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Using Modern Technology to Improve the Efficiency of Emergency Medical Care.

[1]Fahad Hamdi Khalif ALAnazi, [2]Fawaz Helal Rashed alanazi, [3]Waleed Hassan Alanazi

1. Nursing
2. Anesthesia Technician.
3. Anesthesia Technician.

Abstract:

Blockchain technology has transformed traditional healthcare practices by combining AI, machine learning, and big data, revolutionizing the healthcare industry, including emergency medicine. Security and privacy issues are also brought up by the growing use and collection of personal health data, especially in emergency medical situations. Method: We reviewed articles that discussed the revolutionary impact of blockchain technology in relation to the patient journey through the emergency department (ED) and were published in databases like Web of Science, PubMed, and Medline. Findings: Thirty-three publications in all satisfied our inclusion requirements. The results highlight that the main uses of blockchain technology are in documentation and data sharing. When compared to other disciplines, the pre-hospital and post-discharge applications are particularly noteworthy. While Proof of Work (PoW) and Proof of Authority (PoA) are the most widely used consensus algorithms in this emergency care field, Ethereum and Hyperledger Fabric are the most popular platforms overall. Two scenarios and the ED journey map are shown, demonstrating the potential of blockchain technology and highlighting the most notable uses of emergency medicine. Depending on the particular circumstances, problems with interoperability, scalability, security, access control, and cost may appear in emergency medical settings. Conclusion: In order to optimize emergency medical services, our study looks at the current state of research on blockchain technology, emphasizing both its present impact and possible future developments. This method enables frontline healthcare providers to verify their procedures and acknowledge the revolutionary potential of blockchain in emergency situations.

Keywords: Modern Technology, Emergency,Medical care, Emergency Care, Blockchain**.**

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Introduction:

Due to the extensive use and adoption of digital technologies such as artificial intelligence, machine learning, big data, and the metaverse, emergency medicine care has seen a substantial change in recent years in comparison to our traditional healthcare models. The types, velocity, and volume of personal health data have significantly increased due to the growing adoption of digital technologies and the expansion of healthcare services. This has increased the need for data exchange within the healthcare ecosystem. Even though big healthcare data has a lot of potential, it can be difficult to strike a balance between allowing data applications and protecting patient privacy and security (Abouelmehdi, 2018).

In the healthcare system, data ownership and security have taken center stage. As demonstrated by events such as the biggest healthcare data breaches of 2018, which exposed 13 million medical records and had serious consequences, the problem of sensitive healthcare data breaches has become a persistent concern. Sensitive data, including financial information, social security numbers, and medical histories, may also be

at risk. Additionally, the implementation of access control mechanisms and the ownership of personal health data have become increasingly important with the rise of wearable technology and personalized healthcare (Chen , 2019; Di Francesco, 2020).

Numerous reviews that concentrate on blockchain applications in healthcare have been published thus far. However, distinct healthcare sectors and practice settings have their own unique characteristics across various specialized medical disciplines. In addition to commonly used EMR applications, the emergency medical care domain has unique needs, including prehospital emergency services, inter-hospital transfers, and prehospital care for critical illnesses and trauma.

Blockchain technology:

Blockchain technology is a ground-breaking invention that has quickly gained popularity and has the potential to revolutionize a number of industries, including supply chain management, government services, healthcare, information systems, and finance. Fundamentally, a blockchain is a distributed, decentralized ledger that makes safe and open record-keeping possible. Blockchain 1.0 technology was introduced with the rise of Bitcoin as a cryptocurrency. Blockchain 3.0 refers to the use of blockchain technology outside of financial contexts, with the goal of extending its trustless and decentralized features to other systems, especially in the healthcare industry. Blockchain 2.0 involves distributed ledgers with smart contracts. The structure and architecture of blockchains, as well as the advantages and

disadvantages of different consensus algorithms and platforms in the healthcare industry, will be discussed in the section that follows (Hasselgren , 2020; Krichen , 2022).

Pre-hospital emergency medical care:

Pre-hospital emergency medical care is the most unique feature of blockchain application when compared to other specialties. Emergency medical services (EMS) and inter-hospital transfers (IHTs) are its two main components; the former is especially significant. When it comes to saving lives and lowering rates of death and morbidity, EMS is essential. Numerous studies have shown that prompt hospital management and admission for emergencies like ST-elevation myocardial infarction, acute stroke, and trauma depend heavily on accurate and timely EMS detection (Saranya, 2021; Ismail, 2019).

Pre-hospital individual data and assessment results are gathered in the context of emergency medical services (EMS) and may be sent via the internet to data centers or cloud systems. Hospitals or people with various needs may have access to these data. Furthermore, some social media platforms have been used as data transmission channels due to the growing popularity of electronic transmission technologies and social media platforms, which has effectively shortened treatment times (Lahamage, 2021; Hasavari, 2019).

In order to improve the standard of pre-hospital emergency care, a growing corpus of research is employing deep learning-based artificial intelligence (AI) algorithms. AI in emergency medicine has been shown in numerous studies to increase accuracy and efficiency, decrease time to treatment, and improve the detection of stroke, out-of-hospital cardiac arrests (OHCA), and EKG interpretation for ST-elevation myocardial infarction (STEMI). Regretfully, the majority of the data retrieved from the previously mentioned situations might not have been sufficiently safeguarded (Krichen , 2022).

Medical Devices and Drugs:

Medical orders for treatment, which may involve the use of drugs and procedures, will be issued by the emergency physician following the evaluation. Medication safety is one of the main application areas for blockchain and supply chain management. Pharmaceutical companies are having trouble tracking their products through the supply chain process, and counterfeit drugs have posed a serious threat to the global pharmaceutical industry. Due to its involvement in life-saving treatments and the involvement of numerous stakeholders, such as pharmaceutical manufacturers, dealers, distributors, patients, information service providers, and regulatory agencies, the pharmaceutical supply chain has grown more complex (Samanta, 2021).

Similar difficulties are encountered by many medical devices as well, although pertinent applications in emergency medical care are currently less prevalent. Supply chain operations have become fragmented as a result of the medical device logistics service supply chain's enterprises' lack of cooperation as well as the lack of common data management standards and guidelines for data collection (Ismail, 2019).

Depending on their medical condition and the emergency physician's risk assessment, patients may have a number of options following treatment, including discharge, admission, or transfer. They might also have to go ahead and pay for their medical bills (Lahamage, 2021).

Recommendations:

Blockchain technology integration in healthcare presents a promising solution, but it is still in its infancy and has certain drawbacks and difficulties. Cost, complexity, the newness of the technology, the lack of established security and privacy standards, and security concerns are a few of these difficulties.

First off, the large volume of transactions that must be handled in emergency rooms and hospitals makes the deployment of a blockchain system in these settings extremely expensive. Speed should also be taken into account, especially in emergency medical situations where slower processing speeds may limit the real-time applicability of platforms like Ethereum and consensus algorithms like Proof of Work (PoW).

Second, smooth cooperation between various systems may be hampered by the complexity of various blockchain implementations that make use of different underlying technologies. In order to guarantee seamless data interchange and collaboration among diverse healthcare systems, standardization becomes a crucial issue that requires attention. This emphasizes the difficulty of attaining compatibility and is particularly important in emergency departments that must communicate with patients, community healthcare organizations, EMS systems, and pre-hospital. The only way to actually help frontline emergency medical personnel rather than hinder them is through compatibility.

Thirdly, privacy and confidentiality issues come up when efficiency, cost-effectiveness, and scalability are sought after. Additionally, this results in the applicability of various platforms and algorithms in various scenarios being inconsistent. Public blockchains have benefits like high decentralization, but if flaws in their underlying encryption schemes are found, they could expose data that has been stored on them.

Last, but not least, security is a major worry because data could become permanently unreadable if a private key is lost. Furthermore, these systems are vulnerable to an attack known as the 51% attack by nature.

Many of these solutions have been successfully applied in actual emergency medical situations, while other concepts are still in the theoretical or hypothetical stage but show promise.

There are some limitations on our study:

- Initially, methodological choices have imposed limitations on the research process, such as the use of particular search terms and queries to collect data and an emergency medicine-focused approach that might not fully utilize blockchain's capabilities.

- **Second**, the representation of the entire landscape of existing blockchain applications may be hampered by the databases' possible incompleteness.

- **Thirdly**, the vast majority of research is proof-of-concept trials that need more proof. To maximize the benefits of emergency care medicine, future studies could focus on applications both before and after hospitalization. Furthermore, there are still few studies on treatment, informed consent, and educational applications, which emphasizes the necessity of emergency medicine professionals paying more attention and participating more.

Conclusion:

The scoping review looks at and talks about important uses of blockchain technology in emergency medicine. One noteworthy feature that distinguishes emergency medicine from other domains is the application of blockchain technology in pre-hospital and post-discharge settings. There is no one-size-fitsall benefit to consensus algorithms, blockchain platforms, and blockchain types; instead, their efficacy varies according to the particular needs of various emergency care scenarios, each of which has its own advantages, disadvantages, and requirements. Electronic health records (EHR) and personal health records (PHR) are currently the main focus of blockchain implementation; however, there are still possible

obstacles, such as scalability, connecting disparate systems, and insufficient system interoperability.The Internet of Things (IoT) and blockchain integration is becoming more popular, expanding the services and scope of emergency medical care, especially during the "home" portion of the ER visit.

In order to successfully implement blockchain solutions and collaborate with blockchain experts, healthcare providers must have a thorough understanding of the current requirements and challenges in acute medical care. The trend toward blockchain-enabled, patient-centered care is becoming more and more obvious. Enhancing patient-centered

interoperability and improving overall efficiency and security in healthcare data management are potential benefits of integrating blockchain technology into emergency medicine. The simplified access to patient data and the ability to facilitate real-time communication between patients, emergency physicians, and other specialists serve as additional examples of this potential. Additionally, the intrinsic qualities of auditability and transparency offer substantial benefits in guaranteeing the safe and reliable sharing of medical information between patients, healthcare providers, and insurance companies. Depending on the requirements of various scenarios, concentrated efforts should be directed toward resolving issues like costs, scalability, security, access control, and standardization in the future. These initiatives will help blockchain technology become widely used in acute medical care.

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