|  |  |  |  |
| --- | --- | --- | --- |
| REFERENCES | OBJECTIVES | CONTRIBUTIONS | LIMITATIONS |
| **[1.]** J.V. Bibal Benifa, G. Venifa Mini, Saravanan Krishnan,  Chapter 14 - Blockchain-based health care monitoring for privacy preservation of COVID-19 medical records,  Editor(s): Saravanan Krishnan, Valentina Emilia Balas, E. Golden Julie, Y. Harold Robinson, Raghvendra Kumar,  Blockchain for Smart Cities,  Elsevier,  2021,  Pages 259-294,  ISBN 9780128244463,  https://doi.org/10.1016/B978-0-12-824446-3.00005-3 | Blockchain; COVID-19; Internet of things (IoT); Smart cities | This study provides a structure for COVID-19 infectious disease patients, and discusses electronic medical record issues and diagnostics. The work also highlights the data and transactions over a blockchain-based network that is more secure and anonymous. |  |
| **[2.]** Don Roosan, Yanting Wu, Vineet Tatla, Yawen Li, Anne Kugler, Jay Chok, Moom R. Roosan,  Framework to enable pharmacist access to health care data using Blockchain technology and artificial intelligence,  Journal of the American Pharmacists Association,  Volume 62, Issue 4,  2022,  Pages 1124-1132,  ISSN 1544-3191,  https://doi.org/10.1016/j.japh.2022.02.018 | To formulate a conceptual framework based on a scoping review to improve access to health care data in the [community pharmacy](https://www.sciencedirect.com/topics/medicine-and-dentistry/community-pharmacy) setting through the adoption of blockchain technology and AI | This paper proposes a unique conceptual framework to implement blockchain technology for community pharmacists to facilitate data sharing. We conducted a Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) scoping review of the literature to identify current opportunities for integrating blockchain in the Pharmacists’ Patient Care Process (PPCP) process. |  |
| **[3.]** K.N.G.L. Reshwanth, G. Rajyalakshmi, Yendeti Venkata Siva Prasanth, Chalicham Hanish, S. Aravind Raj, K. Jayakrishna,  Chapter 7 - Blockchain technology approach for drug delivery in health care: A review,  Editor(s): Kaliyan Mathiyazhagan, V. Raja Sreedharan, Deepak Mathivathanan, Vijaya Sunder M,  Blockchain in a Volatile-Uncertain-Complex-Ambiguous World,  Elsevier,  2023,  Pages 89-99,  ISBN 9780323899635,  https://doi.org/10.1016/B978-0-323-89963-5.00004-6 | Blockchain; COVID-19; Digital support; Drug delivery; Health care | The use of blockchain technology in healthcare has the potential to improve interoperability and patient-driven data sharing, which could better prepare the healthcare system to manage public health risks such as COVID-19. A systematic analysis of current research in blockchain in healthcare is necessary to further explore its potential applications and advancements in the field. Overall, blockchain technology has various applications that can lead to innovation in healthcare. |  |
| **[4.]** Sharda Tiwari, Namrata Dhanda, Harsh Dev,  A real time secured medical management system based on blockchain and internet of things,  Measurement: Sensors,  Volume 25,  2023,  100630,  ISSN 2665-9174,  https://doi.org/10.1016/j.measen.2022.100630 | IoT; Blockchain; Health; Medical; Sensor | We make an IoT-based prototype that uses Blockchain technology to get rid of this anonymous data access, in the common word patient's data are private through this system. |  |
| **[5.]** McSeth Antwi, Asma Adnane, Farhan Ahmad, Rasheed Hussain, Muhammad Habib ur Rehman, Chaker Abdelaziz Kerrache,  The case of HyperLedger Fabric as a blockchain solution for healthcare applications,  Blockchain: Research and Applications,  Volume 2, Issue 1,  2021,  100012,  ISSN 2096-7209,  https://doi.org/10.1016/j.bcra.2021.100012 | Blockchain; Electronic healthcare records; Feasibility study; Healthcare; Privacy; Security; Use-case | In this paper, we investigate the use of private blockchain technologies to assess their feasibility for healthcare applications. We create testing scenarios using HyperLedger Fabric to explore different criteria and use-cases for healthcare applications. Additionally, we thoroughly evaluate the representative test case scenarios to assess the blockchain-enabled security criteria in terms of data confidentiality, privacy and access control. |  |
| **[6.]** Yaqoob, I., Salah, K., Jayaraman, R. *et al.* Blockchain for healthcare data management: opportunities, challenges, and future recommendations. *Neural Comput & Applic* **34**, 11475–11490 (2022). https://doi.org/10.1007/s00521-020-05519-w | Blockchain;  Healthcare;  e-Health;  EmHealth;  Healthcare data management | In this paper, we discuss how leveraging blockchain for healthcare data management systems can lead to stimulate innovations and bring major improvements. We present the key blockchain features and characteristics. We discuss the premier advantages of adopting blockchain technology along with opportunities for healthcare industries. We present recent on-going projects and case studies to show the practicality of blockchain technology for various healthcare applications. |  |
| **[7.] MDPI and ACS Style**  Haddad, A.; Habaebi, M.H.; Suliman, F.E.M.; Elsheikh, E.A.A.; Islam, M.R.; Zabidi, S.A. Generic Patient-Centered Blockchain-Based EHR Management System. *Appl. Sci.* **2023**, *13*, 1761. <https://doi.org/10.3390/app13031761>  **AMA Style**  Haddad A, Habaebi MH, Suliman FEM, Elsheikh EAA, Islam MR, Zabidi SA. Generic Patient-Centered Blockchain-Based EHR Management System. *Applied Sciences*. 2023; 13(3):1761. <https://doi.org/10.3390/app13031761>  **Chicago/Turabian Style**  Haddad, Alaa, Mohamed Hadi Habaebi, Fakher Eldin M. Suliman, Elfatih A. A. Elsheikh, Md Rafiqul Islam, and Suriza Ahmad Zabidi. 2023. "Generic Patient-Centered Blockchain-Based EHR Management System" *Applied Sciences* 13, no. 3: 1761. <https://doi.org/10.3390/app13031761> | [**patient-centered**](https://www.mdpi.com/search?q=patient-centered); [**IPFS**](https://www.mdpi.com/search?q=IPFS); [**blockchain**](https://www.mdpi.com/search?q=blockchain); [**privacy**](https://www.mdpi.com/search?q=privacy); [**health record**](https://www.mdpi.com/search?q=health+record) | The objective of this research is to develop a Patient-Centered Blockchain-Based EHR Management (PCEHRM) system that allows patients to manage their healthcare records across multiple stakeholders and to facilitate patient privacy and control without the need for a centralized infrastructure by means of granting or revoking access or viewing one’s records. |  |
| **[8.] MDPI and ACS Style**  Abdelgalil, L.; Mejri, M. HealthBlock: A Framework for a Collaborative Sharing of Electronic Health Records Based on Blockchain. *Future Internet* **2023**, *15*, 87. <https://doi.org/10.3390/fi15030087>  **AMA Style**  Abdelgalil L, Mejri M. HealthBlock: A Framework for a Collaborative Sharing of Electronic Health Records Based on Blockchain. *Future Internet*. 2023; 15(3):87. <https://doi.org/10.3390/fi15030087>  **Chicago/Turabian Style**  Abdelgalil, Leina, and Mohamed Mejri. 2023. "HealthBlock: A Framework for a Collaborative Sharing of Electronic Health Records Based on Blockchain" *Future Internet* 15, no. 3: 87. <https://doi.org/10.3390/fi15030087> | [**electronic health records (EHRs)**](https://www.mdpi.com/search?q=electronic+health+records+%28EHRs%29); [**blockchain**](https://www.mdpi.com/search?q=blockchain); [**Hyperledger Fabric**](https://www.mdpi.com/search?q=Hyperledger+Fabric); [**Hyperledger Indy**](https://www.mdpi.com/search?q=Hyperledger+Indy); [**smart contracts**](https://www.mdpi.com/search?q=smart+contracts); [**InterPlanetary File System (IPFS)**](https://www.mdpi.com/search?q=InterPlanetary+File+System+%28IPFS%29) | This paper proposes a framework called HealthBlock for collaboratively sharing EHRs and their privacy preservation. Different technologies have been combined to achieve this goal. The InterPlanetary File System (IPFS) technology stores and shares patients’ EHRs in distributed off-chain storage and ensures the record’s immutability; Hyperledger Indy gives patients full control over their EHRs, and Hyperledger Fabric stores the patient-access control policy and delegations. |  |
| **[9.]** Ghassan Al-Sumaidaee, Rami Alkhudary, Zeljko Zilic, Andraws Swidan,  Performance analysis of a private blockchain network built on Hyperledger Fabric for healthcare,  Information Processing & Management,  Volume 60, Issue 2,  2023,  103160,  ISSN 0306-4573,  https://doi.org/10.1016/j.ipm.2022.103160 | Blockchain; Healthcare; Hyperledger fabric; Hyperledger caliper | This paper contributes to the literature by presenting the use of Hyperledger Fabric in healthcare to improve information flow and solve the fragmentation problem between two medical institutions. In addition, two rate controllers on Hyperledger Caliper are used to evaluate the performance of our network: fixed and linear. |  |
| **[10.]** Zeng Chen, Weidong Xu, Bingtao Wang, Hua Yu,  A blockchain-based preserving and sharing system for medical data privacy,  Future Generation Computer Systems,  Volume 124,  2021,  Pages 338-350,  ISSN 0167-739X,  https://doi.org/10.1016/j.future.2021.05.023 | Blockchain; Hospital information system; Medical data collection and sharing; Proxy re-encryption algorithm; Hyperledger fabric | The research work of this paper provides means for remote diagnosis and treatment, data mining and other practical applications based on the medical data on the blockchain. |  |
| [11.] Muhammad Usman, Usman Qamar,  Secure Electronic Medical Records Storage and Sharing Using Blockchain Technology,  Procedia Computer Science,  Volume 174,  2020,  Pages 321-327,  ISSN 1877-0509,  https://doi.org/10.1016/j.procs.2020.06.093 | Blockchain  Electronic Medical Records  Hyperledger  Permissioned | The research proposes a blockchain-based system for managing and sharing electronic medical records (EMRs) and has implemented a prototype using the Hyperledger platform. The system ensures privacy, security, and easy accessibility of medical records. |  |
| [12.] **MDPI and ACS Style**  Iftekhar, A.; Cui, X.; Tao, Q.; Zheng, C. Hyperledger Fabric Access Control System for Internet of Things Layer in Blockchain-Based Applications. *Entropy* **2021**, *23*, 1054. <https://doi.org/10.3390/e23081054>  **AMA Style**  Iftekhar A, Cui X, Tao Q, Zheng C. Hyperledger Fabric Access Control System for Internet of Things Layer in Blockchain-Based Applications. *Entropy*. 2021; 23(8):1054. <https://doi.org/10.3390/e23081054>  **Chicago/Turabian Style**  Iftekhar, Adnan, Xiaohui Cui, Qi Tao, and Chengliang Zheng. 2021. "Hyperledger Fabric Access Control System for Internet of Things Layer in Blockchain-Based Applications" *Entropy* 23, no. 8: 1054. <https://doi.org/10.3390/e23081054> | [**Hyperledger Fabric**](https://www.mdpi.com/search?q=Hyperledger+Fabric); [**Internet of Things**](https://www.mdpi.com/search?q=Internet+of+Things); [**IoT**](https://www.mdpi.com/search?q=IoT); [**access control system**](https://www.mdpi.com/search?q=access+control+system); [**blockchain**](https://www.mdpi.com/search?q=blockchain) | The study integrates Hyperledger Fabric blockchain and IoT devices to establish root of trust and access control for IoT devices. The attribute-based access control mechanism was created using Hyperledger Fabric components, and Raspberry Pi 4 Model B based on ARM64 architecture was used as the IoT device. The executable binaries and Docker images were built for the ARM64 architecture using Hyperledger Fabric source code. The study successfully assessed the Hyperledger Fabric blockchain implementation and access control mechanism on the ARM64 architecture. |  |
| **[13.] MDPI and ACS Style**  Kakarlapudi, P.V.; Mahmoud, Q.H. Design and Development of a Blockchain-Based System for Private Data Management. *Electronics* **2021**, *10*, 3131. <https://doi.org/10.3390/electronics10243131>  **AMA Style**  Kakarlapudi PV, Mahmoud QH. Design and Development of a Blockchain-Based System for Private Data Management. *Electronics*. 2021; 10(24):3131. <https://doi.org/10.3390/electronics10243131>  **Chicago/Turabian Style**  Kakarlapudi, Prasanth Varma, and Qusay H. Mahmoud. 2021. "Design and Development of a Blockchain-Based System for Private Data Management" *Electronics* 10, no. 24: 3131. <https://doi.org/10.3390/electronics10243131> | [**blockchain**](https://www.mdpi.com/search?q=blockchain); [**data privacy**](https://www.mdpi.com/search?q=data+privacy); [**consent management**](https://www.mdpi.com/search?q=consent+management) | This paper introduces the architectural design and development of a blockchain-based system for private data management, discusses the proof-of-concept prototype using Hyperledger Fabric, and presents evaluation results of the proposed system using Hyperledger Caliper. |  |
| [14.] João Cunha, Ricardo Duarte, Tiago Guimarães, Manuel Filipe Santos,  Permissioned Blockchain Approach using Open Data in Healthcare,  Procedia Computer Science,  Volume 210,  2022,  Pages 242-247,  ISSN 1877-0509,  https://doi.org/10.1016/j.procs.2022.10.144 | OpenEHR; Blockchain; Helthcare; Hyperledger Fabric | The paper proposes the use of blockchain technology and the openEHR interoperability standard to address the problem of distributed and non-integrated digital health records. The combination of these technologies offers fine-grained access permissions and guarantees standardization of electronic records. The proposed architecture will be implemented in a Portuguese hospital's ICU to support clinical decision-making and ensure the interoperability, veracity, privacy, and security of the data used. |  |
| [15.] Yuying Yang, Aixia Song, Qing Chang, Hongmei Zhao, Weidan Kong, Qian Xue, Qianlong Xue, "Improving the Use of Blockchain Technology in Stroke Care Information Management Systems", *Computational and Mathematical Methods in Medicine*, vol. 2022, Article ID 2642841, 9 pages, 2022. https://doi.org/10.1155/2022/2642841 | Blockchain technology, distributed digital ledgers, cryptographic hashes, data security, medicine supply chain, patient information | This study focused on evaluating the application of blockchain technology in Stroke Nursing Information Management Systems. This emerging technology is already in use in the healthcare industry. The patient’s data is kept decentralized, transparent, and mainly incorruptible, thus keeping it secured and sharing of data is quick. |  |
| [16.] Stawicki, S.P., Firstenberg, M.S., Papadimos, T.J. (2023). The Use of Blockchain in Fighting Medical Misinformation: A Concept Paper. In: Stawicki, S. (eds) Blockchain in Healthcare. Integrated Science, vol 10. Springer, Cham. https://doi.org/10.1007/978-3-031-14591-9\_15 | Blockchain;  Censorship;  Disinformation;  Information management; Misinformation;  Oversight;  Public harm;  Social media;  Source credibility | Blockchain technology can help the medical community rapidly adapt to changes and prevent the spread of medical misinformation during pandemics. It promotes scientific consensus, transparency, and public access to scientific discourses, leading to better health outcomes and a more informed public. |  |
| [17.] Pilares, I.C.A.; Azam, S.; Akbulut, S.; Jonkman, M.; Shanmugam, B. Addressing the Challenges of Electronic Health Records Using Blockchain and IPFS. *Sensors* **2022**, *22*, 4032. https://doi.org/10.3390/s22114032 | [**blockchain**](https://www.mdpi.com/search?q=blockchain); [**cryptography**](https://www.mdpi.com/search?q=cryptography); [**electronic health record**](https://www.mdpi.com/search?q=electronic+health+record); [**privacy**](https://www.mdpi.com/search?q=privacy); [**security**](https://www.mdpi.com/search?q=security); [**distributed file system**](https://www.mdpi.com/search?q=distributed+file+system) | One objective of this research project is to aid the acceleration of EHR adoption. Another objective is to ensure the robustness of the system to resist malicious attacks. |  |
| [18.] Said, O. LBSS: A Lightweight Blockchain-Based Security Scheme for IoT-Enabled Healthcare Environment. *Sensors* **2022**, *22*, 7948. https://doi.org/10.3390/s22207948 | [**blockchain**](https://www.mdpi.com/search?q=blockchain); [**healthcare**](https://www.mdpi.com/search?q=healthcare); [**IoT**](https://www.mdpi.com/search?q=IoT); [**IoT simulation**](https://www.mdpi.com/search?q=IoT+simulation); [**security**](https://www.mdpi.com/search?q=security); [**IoT security**](https://www.mdpi.com/search?q=IoT+security) | This paper proposes LBSS, a security scheme for IoT-enabled healthcare that includes blockchain technology for transaction integrity, secure storage of data, and authorization tests for access. The scheme prioritizes data importance and outperforms traditional models in performance metrics, as shown by simulation results using the NS3 package. |  |
| [19.] Mohsan, S.A.H.; Razzaq, A.; Ghayyur, S.A.K.; Alkahtani, H.K.; Al-Kahtani, N.; Mostafa, S.M. Decentralized Patient-Centric Report and Medical Image Management System Based on Blockchain Technology and the Inter-Planetary File System. *Int. J. Environ. Res. Public Health* **2022**, *19*, 14641. https://doi.org/10.3390/ijerph192214641 | [**digital health**](https://www.mdpi.com/search?q=digital+health); [**blockchain**](https://www.mdpi.com/search?q=blockchain); [**smart contract**](https://www.mdpi.com/search?q=smart+contract); [**Ethereum**](https://www.mdpi.com/search?q=Ethereum); [**distributed storage**](https://www.mdpi.com/search?q=distributed+storage); [**IPFS**](https://www.mdpi.com/search?q=IPFS); [**medical images sharing**](https://www.mdpi.com/search?q=medical+images+sharing); [**health system**](https://www.mdpi.com/search?q=health+system) | This research proposes a patient-centric test report and image management system using Ethereum blockchain and Inter-Planetary File System technology. The patient-centric access control protocol is designed for secure access control. The system enables distributed and secure data access for hospitals, patients, and image requestors. The proposed framework was tested using an Ethereum TESTNET blockchain and found to be efficient and practicable. |  |
| [20.] Hiwale, M.; Varadarajan, V.; Walambe, R.; Kotecha, K. NikshayChain: A Blockchain-Based Proposal for Tuberculosis Data Management in India. Technologies 2023, 11, 5. https://doi.org/10.3390/technologies11010005 | [**blockchain**](https://www.mdpi.com/search?q=blockchain); [**privacy**](https://www.mdpi.com/search?q=privacy); [**healthcare**](https://www.mdpi.com/search?q=healthcare); [**data management**](https://www.mdpi.com/search?q=data+management); [**tuberculosis**](https://www.mdpi.com/search?q=tuberculosis); [**Nikshay Poshan Yojana**](https://www.mdpi.com/search?q=Nikshay+Poshan+Yojana) | The main objective of this work is to identify the current implementation challenges of the NPY scheme from patient and healthcare stakeholder perspectives and proposes a blockchain-based architecture called NikshayChain for sharing patient medical reports and bank details among several healthcare stakeholders within or across Indian cities. The proposed architecture accelerates healthcare stakeholder productivity by reducing workload and overall costs while ensuring effective data management. This architecture can significantly improve medical care, incentive transfer, and data verification, propelling the use of e-health applications. |  |