

# How blockchain can improve nursing

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**A**LL INDUSTRIES, including healthcare, are focusing on revolutionary ways to safeguard the deluge of data created and stored from sources such as smart devices, e-commerce transactions, and online banking. Protection for all patient data is paramount due to its sensitive nature, and nurses are now responsible for managing it. Data from the electronic health record, wearable devices, telehealth, and sensor technology all add to the pool of susceptible data in cyber attacks, in which data is stolen and used by hackers to their advantage. And nurses, like patients, want to ensure their data are also secure in the hands of those who collect and manipulate it.

An advanced, fast-moving, and quickly evolving technology called blockchain has a plethora of applications to improve the patient and nurse experience. It can significantly increase data security within healthcare and the nursing profession due to its superior data accessibility, privacy, auditability, and efficiency. This article explores the benefits of blockchain technology and its applicability to clinical practice.

## What is blockchain?

In simple terms, blockchain is digital information (the “block”) stored in a public database (the “chain”).<sup>1</sup> Blockchain technology has roots in Bitcoin innovation.<sup>2</sup> This decentralized digital currency, also known as cryptocurrency, was the first viable use of blockchain. In the case of Bitcoin and newer cryptocur-

rencies, blockchain is used in financial transactions to create a credible, decentralized, serverless, consensus-based ledger network that decreases duplicate spending, forgery, government control, and third-party interference.<sup>3</sup>

As a form of distributed ledger technology, blockchain serves as a grand cluster of connected databases that record all types of transactions. Blockchain technology differs from classic databases in that it prevents the alteration of a transaction

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without the event being known to others. Instead, with blockchain, data transactions and information records are shared and available to all parties, which makes for a more interactive, data-based network.<sup>4</sup>

Blockchain technology for transactional applications uses a shared *ledger*, or record, that documents all transactions that take place within a business network and is shared among all participants in a secure, encrypted environment.<sup>5</sup> At the core of the technology are *blocks*, which are transaction records added to the chain in a linear, chronologic order. Each participant, or *node*, connected to the network receives a copy of the blockchain. The blocks are downloaded automatically upon joining.<sup>5</sup>

The blockchain expands as the number of transactions grows. The blocks record and time-stamp the

sequence of transactions to verify proof of transactions, which are then logged into the blockchain within a discrete network governed by rules agreed on by the network participants.<sup>4</sup>

Factors that create a secure “trust model” for data sharing include network user consensus, knowledge of transactions, transaction origin, and changes in network ownership over time. Users cannot tamper with a transaction after it records to the ledger; if a transaction error occurs, a new transaction must be added to

reverse the error. This trait gives network users full transparency about all transactional activity, such as transaction completions and who created them.<sup>4</sup>

## Blockchain in nursing: present and future

Nurses have unique data needs that beg for information security. For nurses, blockchain is becoming increasingly beneficial in the following ways.<sup>2</sup>

- **Optimizing patient data management and portability.** Blockchain technology can improve data exchange and interoperability to connect data sources and repositories that enable the safe transfer of personal health information among stakeholders in the blockchain network. For example, a group of healthcare organizations on the network logs each health-related

event (or transaction) across the patient-care continuum, enabling nurses to track and update a patient's clinical data set each time they provide a health-related service.<sup>6</sup> Also, patients can allow the transfer of records from one clinician to another.<sup>7</sup> Currently, multiple databases store various types of sensitive patient health information in different locations, including demographics, claims, portals, pharmacies, lab, assessment and documentation systems, and billing.

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Blockchain allows a seamless connection of these sources, services, and applications to follow patient movement and events throughout their journey in the healthcare system.

• **Managing professional nurse credentialing and education.** Members of a blockchain can verify the credentials and track records of various health professionals. This ledger functionality streamlines the nurse hiring process and documents an unalterable history of a nurse's career history.<sup>7</sup> Ledger technology allows nurses to carry their credentials with them and for healthcare organizations to trust those credentials wherever they practice, which would expedite licensure at less cost to nurses.<sup>8</sup> With the addition of secure payment methods for the development and maintenance of smart nurse contracts, this approach of logging lifelong learning plans and accomplishments will give full transparency to employers to guide ongoing, meaningful nursing professional development.<sup>9</sup>

### • **Safeguarding clinical trials and expediting nursing research.**

Implementing a blockchain clinical trial consent log gives study subjects ownership of their data and provides an audit trail of associated clinical activities for nurses, clinical trial staff, and regulators.<sup>9</sup> The technology also maintains an immutable record of patient consent, enabling regulators to monitor clinical trial standards more efficiently to ensure that the trial meets informed consent regulations and

mitigates fraud. Further, blockchain can employ an auditable "smart contract system" that prevents clinicians from using patient data until the end of a contract transaction, requiring consent at each stage of a clinical trial.<sup>9</sup> In nursing research, blockchain ledger technology produces higher data quality by reducing the duplication of health science data collected from multiple sources. With this, nurses can pull data from a centralized location where they exist only once, increasing the standardization of data sets. This ledger-driven data reconciliation improves scientific tools and expedites research time from study outcomes to practice implementation.<sup>10</sup>

### **Final thoughts**

Nurses can make a significant difference in the quality of patient care by harnessing the power of blockchain technology. To improve the security and efficiency of clinical and administrative processes, exploiting blockchain will equate to

best-in-class data management, interoperability, and sharing. By utilizing this emerging technology, nurses can safeguard patient and personal data as well as purvey knowledge, adding value to the nursing profession.<sup>11</sup> ■

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