Transforming Healthcare Outcomes Through Blockchain and Data Analytics

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Healthcare disparities and inequities continue to be a major problem afflicting the US healthcare ecosystem. According to many recent studies, the US faces some of the most acute healthcare disparities of any country in the industrialized world. For instance, a publication in The Lancet questions whether the widening gaps in health and longevity in the United States are associated with increasing income inequality.[1] Another study by the Henry J. Kaiser Family Foundation indicates that rural individuals have a greater difficulty accessing healthcare and obtaining private health insurance compared to urban counterparts.[2]

Many of these healthcare inequities disproportionately impact the most vulnerable and under-served patient populations. Moreover, these same patient populations are often disproportionately afflicted by many of the costliest chronic conditions, including diabetes, hypertension, and obesity to name a few. According to the RAND Corporation and Center for Disease Control and Prevention, chronic conditions and mental health makes up 90% of United States healthcare spending.[3, 6]

Chronic diseases continue to inflate overall healthcare cost in US. With healthcare costs soaring over the past decade, the US healthcare ecosystem needs to understand how to better provide quality care and equitable access to treatments for all patients, including the most under-served groups.

Fortunately, with the proliferation of increasingly savvy data analytics over the past generation, healthcare providers can leverage the power of big data to better understand cost drivers in the US, more comprehensive patient demographics, and overall population health trends. The power of big data allows healthcare providers to make smarter decisions in real time to provide more equitable access, higher quality care, and reduce costs.

Additionally, we have seen the proliferation of blockchain technology over the past several years. Although often mistakenly associated solely with emerging cryptocurrencies, blockchain is an emerging technology that could dramatically alter how transactions and information transfer occurs in the 21st century global economy. According to PrincewaterhouseCoopers, blockchain is defined as "a decentralized ledger of all transactions across a peer-to-peer network."[4] Blockchain has the potential to alter how transactions and the exchange of information occur between parties. Currently, blockchain is primarily used in banking. Nonetheless, blockchain is being adapted to many other industries such as cybersecurity, manufacturing, and government.

Because of the centralized and transparent nature of tracking transactions via blockchain, we can assume that blockchain use will only become more prevalent looking forward. One key area where blockchain can impact healthcare is related to overall diminishing trust in healthcare. According to the most recent Edelman trust barometer, trust in healthcare has diminished in 17 out of 28 major countries, with the United States suffering a 9 point drop in trust in healthcare industries.[5]

As blockchain fundamentally alters the underlying transfer of information, transactions, and data between two parties, there may be some natural linkages to emerging blockchain technology and diminishing trust in healthcare, both on a global and US scale. In the next section, we will explore these technologies in depth, and understand the greater ramifications of how the increasing use of both data analytics and blockchain will impact health equity and healthcare.

What is data analytics? What is blockchain? Why are these important to healthcare?

Data analytics is the act of manipulating data in an interpretable manner that allows one to learn about a topic/problem in order to drive an outcome. Analyzing data in an effective manner allows one to better understand real time trends and when present, a problem and its corresponding influences and causes. Using data analytics in healthcare might allow providers, payers, suppliers, and patients to better understand the contributory factors to a health issue, which can lead to effective solutions and better outcomes. Currently, almost all organizations and many individuals use data analytics in some form.

Blockchain is a novel technology developed in 2008 by Satoshi Nakamoto for the purpose of creating a public transaction ledger for cryptocurrency purchases. The problem in a fast-paced environment such as cryptocurrency trading is that there are too many transactions taking place within seconds of one another. Consequently, it can be challenging to understand:

1) what transactions have been made
2) who made them, and
3) the reliability of the information you have at the present moment in order to make a choice on what you should do

Blockchain solves these problems. In other words, blockchain is a ledger that allows everyone to keep track of all transactions or events that have taken place without the ability for any one person to modify the previous transactions/events to his or her advantage.

In healthcare, blockchain has the potential to create a seismic shift in creating transparency and trust. At a fundamental level, blockchain can increase knowledge of healthcare pricing and increase trust among patients who are concerned about the costs of their care. However, blockchain and data analytics can also have significant impact in unexpected areas such as the health equity space.

What type of benefits exist for my organization by using blockchain and data analytics?

Moore's Law states that processing power doubles roughly every 18 months for new hardware. That means the ability of a healthcare organization to process a broad range of data, from social media to medical

records and everything in between, will only continue to increase as time goes on. Organizations need effective tools to analyze and otherwise process these records if they want to gain benefits ranging from increased insight into operations to the potential to create new revenue streams. There is a widespread shift in terms of organizations creating new top-level roles, such as chief data, analytics and digital officers, as well as new departments centered on these concepts as their importance becomes increasingly clear.

Blockchain enables the sharing of secure data in a distributed fashion, serving as a continuum for data analytics. It creates a more equal system for all stakeholders by functionally eliminating the risk of having data breached or stolen and creating an inherently trustworthy record of data and past actions.

How can blockchain and data analytics be combined to improve health equity?

Technology is a great leveler in terms of providing more equitable access to resources certain stakeholders did not have access to in the past. The continuing rise of healthcare costs can in significant part be attributed to the limitations of a reactive approach to patient care, among other factors. Judicious application of data analytics and blockchain allow for increased predictive powers and lets all stakeholders use such an approach.
By addressing patient problems before they become more serious and intractable and by emphasizing preventative medicine and proactive care at the population health level, there are major benefits to be realized in terms of health equity. Just one example is advanced analytics tools like IBM's Watson AI platform, which can offer critical support for communities that don't have access to enough medical professionals, both at home and abroad. Better early detection, more accurate warnings, and roundly improved access to care can all help drive down costs and boost health equity. Blockchain plays an important complementary role by eliminating security concerns and creating a mutual foundation of trust.

What examples exist of healthcare entities utilizing these new technologies to create a successful outcome?

Watson, already referenced, is a powerful example due to its many applications. As a tool for helping medical professionals make accurate, timely diagnoses, it conducts and builds upon the type of analysis that is simply impossible for an individual medical professional or group of them to access and interpret, especially in time-sensitive situations. By supporting the decisions made by doctors, nurses and other staff, Watson has had a widespread positive impact in the areas where it has been utilized thus far.
Predictive modeling, a much broader category of data analysis tools is another example of new technologies creating successful outcomes. By analyzing risk factors in neonatal care and the NICU, providers make themselves more ready to address potential complications before they even arise. In less intensive applications, predictive modeling can help with everything from predicting the length of stay for specific procedures and improving scheduling and patient management to resource consumption, which can help with optimizing inventory levels and ordering procedures.

What kind of regulation exists for blockchain?

Since blockchain is a new technology, the United States federal government has done very little in terms of regulating the use of blockchain technology. Regulation will likely increase as the potential of blockchain is better elucidated. In a highly regulated industry such as healthcare, usage of blockchain will no doubt be subject to regulation once the technology is more established.

State- and city-level governments can act more quickly than the federal government in some respects, and that includes passing bills to attempt to regulate the use of blockchain. There are other state-level actions to consider, too, such as courts viewing blockchain records as evidence - a purpose they are especially suited for, thanks to their high degree of security - and certifying blockchain for use in real-estate records. A smattering of city- and state-level regulations currently exist but are by no means comprehensive or widely implemented. The regulation process will take time. Technology that becomes more mainstream, from email to wearable devices that record biometrics, has been regulated as it grows more popular. It's not a stretch to think that this will also be the case for blockchain.

What are some challenges about using blockchain in healthcare?

One major concern about using blockchain in healthcare surrounds protecting the privacy of the patient. Since everyone can see who added to the ledger, this narrows the potential of who the data belongs to and the possibility exists for someone to match the presented data to a specific patient, even when the data is deidentified.

In using blockchain and data analytics, it can be easy for users of these technologies to forget the individuals that create this large amount of information. Ultimately, healthcare success comes down to a positive outcome for the individual patient. Balancing the novel information that can emerge from large data sets with the personal and humanized treatment approach that each patient needs can be challenging for healthcare leaders to juggle. In the midst of this technological development, healthcare leaders must inspire their workforce to consider the anomalies that these big picture technologies might not account for well.

How can people in healthcare emerge as leaders of using blockchain?

Historically, healthcare has been extremely slow at adopting new technologies. In our never-ending changing world, healthcare leaders have the opportunity to embrace this technology and be leaders in shaping how this technology is used. Since healthcare leaders already deal with a number of complex issues, our recommendation is to reach out to your colleagues in other fields such as technology, finance, and manufacturing and collaborate with them to make blockchain a useful technology for everyone involved in healthcare.

Conclusion

Health disparities in the United States continue to persist as a major challenge to all stakeholders in healthcare. The impact of improving health disparities and reducing health inequities is significant as health disparities are arguably the largest barrier existing to achieving a healthy population. The onset of data analytics and blockchain have great potential in improving many health

disparities and producing successful outcomes. However, regulatory aspects and concerns over privacy for blockchain and data analytics must be addressed before these technologies can become commonplace in the healthcare industry. Ultimately, we see these tools as potential game-changers for the healthcare industry and recommend that healthcare leaders explore both within and outside of their industry to leverage and maximize the potential of these technologies.

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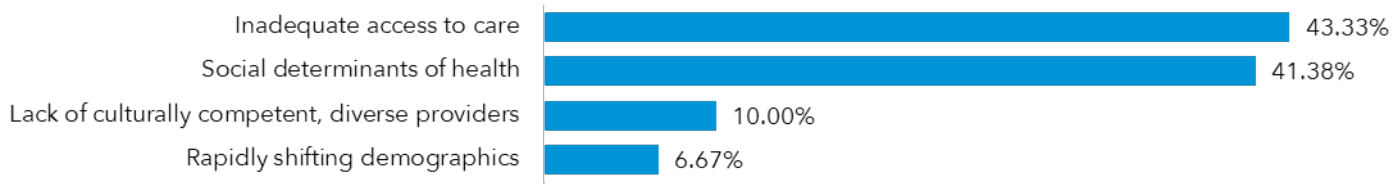
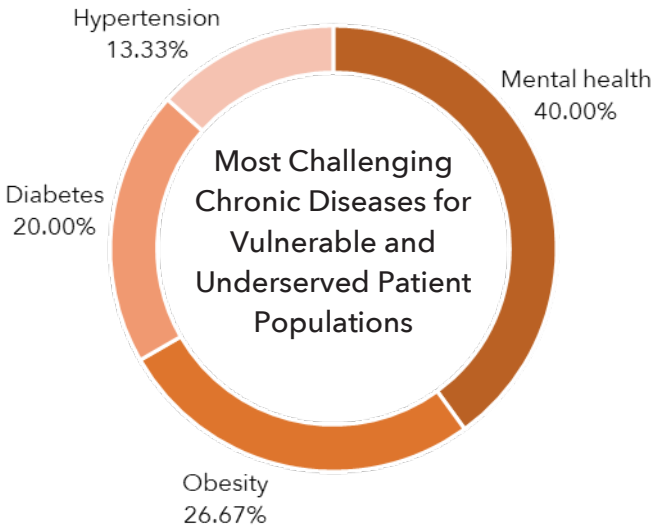
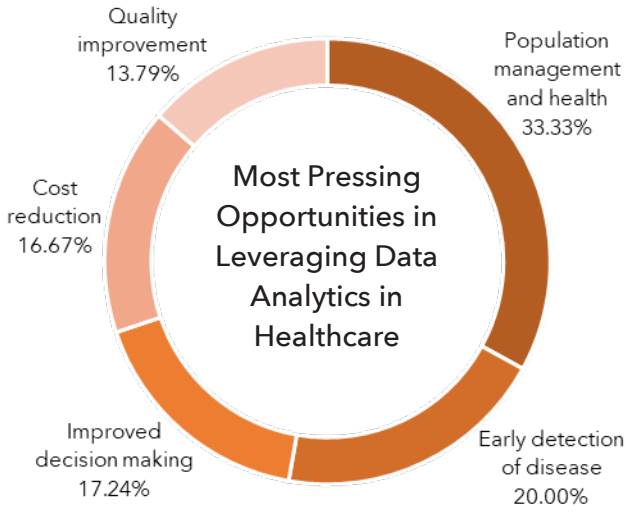
Healthcare Executive Roundtable: Transforming Healthcare Outcomes through Blockchain and Data Analytics Survey

- A survey of 30+ senior healthcare executives and key opinion leaders

Most Pressing Health Inequity Challenges







Best Practices for Leveraging the Power of Big Data to Reduce Health Disparities

Early detection based on risk factors

Education of low income population

Primary prevention by understanding risk factors for disease, illness and injury

Screening patients for high risk of readmission

Identify areas of early intervention and to identify/ mitigate social determinants

Most Significant Challenges Organizations Face in Reducing Health Disparities

Inadequate funding to cover the highest priority issues

Insurance - payer requirements don't always cover the latest technology

Complexity of the many underlying root causes as well as a dynamic landscape and perceptions

Lack of Cultural Competence

Financial pressures, time pressures, lack of enabling infrastructure

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