



# Health chain

Can healthcare be fixed with blockchain tech? (Working paper)

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## 1. What is the problem you are trying to solve?

40% of healthcare involves spending energy on useless stuff. <sup>1</sup>

Health chain is a project born out of our frustration of working at Loyola / Stanford and then founding Savant Care to realize that most of the problems are at an ecosystem level.

## 2. What is the core reason for this waste in healthcare?

Healthcare is an information problem.

### Custody of information

The health data is about the patients who do not have custody of the data. The patients move across medical service providers and they cannot easily share this data across the network of medical service providers taking care of the patient's health.

### Fragmentation of information

It is bad enough that I do not have custody of healthcare data that I own but no single entity is a single point of contact for all my health data. My health data today is spread across 6 different health service providers. Over the last 5 years, I have had the same lab test or imaging done at multiple institutions since data was not shareable without friction.

### Duplication of information

Every medical service provider maintains its own Database, every insurance company maintains its own database. A lot of this data is duplicated. Separate databases result in the whole industry of claim filing.

### Centralization of information

Since maintaining these central databases is difficult there is an inherent force in the current system for centralization.

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<sup>1</sup> 10 admin for every 1 doctor. Ref: <https://hbr.org/2013/09/the-downside-of-health-care-job-growth>



Supply side: Imagine a new med school graduate. She wants to run her own practice but she has no idea how to maintain complex central health databases. Hence she ends up joining a large hospital.

Demand side: Imagine you already see a doctor at Stanford hospital for your knee. You want to see a new doctor for your back. You would prefer seeing a back doctor at Stanford hospital since she will already have your data in the central Stanford EPIC healthcare database.

The supply side and demand side centralization forces are resulting in medical organizations becoming larger and healthcare becoming more corporate and less personal.

### Siloed information

Since health care data is locked in silos of organization boundaries researchers have access to only this siloed data.

# Gatekeepers of the data have no incentive to innovate

## 3. Why did we end up with these problems?

We did not get to this point due to malice or bad actors in the system. We got to this point because we did not have the technology to maintain a tamperproof / immutable database without a central organization. The innovations presented in the Bitcoin paper<sup>2</sup> and the subsequent success of the Bitcoin network prove that we can run a decentralized trustless database for value store, communication, and computation.

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<sup>2</sup> <https://bitcoin.org/bitcoin.pdf>



## 4. What is the future you imagine?

One day in future there will be one decentralized tamper proof health database, where the blockchain will guarantee that the data is accurate without needing to trust people.

Medical service providers (clinics, labs, pharmacies) and insurance companies all will write into this decentralized database. The patient will own the data and use public keys to give access to this data.

This will enable a decentralized health network.<sup>3</sup>

## 5. How will this decentralized database help?

### Give rightful owner the custody of data

Currently, the market can not provide efficiencies since the data owner is the patient but the custody of a patient's data is spread across several health care clinics, hospitals, labs, pharmacies and insurance companies.

Once we give the custody of data to the rightful owner many market imperfections will be removed.

Once the patient has the custody of the data, it will allow for better sharing of medical data about a patient across organization boundaries. This will increase transparency while maintaining privacy.

For e.g. A patient can now see a knee doctor at Stanford and see a back doctor at their local clinic knowing that the back doctor will be able to effortlessly access all the data entered by the knee doctor.

### Reduce the cost of health insurance

Now that all the information is on a decentralized tamper proof DB as a patient I can easily give access to my health data to other insurance companies and let them bid on insuring me. It may also lead to peer to peer insurance exchanges where some other person can bid to insure me.

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<sup>3</sup> For an centralized alternative see ELGA in Austria  
[https://www.bmgf.gv.at/cms/home/attachments/1/7/2/CH1538/CMS1458292318057/1511\\_elga\\_the\\_electronic\\_health\\_record\\_in\\_austria.pdf](https://www.bmgf.gv.at/cms/home/attachments/1/7/2/CH1538/CMS1458292318057/1511_elga_the_electronic_health_record_in_austria.pdf)



## Make healthcare more personal and less corporate.

Reduce the fat layers of management on top of the doctors. A new graduate will not need to run a central EHR system. Since the data is now decentralized she will be able to see the complete medical data of the patient visiting her. Hence, she will find it easier to run a more personal private clinic.

## Lower cost of meds

The current entrenched ecosystem of the big pharmacies walgreens and CVS creating Surescripts and the Pharmacy benefit managers have no incentive to innovate.

Imagine a world in very near future: When you say to your doctor please send my prescription to "Health chain"

Once your prescription is on health chain pharmacies compete to provide you the best price for the medications. And the medications are then shipped to your door.

The only reason we do not have this innovation is that the true owners of the data the Patient do not have custody of the data.

## Enable better pharmacy integration.

First world problem of Savant Care spending 1.5 years of development effort.

Developing world problem of there being no infrastructure.

## Reduce cost by catching insurance fraud

Now that the data is in a central database, a clinic will not be able to bill 2 patients from 2 different insurance companies seeing the same provider at the same time.

## Enable better research

Imagine a future where a researcher from Stanford announces that they will pay 1 token to every cancer patient who makes available their medical records for a new cancer study.

The patient goes in and adds the public key of Stanford university and the medical data of these cancer patients is now available to the researcher.

## Enable better diagnosis



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I suffer from sleep apnea. Currently, I see a sleep doctor at Stanford and I find it very hard to get a 2nd opinion from any other doctor since the process of getting my medical data from Stanford sleep clinic and sharing it with another doctor has too much friction. I will be able to do it just by adding the public key of another doctor to my health records.

### Enable better lab integration.

First world problem of labs refusing to integrate with Savant Care since we were too small. Developing world problem of there being no infrastructure.

### Enable community around diseases.

I would like to participate in a community of others with similar health profile like mine.

## 6. Will tokens help? Do we really need tokens?

### Bootstrapping the network

An important key to inspiring participation in any community is a fair accounting system that reflects each person's contribution.

Imagine we try to do this without tokens.

The problems we will face is: Early adopters do not get a financial incentive to adopt this system and hence tokens will make it easier for this system to be adopted.

### Enable value exchange in the market

Healthcare is a market with a spectrum. On one hand are the patients with all the medical data and on the other hand are the researchers who want access to the data. Introducing a currency enables value exchange in the market.

### Reward desired behavior

As a thought experiment imagine the gov't. passes a law for using this decentralized health care database. In such a scenario are the tokens still valuable to create this ecosystem?



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Even in the above scenario the tokens are valuable as they allow us to reward desired behaviors and work on Prescription non-compliance and lifestyle diseases which are a significant percentage of health care cost.