International Platform of Registered Systematic Review and Meta-analysis Protocols

INPLASY

A CIPP Analysis of Blockchain in Healthcare Higher Education Credentialling – Scoping Review Protocol

INPLASY2025120005
doi: 10.37766/inplasy2025.12.0005
Received: 1 December 2025
Published: 2 December 2025

Doherty, P.

Corresponding author:
Patrick Doherty

pdoherty1006@qub.ac.uk

Author Affiliation:
School of Nursing and Midwifery, Queen's University Belfast.

ADMINISTRATIVE INFORMATION

Support - None.

Review Stage at time of this submission - Formal screening of search results against eligibility criteria.

Conflicts of interest - None declared.

INPLASY registration number: INPLASY2025120005

Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 2 December 2025 and was last updated on 2 December 2025.

INTRODUCTION

Review question / Objective This scoping review asks: How does the literature describe proposed or actualised use cases of blockchain technology in healthcare higher education credentialling?
To further explore this question, a Context-Input-Process-Product (CIPP) Framework was used alongside a PCC framework to design this study's secondary research questions (Stufflebeam and Shinkfield, 1985, Pollock et al., 2023). The population of interest in this study is professional learners in the healthcare sector. The concept of interest is blockchain-based credentialling within the context of healthcare higher education ecosystems.
This study's secondary research questions are as follows:
1. To what extent has the literature discussed the proposed or actualised use cases of blockchain technology in healthcare higher education credentialling?
2. In which healthcare disciplines has blockchain been considered for use in healthcare higher education credentialling as reported in the literature?
3. What are the challenges associated with traditional credentialling models in healthcare higher education, which blockchain seeks to address as reported in the literature?
4. Which blockchain architectures (public, private, or consortium) are reported in the literature as having use cases in healthcare higher education credentialling?
5. What barriers to implementing blockchain technologies in healthcare higher education credentialling are reported in the literature?
6. Which governance and implementation strategies are reported in the literature as supporting the adoption of blockchain in healthcare higher education credentialling?
7. What evidenced or theoretical outcomes of using blockchain in healthcare higher education credentialling are reported in the literature?

Background Blockchain technology underpins non-fiat cryptocurrencies such as Bitcoin and Ethereum. While it lacks a unified definition, blockchain is fundamentally a decentralised, immutable, and encrypted digital code sequence where each node in the system holds a single, complete ledger (Sarmah, 2018, Nakamoto, 2008, Gottlieb et al., 2024). Blockchains can have public, private, or consortium architectures – each with differing levels of scalability, centralisation, and efficiency (Pondkule and Kothari, 2025). This facilitates different use cases of the technology beyond cryptocurrencies and non-fungible tokens (NFTs). Alternative use cases in healthcare delivery include service financing and patient data maintenance (Ahmad et al., 2019). As a sector reliant on a highly qualified workforce, this scoping review seeks to map the literature on how blockchain could support credentialling in healthcare higher education.

Rationale Higher education and healthcare experience a high administrative burden from the disaggregated credentialling of learning outcomes, generating significant financial and non-pecuniary costs (Cheung et al., 2021, Woelert, 2023, Kempenich et al., 2018). Unlike cybersecure blockchain systems, traditional credentialling models are often siloed in centralised institutional, regional, or national systems, which are vulnerable to data breaches (Gershuni et al., 2023, Kruse et al., 2017, Taylor et al., 2020). Blockchain could give learners secure access to longitudinal training records across multiple institutions, supporting workforce mobility across jurisdictions. Also, inherent risks of traditional models include the falsifiability of accreditation certificates with possible harm arising to institutional reputation, probity, and patient outcomes (Alnuaimi et al., 2023, Gershuni et al., 2023, Murray et al., 2011). Blockchain's immutability therefore may allow for tamper-resistant credentialling records, with the technology being built around automated verification, not trust (Taylor et al., 2020).
As an emergent technology and with an anticipated sparse literature, a scoping review is an appropriate methodology to explore blockchain in healthcare higher education credentialling. This scoping review seeks to identify research gaps to inform future innovations and to identify the opportunities and challenges associated with blockchain implementation. Informed by its CIPP conceptual framework (Stufflebeam and Shinkfield, 1985), this study seeks to make practicable implementation recommendations that may inform future policy and practice in healthcare higher education.

METHODS

Strategy of data synthesis This scoping review will adhere to the Arksey and O'Malley (2005) approach (Arksey and O'Malley, 2005). In line with best practice recommendations, it will be conducted and reported in line with Joanna Briggs Institute (JBI) and PRISMA-ScR guidelines (Aromataris and Munn, 2020, Tricco et al., 2018). Whilst this protocol is intended as final, any changes to this protocol will be documented transparently in the final review.
The search strategy for this study is broad, recognising that it is a nascent field which covers healthcare, information technology, and educational disciplines. To design search strings, key terms related to healthcare, higher education, credentialling, and blockchain will be used with Boolean, truncation, and proximity operators. Scopus, MEDLINE (Ovid), and EBSCO ERIC will be searched. These databases provide interdisciplinary, healthcare, and education coverage.
The search string for EBSCO ERIC will be as follows:
(AB(blockchain OR "distributed ledger" OR cryptocurrency) OR TI(blockchain OR "distributed ledger" OR cryptocurrency)) AND (AB("higher education" OR university OR "medical education" OR "nursing education" OR "health professions education") OR TI("higher education" OR university OR "medical education" OR "nursing education" OR "health professions education")) AND (AB(credential* OR certificat* OR licens* OR accred*) OR TI(credential* OR certificat* OR licens* OR accred*))
When searching, a filter will be applied to show only papers published from January 2008 to present. This was when blockchain was first conceptually described in the Bitcoin whitepaper (Nakamoto, 2008).

Eligibility criteria To be included in this study, literature must be published as an open or institutionally-available academic journal article in the English language. This reflects the financial and material constraints of the study. Grey literature will be excluded. While no quality assessments will be made in this study, articles require peer review for inclusion as an informal quality measure. Papers will be excluded if they are published in journals identified by curated "predatory journal" databases. A significant discussion on both healthcare higher education credentialling and blockchain technology will be required for inclusion. To be considered a blockchain, a technology must be a decentralised, immutable, and encrypted digital code sequence where each

node in the system holds a single, replicated ledger (Sarmah, 2018, Nakamoto, 2008, Gottlieb et al., 2024). Papers discussing systems where a replicated ledger is not stored in every node will not be included.
For papers which discuss other credentialling models in healthcare higher education, disaggregated data or specific discussion on blockchain technology will be required for inclusion. No automation tools will be used to assist in decision making of eligibility and inclusion.

Source of evidence screening and selection Following their retrieval from Scopus, EBSCO ERIC, and MEDLINE (Ovid), citations (as .ris files) will be imported into Covidence [Veritas Health Innovation, Melbourne, Australia] for deduplication. Deduplication will be conducted automatically by Covidence and manually by the reviewer. All automatically flagged duplicates will be manually checked by the reviewer before removal.
Title/Abstract and full-text screening will both be conducted on Covidence, where a record of all excluded citations will be held. Citations that progress to inclusion in the final study will be charted using a data extraction form on Notion [Notion, San Francisco, CA, United States of America].
Screening will be conducted by the lead reviewer. If additional reviewers are recruited during the study, disagreements will be documented and resolved through discussion.

Data management Only data required to answer the research question will be charted on the data extraction form hosted on Notion (Pollock et al., 2023). In practice, this means that the data extraction form will record bibliographic details and a field for each CIPP domain. For questions requiring categorisation, reviewer notes made during data extraction will allow for reflexive thematic analysis using the Braun and Clarke (2006) methodology (Mak and Thomas, 2022, Braun and Clarke, 2006).

Reporting results / Analysis of the evidence Evidence analysis and reporting will be done in line with this study's CIPP framework (Stufflebeam and Shinkfield, 1985). As applied to this study and its research questions, data related to context refers to the challenges associated with traditional credentialling models in healthcare higher education disciplines (e.g. medicine, nursing). Input refers to the specific blockchain architecture in terms of its features and organisation. For credentials minted as NFTs, their architecture will be categorised based on their underlying technology (e.g. Ethereum as a public architecture). Process is interpreted as the barriers to blockchain adoption and governance strategies which may be employed to implement blockchain credentialling. Finally, product refers to evidenced or theorised outcomes of using blockchain technology to support healthcare higher education credentialling.

Presentation of the results The findings of this study will be presented narratively, accompanied by tables, charts, and graphs to maximise fluency. The PRISMA flow chart will be generated automatically on Covidence during the screening process. Graphs and tables will be produced using Microsoft Excel [Microsoft, WA, United States of America]. The findings will then be discussed and recontextualised in the wider literature.

Language restriction English.

Country(ies) involved United Kingdom.

Keywords Blockchain; NFT; Digital Ledger; Healthcare Education; Credentialling; CIPP.

Contributions of each author
Author 1 - Patrick Doherty - Lead Reviewer.
Email: pdoherty1006@qub.ac.uk

References
AHMAD, S. S., KHAN, S. & KAMAL, M. A. 2019. What is Blockchain Technology and its Significance in the Current Healthcare System? A Brief Insight. Current Pharmaceutical Design, 25, 1402-1408.
ALNUAIMI, A., HAWASHIN, D., JAYARAMAN, R., SALAH, K. & OMAR, M. 2023. Trustworthy healthcare professional credential verification using blockchain technology. IEEE Access, 11, 109669-109688.
ARKSEY, H. & O'MALLEY, L. 2005. Scoping studies: towards a methodological framework. International Journal of Social Research Methodology, 8, 19-32.
AROMATARIS, E. & MUNN, Z. 2020. JBI manual for evidence synthesis, Jbi.
BRAUN, V. & CLARKE, V. 2006. Using thematic analysis in psychology. Qualitative research in psychology, 3, 77-101.
CHEUNG, K., ROGOZA, C., CHUNG, A. D. & KWAN, B. Y. M. 2021. Analyzing the Administrative Burden of Competency Based Medical Education. Canadian Association of Radiologists Journal, 73, 299-304.
GERSHUNI, O., ORR, J. M., VOGEL, A., PARK, K., LEIDER, J. P., RESNICK, B. A. & CZABANOWSKA, K. 2023. A systematic review on professional regulation and credentialing of public health

workforce. International journal of environmental research and public health, 20, 4101.
GOTTLIEB, M., DEUTSCH, C., HOOPS, F., PONGRATZ, H. & KRCMAR, H. 2024. Expedition to the blockchain application potential for higher education institutions. Blockchain: Research and Applications, 5, 100203.
KEMPENICH, J. W., WILLIS, R. E., CAMPI, H. D. & SCHENARTS, P. J. 2018. The Cost of Compliance: The Financial Burden of Fulfilling Accreditation Council for Graduate Medical Education and American Board of Surgery Requirements. Journal of Surgical Education, 75, e47-e53.
KRUSE, C. S., FREDERICK, B., JACOBSON, T. & MONTICONE, D. K. 2017. Cybersecurity in healthcare: A systematic review of modern threats and trends. Technology and Health Care, 25, 1-10.
MAK, S. & THOMAS, A. 2022. Steps for Conducting a Scoping Review. J Grad Med Educ, 14, 565-567.
MURRAY, T. L., PHILIPSEN, N. C., BRICE, E., HARVIN, L., HINDS, D. & WARREN-DORSEY, R. 2011. Health Care Fraud: Stopping Nurse Imposters. The Journal for Nurse Practitioners, 7, 753-760.
NAKAMOTO, S. 2008. Bitcoin: A peer-to-peer electronic cash system. Available at SSRN 3440802.
POLLOCK, D., PETERS, M. D., KHALIL, H., MCINERNEY, P., ALEXANDER, L., TRICCO, A. C., EVANS, C., DE MORAES, É. B., GODFREY, C. M. & PIEPER, D. 2023. Recommendations for the extraction, analysis, and presentation of results in scoping reviews. JBI evidence synthesis, 21, 520-532.
PONDKULE, P. M. & KOTHARI, S. 2025. Implementation of blockchain-based document management system for higher education organizations. International Journal on Smart Sensing and Intelligent Systems, 18.
SARMAH, S. S. 2018. Understanding blockchain technology. Computer science and engineering, 8, 23-29.
STUFFLEBEAM, D. L. & SHINKFIELD, A. J. 1985. Stufflebeam's Improvement-Oriented Evaluation. In: STUFFLEBEAM, D. L. & SHINKFIELD, A. J. (eds.) Systematic Evaluation: A Self-Instructional Guide to Theory and Practice. Dordrecht: Springer Netherlands.
TAYLOR, P. J., DARGAHI, T., DEHGHANTANHA, A., PARIZI, R. M. & CHOO, K.-K. R. 2020. A systematic literature review of blockchain cyber security. Digital Communications and Networks, 6, 147-156.
TRICCO, A. C., LILLIE, E., ZARIN, W., O'BRIEN, K. K., COLQUHOUN, H., LEVAC, D., MOHER, D., PETERS, M. D., HORSLEY, T. & WEEKS, L. 2018. PRISMA extension for scoping reviews (PRISMA-ScR): checklist and explanation. Annals of internal medicine, 169, 467-473.
WOELERT, P. 2023. Administrative burden in higher education institutions: a conceptualisation and a research agenda. Journal of Higher Education Policy and Management, 45, 409-422.