Chapter 15
Blockchain in Healthcare: A Primer

Nilmini Wickramasinghe
https://orcid.org/0000-0002-1314-8843
Swinburne University of Technology, Australia & Epworth HealthCare, Australia

ABSTRACT

Blockchain is a decentralized, digital ledger that keeps a permanent, unalterable record of transactions between users. One of the greatest advantages of Blockchain is that it is much more secure than other data storage platforms, and thus particularly relevant for healthcare. The chapter serves to outline areas and opportunities for deploying this technology into key healthcare contexts to support effective and efficient operations as well as heightened transparency and trust around activities between and within stakeholders.

BACKGROUND

The healthcare sector is one of the globe's largest industries. It consumes over 10% of the Gross Domestic Product of the most industrialized states. Simply, this sector includes generalization as well as commercialization of products and services to treat patients with preventive, palliative care, curative, and rehabilitative care. Being a multifaceted system of interconnected institutes under heavy regulatory boundaries, patient information is highly fragmented, and the expense of healthcare delivery is constantly increasing because of ineffectiveness in the system and dependence on various intermediaries. Moreover, transparency on the whole process on enhancing data sharing between many parties, even though supposedly important to the patient, is still inefficient on full transparency and control from the patient's outlook. This inadequacy in the system has heightened the need for Information Technology (IT) systems that can eliminate the middle steps, improve efficiencies and cut costs while cultivating trust and transparency. The blockchain is a technology which can aid in solving these healthcare challenges by offering decentralized trust and the establishment of a trust architecture. It enables decentralization which promises to reduce the issue of vendor lock-in that has plagued the medical care industry.

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INTRODUCTION

Patient data dispersed across varying institutes in the value of the medical care sector known as the data silos and sharing of data is susceptible to a multi-level practice of permission control (Gordon & Catalini, 2018). As a result of this, most often, critical data is inaccessible and unavailable at the time when they are needed urgently (Gordon & Catalini, 2018). Dimitrov (2019) claims that Blockchain can address this challenge with health data exchange by serving as a foundation for a reliable decentralized database. It can enhance one-stop access to the entire health history of an individual across all the medical physicians Dimitrov (2019) . Access control systems that are built using trust in blockchain places patients in control of their information Dimitrov (2019) . They can gain consent and access rights to external parties such as scientists to have access to all or even a subset of their health records Dimitrov (2019) . This element of the blockchain fits nicely with the patient-centric structure of the medical sector where the blockchain can act as a catalyst encouraging trust (Gordon, & Catalini, 2018).

The records stored in the blockchain technology are absolute and cannot be altered or even deleted (Gordon, & Catalini, 2018). According to Delgado-Mohatar, Fierrez, Tolosana, & Vera-Rodriguez, (2019), this feature of blockchain offers primitives such as provenance and data reliability which can be utilized in building solutions to mitigate drug counterfeiting and clinical fraud. For example, deceitful results and removal of information in medical investigations which fail to align with the scientist's bias or the funding source can be controlled by strengthening the integrity of information in blockchain (Frandsen & Joynt, 2015). Additionally, it enhances the storing of the indisputable log of subject's consent in a healthcare trial (Frandsen & Joynt, 2015). In terms of financial views, blockchain helps in saving hundreds of billions of dollars, especially for the pharmaceutical sector as it helps in defining a chain of custody in the supply chain (Frandsen & Joynt, 2015).

With the blockchain technology, it is possible to write custom laws and regulations hence forming contracts on the blockchain (Frandsen & Joynt, 2015). This process is similar to that of the real world contracts and is majorly legally binding (Frandsen & Joynt, 2015). These types of contracts in blockchain are known as smart contracts (Frandsen & Joynt, 2015) and can be used in various processes within medical care including insurance and billing which aids in automating the whole process and minimizing the expenses.

FOCUS AREAS AND FACILITATORS FOR BLOCKCHAIN IN HEALTHCARE

Pharmaceuticals are one of the promising capacities for blockchain (Gordon & Catalini, 2018). One key area of use is in drug traceability (Gordon & Catalini, 2018). Blockchain could thus not only be used in prescription traceability but also in tracing counterfeit drugs (ibid). All the information entered into the system is complete and time stamped (Gordon & Catalini, 2018). The time-stamped permanent records could possibly eliminate the expense of medical trials and data management and promote interoperability as well as (Gordon & Catalini, 2018). Significant resources are currently being wasted on drugs because of non-conformation to consumer genetics and the incapacity to offer a conventional health solution (Gordon & Catalini, 2018). Therefore, Blockchain can minimize the leeway for counterfeit drugs to hit the black market as well as reduce prescription mishandling (Gordon & Catalini, 2018). Blockchain technology's security could aid in restructuring patient-centric drug improvement for future targeted therapies by better smoothing of the exchange of personalized data and direct medical sources for stud-