in the plain public-key model. A party participating in the contract needs only access to their public/private key this way to complete the signing. An important simplification in key management/distribution is thus achieved without compromising efficiency, security, or assurance MediBond will also be a secure network and will have all necessary medical information, all involved parties can access what they need just by accessing the blockchain.

Medical Records Management: Medibond will transform the way medical records are sent and received by securely encrypting the transfer of all medical data among hospitals, pharmacies, and insurance companies. Users of our platform are in control of all their information and medical data transfers which ensures the integrity of the data and the sender, providing consistency, accuracy, and availablity while not compromising the durability and reliability of the data. Due to the whole platform being built atop the blockchain and its decentralized nature, there's no central point of

failure and will be able to withstand malicious attacks as well as resource exhaustion attacks. All data will be cryptographically secured on the blockchain and only accessible to approved parties. This will prevent sensitive information from getting into the wrong hands.

Patient Health History: Another exciting feature we're happy about is our plan to incorporate medical history on the blockchain. We plan to implement normalization schemes for medical data of all sorts, whether it be blood tests, MRI results, diagnosis by doctors, etc. We plan to support clear standards for importing any alphanumeric medical data onto our cryptographic platform. Storage will be able to be purchased using our own MediBond tokens and all of this information shall be kept secure by our multi-signature protocol so that a third party can access it only if both doctor and patient sign off on the request. Secure, easy to use, all in one place.

We'll also be working on an artificial intelligence platform to be launched on our blockchain that can be trained to predict and diagnose medical ailments based on our vast database of previous diagnostic history and medical exams. Patients will be able to approve their data to be used for this and we plan to reward them with tokens for the access that they'd grant to this data. With this, doctors everywhere will be able to quickly narrow down options for diagnosis and treatment with the help of an intelligent platform with patient data from all around the globe. We've already begun steps in making progress to the development of this neural network and will have a brief working concept demonstration prior to the official launch of its integration into the MediBond platform.

CONCLUSION

The blockchain and decentralized technologies will play an increasingly significant role in healthcare and technology used by those in sibling industries. The benefits of blockchain are enormous, from decentralization, to security and scalability, to privacy and affordability. This is a highly beneficial disruption that has begun in the healthcare industry and will bring numerous benefits to all who take part in this revolution. We believe that it's vitally important that healthcare companies adopt to blockchain technology and jump on board with us at MediBond to guarantee they will not be left behind in this quickly evolving atmosphere. We hope to lead the movement in this area of medical data security and integrity as well as bring advancements to the field of medical diagnostics. These will only be the first of many decentralized applications and platforms that we plan to build on the technology of the blockchain to bring out the full potential of what healthcare can be like for insurances, pharmacies, doctors, and individuals as we embrace all that these wonderful new technologies have to offer.