LONGFORM LEARNING EVIDENCE

5 WAYS BLOCKCHAIN CAN TRANSFORM HEALTHCARE

Intended for a non-healthcare blockchain specific audience but rather for a general business publication such as the Wall Street Journal.

Sofia Shirley

HOD 4952

Andy Coravos

5 Ways Blockchain Can Transform Healthcare

Blockchain has been called the most disruptive technology since the Internet. Let's take a look at five potential ways in which this powerful tool can disrupt the healthcare industry.

By Sofia Shirley

Blockchain – you may have heard of it. More likely, you've heard of Bitcoin, a cryptocurrency that allows for completely digitized money. Blockchain, in fact, is the technology that enables Bitcoin, but it's far more expansive than that. In a nutshell, Blockchain is an immutable, decentralized, distributed ledger.

Let's break that down. Essentially, a blockchain is a transaction log that is shared between multiple parties so that every party has access to the same copy of the log at all points in time. No single party owns the log; rather, ownership is 'distributed' throughout all involved parties. Blockchains are also immutable, meaning that 'blocks' can only be added to the 'chain'; transactions cannot be deleted or altered once they are added. A transaction is added only after being

validated by the different parties, or nodes. Because of this, blockchains eliminate the need for trust or a central authority to act as a middleman in many bulky business processes today.

However, blockchain is not the be-all, end-all of emerging tech. The use of blockchain in a technology stack is most helpful in complex industries lacking trust and saturated with middlemen. Clearly, healthcare is a good fit. America's healthcare industry is spiraling out of control, with costs at an all-time high and only continuing to rise. While we spend more, per person, on healthcare (per person) than practically any other nation, our healthcare outcomes are nowhere near the best. If we proceed as predicted, healthcare expenses will exceed 20% of the GDP and reach $5.7 trillion by 2026.

PHYSICIAN CREDENTIALING

By the time he or she becomes a full-fledged doctor, each physician holds a plethora of credentials: his or her medical school diploma, certification of residency, verification that he or she passed the boards, verification that his or her credentials are up-to-date. The list goes on and on. This might not be such a big deal except for the fact that every time a physician joins a new practice or hospital, that organization needs to verify each and every one of those credentials before that physician can begin seeing patients.

Suddenly, what should be an easy hiring process becomes a huge administrative ordeal. It is estimated that hospitals lose $7500 per physician, per day while they wait to receive all of the proper credentials and verification. Given that this process typically takes two to three months, the end cost runs, on average, around $450,000 to $675,000 per physician. That amount of money is simply a waste adding to our already extraordinarily costly healthcare system. Beyond that, it is an incredibly repetitive process, with most providers going through a version of this verification process with 15-25 organizations.

Giles Ward, Chief Operating Officer at Hashed Health, witnessed this problem directly in his previous role at a dialysis company.

"We could build a clinic faster than we could credential a doctor who was practicing in a competing clinic across the street," Giles said.

The inefficient provider credentialing system seems even more problematic when the worsening doctor shortage is taken into consideration.

Fortunately, physician credentialing has been deemed a great use case for blockchain currently because it would not disrupt the ecosystem. Rather, it would just eliminate waste and cut down on spending – two things that almost everyone can get behind. All of the physician's data is verified once, as it is uploaded onto the blockchain. After this one verification, it never needs to be verified again.

> " We could build a clinic faster than we could credential a doctor."

Hashed Health is ready to take to market a product that attempts to reduce some of this administrative burden, spinning off a product called The Professional Credentials Exchange, or ProCredEx. ProCredEx aims to reduce the time that it takes to credential a physician by multiple weeks. ProCredEx has defined itself as a network that will allow parties to request and grant access to credentials quickly, efficiently, and securely. It will build a market for credentials unlike any currently out there.

ProCredEx's Chief Executive Officer Anthony Begando firmly believes blockchain serves a purpose for this use case. Here, blockchain is not just hype.

"We're using blockchain because it creates software-driven trust, and in our use case, trust is the apex of the problem. If we can leverage blockchain to say, 'This document is real and relied upon,' we won't have to spend two months finding it," Anthony said.

ProCredEx will begin its pilot program shortly, which should illuminate more specifics regarding just how much time and money this blockchain solution can save. WellCare, Spectrum Health, National Government Services, The Hardenberg

DISTRIBUTED HEALTH: Tori Adams from ConsenSys Health presents at leading healthcare blockchain conference Distributed Health 2018 at the Schermerhorn Symphony Center in Nashville, TN last month.

Group, and Accenture have all signed on as initial participants in the project.

Additional notable healthcare companies Optum, Humana, MultiPlan, Quest Diagnostics, and United have also teamed up to take on provider data challenges.

PHARMA SUPPLY CHAIN

Blockchain can be used to track pharmaceuticals across the supply chain. Drugs change hands over and over again as they travel from manufacturer to patient. This confusing chain of events opens up the possibility of fraud.

However, if each drug is tracked on the blockchain, it becomes much more difficult to swap out one drug for another or to just lose track of one. Buyers can then have more confidence that what they buy truly is what the label says.

This use case for blockchain in healthcare may be implemented sooner rather than later. That's due to the Drug Supply Chain Act of 2013, which states that by 2020, hospitals and pharmacies must be able to determine exactly which manufacturers or repackagers supplied their pharmaceuticals. Using blockchain creates this shared, immutable database of these drugs that can easily provide this information and allow these organizations to comply with the law.

The tracking of pharmaceuticals has utility beyond just seeing the drugs' exact location. Storing the data on the blockchain allows for the provision of many more details and specifics. For example, if a certain pharmaceutical is recalled due to a faulty ingredient, the data on the blockchain could be used to show which specific batch contained that bad ingredient. Then, instead of recalling hundreds of millions of dollars' worth of pharmaceuticals, the manufacturer

would only have to take the loss on the one bad batch of that specific pharmaceutical.

Walmart already uses blockchain technology to track all their leafy greens for E. Coli outbreaks, so why not expand that use case to pharmaceuticals in healthcare?

The trickiest part may be in getting all of the separate pharmaceutical companies to work together. If each comes up with their own, separate blockchain solution, it will not do anyone much good.

"Blockchain is a network beneficial solution. For a company by itself, it's not going to be very beneficial," said Susanne Somerville, founder of Chronicled.

OPIOID EPIDEMIC

The opioid epidemic is a public health crisis in the U.S., with an estimated 115 Americans dying every day from an opioid overdose. Fortunately, blockchain is here to help. The blockchain can be used here to alert authorities or providers when a patient has "double doctored," or received the same prescription from multiple physicians.

For Tori Adams, the Leader of US Government Practice at blockchain company ConsenSys, this problem is deeply personal. Tori's own daughter struggles with opioid abuse, so she knows firsthand the devastating effects that opioid addiction has on both the individual and his or her entire family. From this experience, Tori has committed to figuring out how blockchain can be used to help alleviate this problem.

Even Tori, however, understands that blockchain itself is not the solution to opioid abuse.

THE OPIOID EPIDEMIC: The opioid crisis plagues the U.S. in mounting numbers. Can blockchain be part of the solution?

"Blockchain itself isn't going to cut straight to the jugular of the opioid epidemic," Tori said. Rather, it will "improve upon [infrastructure] systems that already exist."

David Houlding, Principal Healthcare Lead at Microsoft, echoed this sentiment.

"It [blockchain] will vastly reduce the opioid epidemic," David said. "I would not say this will eliminate the opioid problem, but this will help."

It currently primarily falls to the states to track opioid use. When opioids cross state lines, then, that tracking typically becomes convoluted and loses accuracy. Putting the data on the blockchain will increase transparency.

Using blockchain will also facilitate collecting mass amounts of data from hospitals on the prescription and administration of opioids. Gathering this data could help healthcare professionals and healthy policymakers come up with a more effective strategy to curb the issue. IBM is currently working on a project with CDC that will collect surveys from hospitals regarding these practices. Intel Corp. is another large player that has already begun work as well.

ELECTRONIC MEDICAL RECORDS

An electronic medical record is a digitized log of a patient's health information, currently created and held by a health care provider. With blockchain technology, data can be held by the patient itself – wouldn't it make sense for the patient to own their own personal information? That way, the patient can decide who to share that data with – and when. Let's say a patient received medical care in Italy while on vacation. During that trip, they'd want to provide their complete medical history to that attending physician. Two weeks later, however, after they have fully recovered and have returned home safely, there is no reason for that Italian physician to continue to have access to that patient's personal health information. The patient could deny that physician future access to their records.

> ❝ Everyone's favorite use case is medical records on the blockchain."

On the flipside, this could also make it easier for patients to share their records. I work at Shade Tree Clinic, a free medical clinic offering care to the uninsured. One of our patients is moving across the country in a few weeks, and requested access to his medical record. He was told that he would essentially have to drive to Vanderbilt (difficult as he has no car) to receive them, and that if he wanted the full record than he would have to pay. He would have to spend his hard-earned money to receive information about his own health – information that is critical for him to receive proper care in the future. With a new kind of electronic medical record on the blockchain, the patient would automatically have all of his own data and be able to share it with his new provider instantly – no cost or hassle involved.

EMRs have been deemed the "holy grail" of blockchain uses in healthcare. Unfortunately, turning it into a reality may require a long and difficult road.

"Everyone's favorite use case is medical records on the blockchain," said John Bass, CEO of Hashed Health. "I love that use case as well, but I just think it's going to take a while to get there."

The biggest roadblock relates to concerns around the security of EMRs on the blockchain. Healthcare is an extremely regulated industry due to the sensitive nature of patient health information (PHI), which is rigorously protected by HIPAA. However, it's important to note that PHI itself would likely be stored off-chain, thereby protecting the patient and upholding patient privacy laws. Nevertheless, this is still a huge concern for providers. In the U.S., there is "zero risk tolerance" for sharing of secure patient data. Hospitals can be fined up to $50,000 per patient per breach – and that's a risk that no one wants to take. There would need to be more convincing evidence as to the security and feasibility of using blockchain in healthcare before this use case becomes a reality.

But again, just think of the reward.

"The best type of patient is an informed patient. If blockchain can deliver a patient-managed EHR system, the business of healthcare will be about delivering service and treatment to better health and not owning the patient's health," said Maria Palombini, Director of Emerging Communities and Initiatives Development at the IEEE Standards Association.

A blockchain-enabled world with patient-owned EMRs opens up a realm of possibilities. A patient can choose to easily donate his or her data to a clinical trial for research. A patient with a chronic condition could easily move from specialist to specialist without having to worry about leaving crumbs of information behind or repeating the same information over and over again. A patient could voluntarily elect to sell his or her data to a pharmaceutical company.

VALUE-BASED CARE

The healthcare industry is moving away from traditional, fee-for-service models and towards value-based care, in which compensation is based on the outcome rather than the process.

Value-based care revolves around maximizing quality of care while minimizing cost. Ultimately, value-based care aims to spend fewer dollars while achieving better patient health outcomes. It manifests in a variety of different payment models, from pay-for-performance (P4P) to accountable care organizations (ACOs) and bundles.

P4P uses financial incentives or disincentives to motivate providers to provide high quality services. Different performance metrics are assessed to determine if the hospital should

be rewarded or penalized based on either its own improvement from the previous standings or on their its value compared to peer institutions.

Accountable care organizations (ACOs) group doctors, hospitals, and other healthcare providers in order to provide coordinated, comprehensive care. Together, this voluntary group is reimbursed based on the quality of the care provider. They share the risk and reward of financial incentives based on their relative performance in a fiscal year and achieved cost savings by working in this network.

"Bundles" are a payment model in which providers are paid for a set of healthcare services related to a singular condition. Commonly used for orthopedic or cardiac procedures like knee replacements, the payment for the bundle will cover everything involved with that 'episode of care' for a defined time period.

Value-based care has traditionally been difficult because it's tricky to track the various outcomes in a timely fashion. Previously, physicians would take the risk up front and then be told how they performed months after the procedure was completed. By removing the incentive from the event, providers feel too removed from the reward for value-based contracts to serve as a true incentive. Smart contracts can change that by immediately triggering the appropriate response for each possible outcome.

Let's use a weight-loss pill as an example. If after two months of proper use, the patient loses a significant amount of weight, then that patient will not receive a rebate, because the drug appeared to have worked. If after two months of proper use, the patient does not lose a significant amount of weight, then the patient will receive a rebate. This makes

sense because it means that a patient will not be spending a significant amount of money on a medication or a treatment that was not effective in curing their condition. If a patient failed to complete the full two months of the treatment, they will not be eligible for a rebate. All of these "outcomes" (essentially rebate or no rebate) are automatically triggered by the smart contract; no one needs to manually track the outcomes of each and every patient.

Hashed Health announced its newest product, Signal Stream, on November 7th, which aims to do just this. Corey Todaro, Hashed Health's Chief Products Officer, is currently spearheading this effort.

"Blockchain can enable a smart payment system to match the distributed care teams that will take responsibility for episode- and disease-centered payment models," Corey said.

Hopefully, this can bring us one step closer to paying for quality – just as we do in virtually every other industry.