Improving Provider Data Accuracy

A Collaborative Approach Using a Permissioned Blockchain

synaptic Health Alliance

Humana. MultiPlan. OPTUM® Quest Diagnostics™ UnitedHealthcare®

Table of Contents

Executive Summary	**3**
Provider Data Management: A Costly Investment	**4**
Bad Provider Data Hurts All Stakeholders	**5**
Why Blockchain Technology?	**5**
Provider Data Management: A Logical Starting Point	**6**
Why the Alliance?	**7**
Proposed Solution	**8**
Technology	**8**
Potential Benefits of Blockchain Technology in Healthcare	**12**
Pilot Scope	**13**
Contact Us	**14**
Notes	**14**

▌ Executive Summary

Billions of dollars are spent annually on provider data management, yet highly accurate provider directories remain a challenge. The Centers for Medicare & Medicaid Services (CMS) reported that 52 percent of the provider office locations listed in the online provider directories reviewed between September 2016 and August 2017 contained at least one error.[1] Accurate provider data is critical for connecting patients with appropriate network care providers.

Now, Humana, MultiPlan, Optum, Quest Diagnostics and UnitedHealthcare have formed the Synaptic Health Alliance to explore the use of blockchain technology in tackling the challenge of accurate and efficient provider data management and sharing. This new healthcare alliance is unique in its member composition and among the first to have a national footprint.

The Alliance views blockchain technology as a means to a critical end: ensuring that data is accurate and sharable for reliable use across the healthcare ecosystem. Thanks to the members' large collective data volume and national footprint, this collaboration could prove the business value of cross-company data sharing in healthcare and, ultimately, help facilitate a significant positive impact in the healthcare market space. Blockchain is a logical choice for technological disruption because it features built-in transparency and verifiability of transactions without an intermediary, so control will be decentralized and all participating organizations will be peers. These are important prerequisites if diverse stakeholders are to collaborate productively in service to healthcare consumers.

The Alliance plans to hit the ground running with a pilot project that explores how blockchain technology can be used to help ensure that provider directories contain the most current and accurate information possible. Through what it is calling the "provider data exchange" (PDX), Alliance members would be able to actively share data with the aim of showing

"Everyone in this industry has been dreaming of interoperability for a long time. Blockchain is a key to that. Better quality data leads to better decision-making, better patient care and experiences – that's the promise of what this alliance hopes to deliver."

Lidia Fonseca, Chief Information Officer, Quest Diagnostics

potential administrative cost savings for payers and providers while demonstrably improving provider demographic data quality and the experience of care for healthcare consumers.

Ultimately, the Alliance intends to expand beyond the original five founding members to include other stakeholders in the healthcare ecosystem. According to Lidia Fonseca, chief information officer, Quest Diagnostics, "Everyone in this industry has been dreaming of interoperability for a long time. Blockchain is a key to that. Better quality data leads to better decision-making, better patient care and experiences – that's the promise of what this alliance hopes to deliver."

Provider Data Management: A Costly Investment

Provider data is a key building block of the U.S. healthcare system. It's essential for connecting patients with providers and supporting consumers in making decisions related to their care. Across the U.S. healthcare ecosystem, more than $2.1B is spent annually by hospitals, doctors and health insurers to maintain provider data, according to conservative estimates.[2] Despite this staggering investment, the system is still inefficient and reliant on manual processes.

State and federal laws, regulations and guidance require health plans to regularly update provider directories, such as monthly with some requirements being even tighter. Additionally, many of those same laws require insurers to contact every provider in their directories, sometimes as often as every three months, and make updates to those directories much faster than has been done in the past. The present model encourages potentially duplicative outreach and maintenance costs while creating silos of data.

This large-scale duplication of effort also means redundant expenses. On average, providers are affiliated with 20 health plans[3] and often have to make updates with each health plan individually. Yet health plans typically maintain their own provider data sets and rarely collaborate on the daunting task of provider data management, while bearing the high administrative costs.

The U.S. healthcare industry spends more than $2.1B annually to maintain provider databases.

Bad Provider Data Hurts All Stakeholders

Inaccurate, outdated provider data can negatively impact payers, providers, and consumers. Maintaining vast amounts of ever-fluctuating data, and ensuring its accuracy, is critical for health plans when performing essential business functions.[4] In fact, health plans participating in the Medicare Advantage program may face penalties of up to $25,000 per day per beneficiary or be banned from new enrollment and marketing if their directories have high error rates.[5]

Data errors also make it harder for providers who are incorrectly listed as being out-of-network or not accepting new patients to maintain full panels, and the wrong contact information can prevent prospective or current patients from getting in touch and impact certain business functions including reimbursement. In addition, multiple recurring requests from multiple health plans for the same data attestation are a distraction that add to a provider's administrative burden.

Perhaps most concerning, however, is the impact on consumers, who routinely search provider directories to check whether a provider is accepting new patients, to find doctors who meet specific criteria, such as plan participation, location or office hours, or to find a provider's contact information. Discovering that the information is inaccurate is frustrating and can undermine confidence in health plans.

Why Blockchain Technology?

Managed care organizations, health systems, physicians, diagnostic information service providers and other healthcare stakeholders typically maintain separate copies of provider data. Changes to the data files affect only the copy in which they are made. When discrepancies are found, efforts to reconcile them are time-intensive, costly and sometimes ineffective. Moreover, having many siloed copies of overlapping provider data scattered throughout the healthcare system makes it impossible to compare, validate and reconcile them.

Blockchain technology enables the efficient creation of a synchronized, shared source of high-quality provider data through a decentralized, distributed ledger across a peer-to-peer network. Transactions are recorded chronologically in a cooperative and tamper-resistant manner, and updates entered by any party on their record are replicated almost immediately across all the other parties' copies. When updates to a transaction are entered and accepted, those updates amend, rather than alter, those

transactions. All transactions and updates remain visible and unchanged, providing a real-time audit trail and ensuring data integrity.

A permissioned blockchain solution, such as the one being pursued by the Synaptic Health Alliance, could enable participants to share some of the administrative burden and cost of data maintenance and reconciliation, improving data quality while substantially reducing the time and expense. Efficiencies also might be achieved by automating certain manual and redundant processes, such as address cleansing and federal sanctions monitoring.

Provider Data Management: A Logical Starting Point

There are many promising use cases for blockchain technology in healthcare. The main considerations that led the Synaptic Health Alliance to choose provider data management as the focus of its initial pilot include:

- The dependency of the healthcare system on accurate provider data.
- The pervasiveness of inaccurate provider data.
- The negative impact of widespread provider data errors on consumers.
- The inefficiency of current provider data management processes.
- The non-proprietary, non-competitive nature of provider demographics and, therefore, the low barrier to sharing and comparing this data across companies.

In a 2018 white paper, non-profit organization The Council for Affordable Quality Healthcare (CAQH) issued an industrywide call to action to develop an industry roadmap for improving provider data quality, standardize definitions and requirements, define and maintain high-quality data and centralize data resources.[6] The Synaptic Health Alliance's first pilot is an effort to address the noted challenges.

David Murtagh, vice president of operations, MultiPlan

"We're looking forward to exploring how blockchain technology can make the process more efficient while reducing costs, ideally to build investments that can enhance the provider and patient experiences."

David Murtagh, Vice President of Operations, MultiPlan

explained, "Throughout healthcare, there are so many reasons to share data. With increasing state and federal requirements relating to provider data maintenance and quality, tackling the high cost and redundancy in this space is a logical starting point. We're looking forward to exploring how blockchain technology can make the process more efficient while reducing costs, ideally to build investments that can enhance the provider and patient experiences."

Why the Alliance?

The Synaptic Health Alliance is a unique collaboration bringing together large, industry-leading companies with national footprints and varying business relationships (vendor/client, provider/network, competitors) all drawing on their complementary perspectives and shared desire to improve the healthcare ecosystem.

"Blockchain is the trigger that brought us together, but the collaboration to solve widespread healthcare problems is our real goal. We envision the possibility of effecting change at scale – helping to make the health system work better for everyone."

Mike Jacobs, Senior Distinguished Engineer, Optum

The Alliance members' collective focus on working together for the greater good – for the benefit of all healthcare stakeholders in this country, rather than just their own constituents – is unique in its use of blockchain technology. This is demonstrated by the Alliance members' commitment to create a new shared source of high-quality provider data. Ultimately, the founding members are attempting to build the framework and technology for sharing provider demographic data that could be leveraged for other use cases, such as patient-consented sharing of clinical data between plans and providers to enable faster and better care decisions.

"Blockchain is the trigger that brought us together," said Mike Jacobs, senior distinguished engineer, Optum, "but the collaboration to solve widespread healthcare problems is our real goal. We envision the possibility of effecting change at scale – helping to make the health system work better for everyone."

Proposed Solution

The Synaptic Health Alliance plans to build a permissioned blockchain that would let members view, input, validate, update and audit non-proprietary provider data within the network, with the goal of improving data accuracy and lowering the associated administrative burden and costs.

Following the pilot phase, the founding members envision creating an industry market that would enable further collaboration on the data and connect the current data silos to improve provider data management for the overall healthcare system.

The pilot is examining whether sharing the administrative efforts related to provider data management lowers the individual share of that burden for health plans and care providers. It is also testing whether incentives could also be built in to motivate data sharing with everyone in the blockchain network, which would improve data quality and decrease data maintenance costs.

Technology

A blockchain is a distributed system for synchronizing transactions or information among many computers in a network. A permissioned blockchain is a private network in which only computers that are authorized to participate – referred to as nodes in that network – can synchronize information throughout the network.

Blockchain is made up of four parts...

1. A distributed database
2. An append-only structure
3. Smart contracts
4. Incentives

...that enable

- Improved resiliency, security, and integrity
- A shared source of provider data with immutable records that eliminates variations and versions
- Reduced costs of reconciliation and manual processing steps
- Participant incentive alignment, value transfer and bootstrap funding of a network or development

Blockchain was originally developed as a public, permission-less network to enable direct transactions of virtual money without a central authority, bank or middleman. Although the intent is for the transactions of the parties to be anonymous, participants in this type of blockchain network are identified using publicly viewable strings of numbers and letters, called addresses, which serve as pseudonyms, just as some authors write under a pen name to protect their true identities for privacy reasons. If someone discovers the identity of the person associated with a blockchain participant's address, his or her transactions are no longer anonymous.

For this reason, enterprise blockchains typically are permissioned, with participation by invitation only. A permissioned blockchain enables approved participants to blur industry lines to share and exchange information in a cooperatively-owned, synchronized, distributed ledger, addressing administrative cost and data quality issues that impact all stakeholders. Permissioned blockchains are used by consortia in industries such as finance to manage industry value chain opportunities.[7]

Blockchain Technology Selection

The Synaptic Health Alliance technology team invested considerable thought into the selection of the blockchain technology. The selection criteria focused on features – what can be done with the technology – and suitability for enterprise/consortium use, including deployment options, technology maturity, number of enterprises and consortiums using it, licensing and level/availability of professional support.

The technology team prototyped two blockchain technology stacks for the pilot. Based on lessons learned from that experimentation, the alliance ultimately chose Quorum, an enterprise-focused version of Ethereum whose key attributes include:

- Close association with the largest open source community for blockchain (Ethereum)
- Open-source license
    - GPL/LGPL open source license ensures the Quorum platform will be free to use in perpetuity. This also makes it an attractive choice for experimentation, e.g., pilot programs.

- Mature technology
  - Ethereum is one of the fastest growing public blockchains. Because the Quorum version is designed to develop and evolve alongside Ethereum and includes only minimal modifications to Ethereum's core technology, Quorum can incorporate most Ethereum updates quickly and seamlessly.
- Enterprise-ready capabilities: privacy, security and zero-knowledge proofs
  - On public blockchains, participants are anonymous (pseudonymous) and transactions are completely transparent. Healthcare, however, requires private transactions between known participants. The Quorum version of Ethereum, designed for enterprise and consortium use, supports both transaction-level privacy and network-wide transparency to enable verifiability and trust.
  - One of Quorum's key security features is zero-knowledge cryptography. Zero-knowledge proofs allow the system to authenticate a single data element in an encrypted file without revealing any of the other data in that file. Authentication is binary (yes/no). Even the system doing the check does not decrypt the data. This entirely automated authentication process also minimizes the possibility of human error and can allow sensitive information to be distributed across the network without being viewable by potential bad actors. And if human error does occur, the system can identify the source of the breach and remedy it.

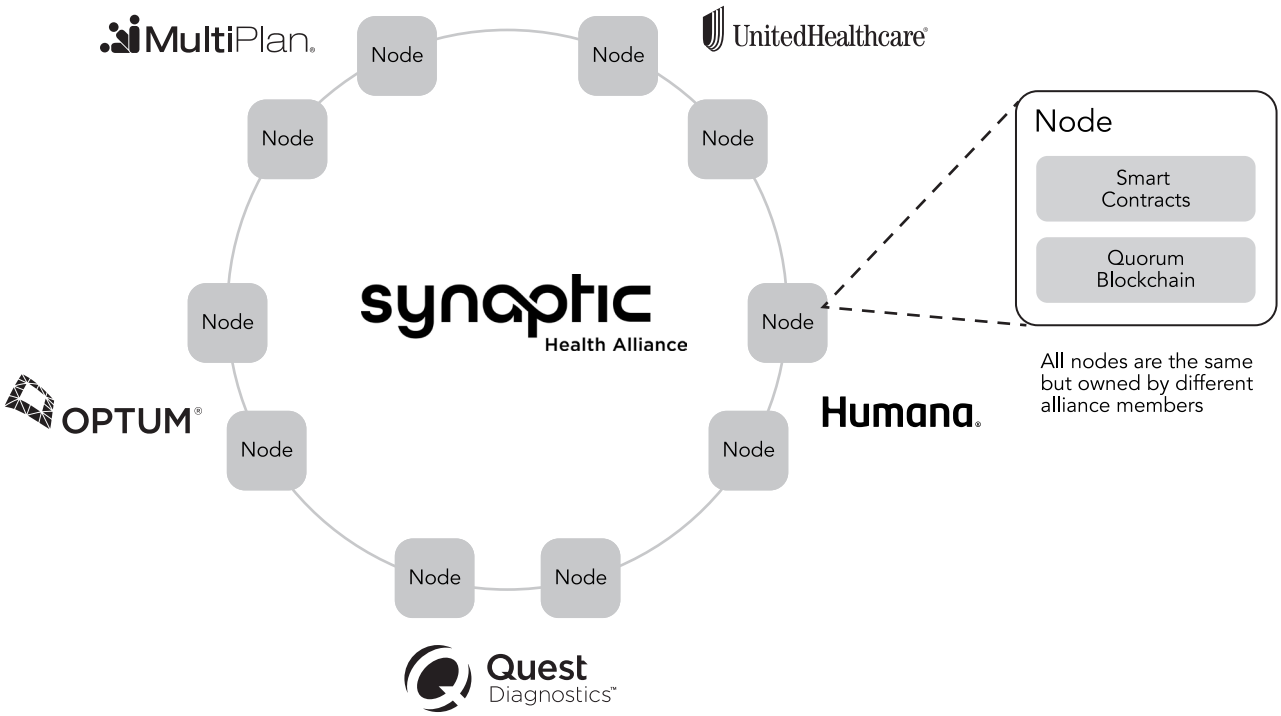
Although zero-knowledge proofs are not needed for non-confidential information such as basic provider data, they are a powerful tool in the healthcare setting, positioning the Alliance for potential future blockchain use cases involving sensitive, confidential information, such as protected health information (PHI). For example, a node on the blockchain with sufficient privacy protections and protocols could query a personal health record to find out (verify) whether a patient is prediabetic (yes/no) without revealing or exposing any of the information that health record contains (including prediabetes risk factors).

The Synaptic Health Alliance Blockchain

The Alliance is deploying a multi-company, multi-site, permissioned blockchain. Unlike a public anonymous blockchain, the alliance consciously chose to deploy a permissioned blockchain. This is a more effective approach, consistent with enterprise blockchains. Each Alliance member has the flexibility to deploy its nodes based on its enterprise requirements. Some members have elected to deploy their nodes within their own data centers, while others are using secured public cloud services such as AWS and Azure. This level of flexibility is key to growing the Alliance blockchain network.

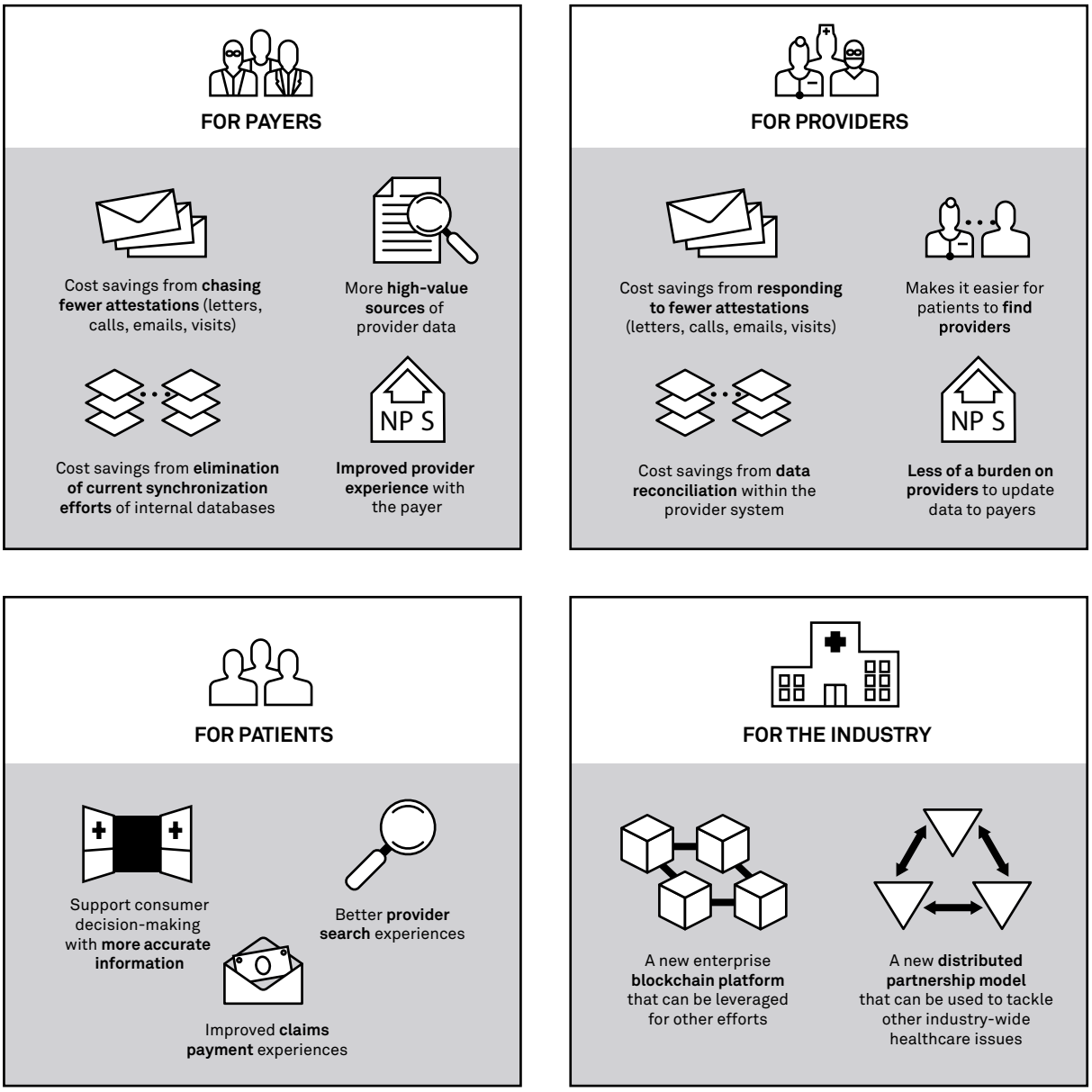
Each node runs the Ethereum-based Quorum technology. The Alliance's technology team has created a repeatable, automated approach to deploy nodes consistently across the Alliance. Quorum nodes use the go-ethereum client to maintain transaction data that is visible to all network participants as well as private data that is visible only to parties of private transactions. Private transactions are enabled through the Constellation extension of Quorum.

Multi, Cross-Cloud Structure



The Alliance envisions three approaches to implementing applications on its blockchain. Legacy applications would be able to interact with the blockchain network through custom integration bridges. New applications and distributed applications are other possible approaches to adding more value to the blockchain.

Potential Benefits of Blockchain Technology in Healthcare



Pilot Scope

Many blockchain pilots run all their blockchain nodes, and the entire network, on a single computer or in a single data center. From an architecture perspective, those pilots aren't providing a valid proof of concept. The nodes in the Synaptic Health Alliance blockchain network communicate over the internet, and the Alliance hopes the pilot will demonstrate the viability of a permissioned blockchain whose nodes are distributed within different companies and in the public cloud.

"The promise of blockchain is exciting and it's about putting consumers at the center of their healthcare. This alliance helps us learn how to deliver on that promise."

Ramu Kannan, Chief Technology Officer, Humana

The public cloud provides a convenient infrastructure capability, and the Alliance technology team has created best-practice cybersecurity controls designed to protect even sensitive healthcare information using infrastructure-as-code (IAC), a new approach that completely automates the configuration to circumvent errors that can occur when human intervention is required.

The scope of the initial pilot is expected to include the development of the following:

- A permissioned, cooperatively-owned blockchain "utility" with nodes for contributing and consuming provider demographic data.
- A blockchain data exchange marketplace and application.
- A model for incentives to drive positive contribution and consumption behaviors across all participating organizations.
- An administrative cost savings model to be used by all participating organizations for measuring results.

The expectation is that each Synaptic Health Alliance member in this pilot will be responsible for the integration of their respective systems and databases to contribute data to the blockchain.

The pilot is intentionally limited to a use case involving simple data elements and development of work that will be reusable by the founding Alliance members. The work achieved during this project could complement future, more complex payer- or network-specific work by an expanded membership that would be required to achieve many of the benefits of publishing a highly accurate provider directory.

"The promise of blockchain is exciting and it's about putting consumers at the center of their healthcare. This alliance helps us learn how to deliver on that promise," explained Ramu Kannan, chief technology officer, Humana.

Contact us

For information about blockchain or the Synaptic Health Alliance, please visit synaptichealthalliance.com or email info@synaptichealthalliance.com.

Notes

1 "Online Provider Directory Review Report," US, Department of Health & Human Services, Centers for Medicare & Medicaid Services (January 2018). Retrieved April 10, 2018, from https://www.cms.gov/Medicare/Health-Plans/ManagedCareMarketing/Downloads/Provider_Directory_Review_Industry_Report_Round_2_Updated_1-31-18.pdf

2 "Streamlining Provider Data Management Could Save Billions…but Is It Possible?", Health Plan Week, Vol 27, No. 4 (January 2017). Retrieved April 10, 2018, from https://www.availity.com/-/media/files/availity/resource-library/articles/health-plan-week-january-2017.pdf

3 EY, Humana. (2018). A Marketplace for Provider Data – Using Blockchain to Reimagine How Health Plans Manage Physician Identity Information. https://www.slideshare.net/ernstandyoung/a-marketplace-for-provider-data-using-blockchain-to-reimagine-how-health-plans-manage-physician-identity-information

4 "Streamlining Provider Data Management Could Save Billions…but Is It Possible?", Health Plan Week, Vol 27, No. 4 (January 2017). Retrieved April 10, 2018, from https://www.availity.com/-/media/files/availity/resource-library/articles/health-plan-week-january-2017.pdf

5 Susan Jaffe, "Obamacare, Private Medicare Plans Must Keep Updated Doctor Directories In 2016," Kaiser Health News (March 2015). Retrieved April 10, 2018, from https://khn.org/news/health-exchange-medicare-advantage-plans-must-keep-updated-doctor-directories-in-2016/

6 "Defining the Provider Data Dilemma: Challenges, Opportunities and Call for Industry Collaboration," CAQH (September 2016). Retrieved April 10, 2018, from https://www.caqh.org/sites/default/files/explorations/defining-provider-data-white-paper.pdf

7 "Blockchain: How this technology could impact the CFO," EY (no date). Retrieved April 12, 2018, from http://www.ey.com/gl/en/industries/technology/ey-how-blockchain-technology-could-impact-the-cfo