

DISCUSSION

## Blockchain Predictions for Health Care in 2021

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### Abstract

With coronavirus (COVID) spreading across the world and the health care system being pushed toward more digitization and technology, last year was a unique year of human tragedy. There is a silver lining to this tragedy, that is, providers, payers, and pharma companies have shifted quickly toward better technologies, including artificial intelligence (AI) blockchain, and so on.

Keywords: *COVID-19; public-private partnerships; blockchain; digital; health care; pandemic*

### Prasad Kothari

Most of the companies have quickly adopted better technologies during the pandemic; that is, from Amazon securing a blockchain patent for optimum supply chain, Health and Human Services (HHS) promoting the idea of interoperability of electronic health records or electronic medical records (EHR/EMR) systems to leveraging more artificial intelligence (AI), and Centers for Medicare & Medicaid Services (CMS) bringing payment parity between in-person physician visits and telemedicine visits. In addition, the South Korean government is using the blockchain technology to fight diabetes through Sendsquare; payers like Anthem are leveraging blockchain for member data; providers like Mayo Clinic are partnering with Google Cloud and blockchain organization, such as Medicalchain, and IBM has announced that the blockchain technology can play a key role in the distribution of coronavirus (COVID) vaccines.

In 2020, there was a great push toward building and adopting a digital, decentralized blockchain technology with a layer of cognitive AI. In 2021, we hope to see the Affordable Care Act's vision of providing a high quality of care delivered at lower costs while maintaining focus on population health, personalized health, and preventative health leveraging technologies, such as AI, data science, and blockchain with patient-centric applications.

In 2021, technology will combine to focus on the 'Care' in health care. Drug discovery will be accelerated using drug discovery optimization methods, such as Generative Adversarial Networks (GANs). Clinical trials will be re-designed using real-world data (RWD) for efficiency, and empowered by data sharing through the blockchain technology. Bias in the AI algorithms and data can be treated better with the creative use of technologies like blockchain, and so on.

It will hopefully be the year of managing the supply chains related to chronic illnesses and disease management through use of effective therapies like cell and gene therapies leveraging blockchain and AI.

It will be the year of medical education leveraging blockchain and augmented reality/virtual reality (AR/VR). Blockchain can also lead to an acceleration of all pharmaceutical research and developmental activities, a complete change in the paradigm for safety testing for medical devices, while reducing adverse events, as well as leading to a new biotech era.

The year 2021 will be the era of collaboration through efficient technologies with open science ecosystem and build on collaborative theories of knowledge production. More importantly, the year 2021 will be the year of technology taking the center stage in health care systems

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with policymakers creating new frameworks so that payers, providers, and pharma companies can leverage these technologies to deliver results while building new public-private partnerships (PPP). The research authors have enumerated below more details and facets of the technology's impact and their expectations for 2021.

### **Melanie Nuce**

The COVID pandemic will have a lasting effect on technology budgets in 2021, resulting in the exploration of blockchain, AI, and other solutions to be more strictly centered on the timeliest use cases in health care. This includes vaccine traceability, pharmaceutical drug authentication, and managing the supply chains related to chronic illnesses and disease management with therapies, such as cell and gene therapies.

The identification of products and assets in the supply chain will need to be consistent between the item's physical and digital representation in order for this technology to support effectively these important use cases.

We look for prioritization of data quality, as well as more businesses deepening their use of global data standards as a foundation for systems interoperability and data-sharing efficiency.

### **Ingrid Vasiliu-Feltes**

For the year 2021, I predict we will witness increased deployment of blockchain technology for Digital Health Twins within the life sciences and health care industry.

Within the health care industry, blockchain powered digital twins can be used in optimizing medical education and medical training, as well as further enhancing patient safety and patient privacy, thereby contributing to the development of a patient-centric care delivery model.

Combining digital health passports with digital health towns can also address one of the major pain points – patient health records. The powerful trisect of digital health twins, digital health passports, and creation of digital health identities can reshape the global health care ecosystem by offering new solutions for data access and ownership. For the life sciences industry, digital twins build on blockchain technology can expedite development of precision medicine solutions, as well as a large-scale adoption of virtual clinical trials.

They can also lead to an acceleration of all pharmaceutical research and development activities: a complete change in the paradigm for safety testing for medical devices, as well as a new biotech era. Using the blockchain technology for digital health twins, we can leverage its audibility, scalability, and avoidance of systemic waste or redundancy, thus, decreasing costs and increasing efficiency. By allowing proof of ownership and restricted data sharing, digital health twins can become the conduit for a

truly patient-centric health ecosystem. The major barriers we have to overcome for this prediction to become a reality are regulatory and socio-economic.

### **Dominique Hurley**

I believe 2021 will bring about a greater focus on data collaboration and increased acceptance of blockchain as a good choice to create and share trusted data across organizations. In 2020, as we tried to trace and track the spread of COVID-19, we learned the value of centralized, current, patient healthcare data. In 2021, as we rapidly move to vaccinate our citizens and expand on remote care solutions such as telemedicine and consumer wearables, the need to share data between emerging and traditional healthcare companies will be more pressing than ever.

I think we will see consumer device data welcomed by practice management systems either directly or through third party technologies adept at healthcare transaction management. The winners will make it easy for legacy EHRs to absorb remote patient vitals and other biometrics. We will also see data-savvy wearable and other patient care applications deliver practice information back to the patient via their device. And, as pharmacies take on vaccination delivery, the long-desired link between practice and pharmacy will finally become a priority for technology teams on both sides.

All parties will want immediacy of information to coordinate across an increasingly complex care ecosystem; however, unlike 2020 where HIPAA requirements were loosened to ensure rapid access to needed information, in 2021, the data collaboration will come with the necessary requirement of privacy protection. Collaborating companies will need a trusted, current, and shared perspective on patient authorization; and home grown identity and consent systems will not scale to meet this demand. Blockchain-enabled solutions that can provide identity, consent, and transaction authorization services will become invaluable outsourcing choices to private and public entities looking to continue the pace of cross-system patient care.

### **Mercury Fox**

In the 21st century, there will be a demand for interdisciplinary expertise on a global scale in scientific research and discovery. Despite deep investments in interdisciplinary research, the COVID pandemic has thrown into sharp relief the gap between the technologies, venues, and policies that facilitate collaborative research, and the norms and practices that drive collaboration.

Open science blockchain platforms will support the “collaboratory cultures” framework, which defines, measures, tests, and produces evidence-based best practices in cross-domain research. Specifically, these distributed

ledger technology (DLT) platforms will facilitate a transformative approach to scientific collaboration by leveraging big data assets and analytics to open existing research pipelines; advancing findability, accessibility, interoperability and reusability (FAIR) principles by making research artifacts findable: accessible, and re-usable in real time, thus, protecting intellectual property via immutable records and providing the reflexive framework to actively engage ethical and responsible research. This use case for blockchain research platforms as an enabling technology will advance the effectiveness of international research collaboration in the open science ecosystem and build on collaborative theories of knowledge production, as well as advance open science best practices, which continue to privilege existing research infrastructures over the under-represented research communities they were meant to benefit. The blockchain technology will help researchers in future to realize the open science and data-sharing goals that we have set forth today.

### Sweta Sneha

The health care space in the United States is humungous, critical in nature, and one of the avenues that invites massive investment toward the associated technology and learning. While there was incredulity initially around the proven results of piloting blockchain in health care, investing in this technology seems to be the popular choice.

Many prominent organizations are investing in the blockchain technology with an intent to solve technology, interoperability and data-related issues. It is the day and age where patients realize the importance of having control over their own health care data. In an environment where such sensitive data are of paramount importance, there is a definite need for appropriate checks, enhanced security, and augmented audit capabilities. There is a continued increase in the need for such a technology in health care facilities, given the focus on interoperability and sharing of medical records or information.

From the cryptographic hashtags to the inherent layered security, the blockchain technology could potentially be a solution to the problems that have been lingering around the health care space for the last two decades. In the coming few years, it might be a solution that a complete generation believes in and could continue to be the choice for future generations.

Automating many administrative tasks and speeding up the care process has been one of the pivotal objectives of health care internet technology. The distributed ledger and smart contract abilities, if implemented with utmost care, can quicken the care process and improve the overall health outcomes. This can further be linked to track pharmacy and medical supply chains from the origin to

destination with zero data compromise. While the possibilities can be endless, the real-life impact hinges on a thorough impact analysis and prudent implementation.

### Wendy Charles

In the next year, I predict there will be a greater emphasis on virtual health care and research, which requires non-traditional methods for health care organizations to access and share their health information. I also predict there will be more use and acceptance of consumer-grade sensors and wearable data in home-based health care monitoring and health-related research.

As virtual health care and research involves web-based interactions, this has forced a progressive narrowing of the 'digital divide'. Smart phones and internet-connected e-readers are less expensive, while cellular reach and broadband are more widely available. To achieve the necessary infrastructure to integrate and secure these diverse sources of electronic health information, I am encouraged to see that health care organizations are increasingly receptive to blockchain. Blockchain-based dynamic consent could be an integral part of managing this access and sharing.

### Jim Nasr

I have three predictions for 2021. Prediction 1: innovative health care developers will bundle in skinnier blockchain functionality as a underlayer of their applications. A likely example would be 'Proof of Action' functionality such as proof-of-data exchange or proof-of-data authenticity – the use of blockchain primarily as an immutable ledger to prove and report on things happening as expected and compliantly.

Prediction 2: health care will demand objective return on investment (ROI) from blockchain investments, leading to rethinking of how the blockchain technology can be adopted more practically and in smaller, more incremental parts. Smart developers will use this as an opportunity to implement 'blockchain as an abstraction', where some blockchain benefits can be passed on to clients in a low friction 'abstracted' way with a simple adoption model that does not necessitate users or organizations to change their existing usability or application architecture.

Prediction 3: consumers will be much more aware of #fakenews in the context of health care and will demand for greater transparency of health data, starting with the distribution and availability of COVID-19 vaccines. Blockchain can be the backbone of trusted data flow among the many players involved in the COVID-19 vaccination data flow, and it can be used to offer a public, frequently updated, and computationally trusted mechanism to show the supply and demand flow for COVID-19 vaccination.

### **Radhika Iyengar**

- AI-based diagnostics, nanotechnology, and three-dimensional (3D)-printed prescription medicines
- Continuous remote patient monitoring, digital therapeutics, and robotic surgery
- Star Trekkian medicine of the future, with dramatically improved health outcomes.

Are we there yet?

Health care and medicine are becoming increasingly digital. Sophisticated digital enablement tools and Internet of Medical Things (IoMT) are helping us realize highly innovative clinical care – one that we dreamed of but seemed elusive. The great inflection point of 2020 has been COVID-19, which is driving a new acceptance of technology in the health care sector. For example, the decades-old telehealth movement has finally achieved product-market fit to serve the urgent need for mass remote health care.

Nevertheless, the pandemic has also underscored the failings of our health care systems and exposed our inability to equitably and better serve the health needs of a global population. One of the biggest failures is around health data. With digital enablement, digital identity, and

a data-driven medicine, there is an explosion of data that is left insecure and exposed. Furthermore, these disparate data are still siloed, and true interoperability has not yet been achieved.

What we expect to see in 2021 and beyond is the ability to secure the whole data story. Blockchain-based systems provide the necessary infrastructure to secure edge device data. These systems can also drive better data shareability and interoperability – potentially leading to more diverse and inclusive AI applications in medicine.

In future, health care and medicine will deliver better health outcomes powered by the convergence of multiple advanced technologies – IoMT, AI, blockchain, 5G connectivity and more.

We are finally getting there.

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