Book Review: Malviya R, Sundram S. (Eds.). Blockchain for Healthcare 4.0: Technology, Challenges, and Applications (1st ed.). CRC Press; 2023

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The regulation of information access, control and exchange in the healthcare industry has become increasingly critical in the era of innovative digital health technologies, including artificial intelligence in diagnostics, mobile health applications, and blockchain platforms for record storage and transmission. Malviya, R., & Sundram, S. (Eds.) in their book, *Blockchain for Healthcare 4.0: Technology, Challenges, and Applications* provide valuable insights into the regulatory and implementational challenges, as well as the potential of blockchain technology in healthcare. Blockchain is a decentralized digital ledger system that creates and stores transactions that are time-stamped and encrypted in blocks linked to each other, much like a chain. Each transaction is authenticated through consensus among all computers across the network participating in this verification process. Malviya, R., & Sundram, S. (Eds.) present a range of innovative solutions that blockchain offers in healthcare, including disease tracking and surveillance, heart attack prediction, and genome mapping and editing (Chapters 4, 7, 12, 14, and 16). The book also explores regulatory and standardisation challenges in data privacy, healthcare record management, and pharmaceutical tracing and security (Chapters 6, 9,10, 11, and 15), as well as some of the constraints and barriers to the adoption of blockchain-based technologies in healthcare (Chapters 1, 2, and 5).

Critical analysis

A recurring theme in the book is the hesitancy among both patients and healthcare providers to adopt blockchain technology (Page 20). While blockchain offers benefits in the healthcare sector such as efficient record management, disease prediction detection, and treatment pathways, skepticism remains about the functionality and performance of blockchain platforms (Page 19). The cost and complexity of transitioning from traditional systems and practices as well as limited interoperability among blockchain platforms are some of the concerns identified as reasons for the hesitancy (Pages 52, 156 and 218-220).[1] Ironically, blockchain platforms rely on stakeholder participation to function optimally, so reluctance to transition to blockchain-based technologies presents an incongruent challenge. The book suggests that the reluctance can be overcome by the standardisation of data formats and protocols to ease data exchange and interoperability (Page 218). The book also proposes that a host of operational costs including uploading and transmitting 'patient and donor medical information' (Page 14), drugs supply chain transparency (Pages 62 and 130), cost of treatment, insurance, and overall administrative manpower (Pages 205 233 and 249) can be significantly lowered and ultimately outweigh the initial cost of transitioning (Pages 16, 29 and 56).

Another central theme throughout the book is the extraordinary potential that blockchain technology affords regarding data protection and transparency. One of blockchain's primary features is that it operates as a decentralized database of records and transactions which are verified and protected by built-in cryptographic algorithms (Page 4). This function of blockchain platforms provides multilayered security and 'makes it exceedingly difficult to alter the records of patients' treatments and biodata, diseases surveillance, (Pages 4, 157 and 58), clinical trial records and pharmaceuticals and medicine manufacturing records (Pages 15 and 62). These fortified security and verification measures also help to guarantee that the patients have total control of their information and can choose who to grant permission to access their data thus ensuring that patients' consent is not only 'informed' but also meaningful and transparent (Pages 16, 20, 97 and 215). It is pertinent to note however that the feature of blockchain-based platforms to publish every record and transaction for verification and transparency increases the possibility of private data breaches. While these platforms are highly impervious to cyberattacks and unauthorised access, the public nature of information exchange makes it 'feasible for users to track transactions and recognise specific users based on their activity on the blockchain' (Pages 42 and 188). The book emphasises the need to incorporate the unique requirements for data privacy in the health sector into blockchain platforms (Pages 16-20).

A third, and arguably the most important, contribution of this book is its analysis of various regulatory challenges to the adoption of blockchain technology in healthcare. These include insufficient legislation, inadequate standardisation protocols,

and barriers to compliance with data protection laws. With the rapid advancements in technological innovation, stakeholders particularly in healthcare are increasingly confronted with complex legal and ethical challenges that require progressive regulation (Pages 155-158). While the book identifies traditional regulations that have assumed a central control on technology in healthcare, they include Europe's General Data Protection Regulation (GDPR) and the Health Insurance Portability and Accountability Act of 1996 (HIPAA) of the United States of America, etc. these laws tend to focus more on data privacy and protection. (Pages 18, 217 and 228). There is, therefore, a need for tailored medical legislation for innovations like blockchain technology that address concerns such as 'who possesses what in a blockchain, who has access to what, and how the distributed ledger is stored.'[1]

One crucial recommendation the book offers is the establishment of institutions responsible for regulating and standardization of blockchain platforms in healthcare (Pages 68 and 154). Regulatory guidelines on standardisation will help to ensure uniform data sets, security procedures, information access, and control and transmission as well as patient and healthcare provider ID verification across blockchain platforms (Pages 18, 170, and 215).

Conclusion

Blockchain for Healthcare 4.0: Technology, Challenges, and Applications offers a well-rounded perspective on the interplay between innovation and regulation in healthcare. The book highlights the benefits of blockchain-based technologies in healthcare and sheds light on the reluctance to adopt the technology and its potential impediments as well. One key strength of the book is the diverse research expertise of the authors, this facilitated the comprehensive and multifaceted viewpoints on blockchain technology in the healthcare industry.

Conflicts of interest. None.

1. Gökalp E, Gökalp M, Gökalp S, Eren P. Analysing opportunities and challenges of integrated, blockchain technologies in healthcare. In Information Systems: Research, Development,, Applications, Education. 2018 https://doi.org/10.1007/978-3-030-00060-8_13.