Advancing Healthcare: AI Integration, Interoperability and Sustainability Challenges

Bala Dhandayuthapani V.[a]

[a]**IT Department, College of Computing and Information Sciences, University of Technology and Applied Sciences, Shinas campus, Shinas, Oman**

DOI: 10.25929/j3xxxy63

ABSTRACT

This article explores the evolving landscape of healthcare transformation through intelligent integration, focusing on artificial intelligence (AI), interoperability, and sustainability in the digital era. This analysis thoroughly investigates various aspects, including patient-centric immunization systems, blockchain-based e-health management, resource optimization, and adaptable clinical solutions. The investigation is framed around evolving healthcare considerations, emphasizing a thorough exploration of advancements, comparisons, and challenges encountered in the implementation of intelligent and integrated healthcare systems. The conclusion provides valuable insights for healthcare professionals and policymakers, guiding the development of a more connected and intelligent healthcare ecosystem.

KEYWORDS

Intelligent integration, artificial intelligence (AI), interoperable systems, healthcare, sustainability

1. Introducion

The healthcare sector is undergoing a profound conversion due to the integration of innovative technologies, particularly the convergence of artificial intelligence (AI), interoperable systems, [1] and sustainable practices. In recent years, the healthcare industry has experienced a shift in basic assumptions towards intelligent integration, highlighting a development recognition of the capability assistance and encounter by these advanced technologies.

The need for a patient-centric, interoperable immunization information system is growing, with the rise of healthcare and public health associations recognizing the potential of the internet of things (IoT) in facilitating efficient healthcare services [2] The emergence of decentralized e-health systems built on blockchain technology presents challenges and opportunities, requiring careful attention to interoperability and synchronization management. Security [3] concerns in smart IoT applications require a comprehensive analysis to identify and address potential vulnerabilities.

The integration of AI in healthcare is promising for optimizing resources and promoting sustainability. It can transform diagnostics, treatment, and resource allocation. However, challenges include ensuring environmental sustainability in data-driven health analysis. This analysis investigates the intersection of AI and blockchain technology in electronic health records, identifying interoperability [4,5] requirements and challenges. Surveys provide insights into current trends and potential developments in IoT and AI implementation [6] in remote healthcare systems. [7] The analysis explores Medical 4.0 knowledge, focusing on advancements and applications in healthcare. It highlights the importance of consistent, flexible AI and IoT-based personalized healthcare assistance, emphasizing the need for a robust and adaptable healthcare infrastructure.

The integration of AI in smart cities [8] and healthcare techniques is transforming urban and healthcare environments. The scalability and interoperability of care medicine platforms and cloud-based hospital intelligence systems are crucial for advanced healthcare solutions. However, concerns about environmental sustainability have led to a scoping evaluation to assess current issues and identify potential improvements. This exploration extends to future computing paradigms for medical and emergency applications, emphasizing the need for alignment with sustainability goals.

The rapid digitization of the healthcare sector is driven by AI, interoperable [9] systems, and sustainable practices. However, challenges such as interoperability, security, and regulatory restrictions hinder their optimal integration. This analysis aims to explore ways to integrate these technologies to improve healthcare delivery, minimize challenges, and ensure long-term viability. Stakeholders recognize the benefits of AI, interoperable systems, and sustainable practices, and regulatory adaptation is crucial. Collaboration and knowledge sharing among stakeholders are essential for addressing challenges and driving innovation in healthcare.

This analysis aims to guide healthcare policy, technology development, and implementation by analyzing the intricate interactions between AI, interoperable systems, and sustainable practices. It seeks to provide a patient-centric approach, empower stakeholders to navigate digital transformation challenges, capitalize on opportunities, and foster global innovation in healthcare systems.

The dynamic interplay between AI, interoperable systems, and sustainable practices in the digital [10] era forms the bottom of this analysis. By addressing these issues, the analysis intends to provide valuable insights that can guide the ongoing transformation of healthcare towards a more efficient, patient-centric, and sustainable future. The article is formed into six sections: section 2 with analysis framework, section 3 with evolving healthcare considerations, section 4 with comprehensive explorations, section 5 with comparisons and challenges, and section 6 with a conclusion.

2. Analysis Framework

Intelligent Integration in Healthcare: The imperative for intelligent integration in healthcare envisions a patient-centric, interoperable immunization information system. [11] This approach aligns with the broader call for a comprehensive and connected healthcare ecosystem, facilitating the seamless flow of information for improved patient outcomes.

AI and Healthcare Transformation: The transformative potential of AI in healthcare has been extensively explored. Lim & Rahmani have published a survey on semantic IoT load inference attention management, emphasizing AI's role in facilitating collaboration in healthcare and public health. [12] The integration of AI promises to revolutionize diagnostics, treatment plans, and resource optimization. [13,14]

Interoperable Systems and Blockchain in Healthcare: The decentralized e-health systems are crucial factors in interoperability and administration [4,15] Blockchain-based decentralized e-health systems emphasize the need for effective interoperability and synchronization.4 The systematic examination of interoperability calls for blockchain-aided automated health records. [15]

Security Challenges in Smart IoT Applications: Security confronts in smart IoT applications within healthcare have been a focal point. [16] A comprehensive analysis based on security questions and conditions for smart IoT applications, highlights the need for robust solutions to safeguard healthcare data. [16]

Sustainability in AI-Driven Healthcare: The incorporation of AI in healthcare advances sustainability concerns, particularly in data-driven health exploration. [17,18] Samuel & Lucassen, and Richie conducted feasibility investigations on the environmental impact of data-driven health analysis, highlighting the need for environmentally conscious approaches in AI-driven healthcare analysis. [17,18]

Advancements in Medical 4.0 Technologies: Medical 4.0 technologies, characterized by the fusion of AI, interoperable systems, and sustainable practices, are a pivotal focus, [14] which explores the capabilities and applications of Medical 4.0 technologies, shedding light on their potential to reshape healthcare delivery. [14]

Future of Healthcare Computing Paradigms: The future of healthcare computing paradigms emphasizes the need for computing solutions that cater to medical and emergency applications. [19,20] These paradigms are crucial for ensuring the alignment of technological advancements with sustainability goals in healthcare.

Surveying AI Sustainability and Edge AI: Surveys on AI sustainability and edge AI contribute insights into emerging trends and challenges. [20,21] A survey on edge AI provides a comprehensive overview of scalable and interoperable platforms. [21] An analysis on AI sustainability outlines developing tendencies and analysis encounters. [20]

Wireless Standard-Compliant E-Health Solution: Martínez & González contribute to the literature by presenting a wireless standard-yielding e-health results catering to the specific needs of elderly populations. [22] This wireless solution aligns with the broader goal of creating interoperable systems that accommodate diverse healthcare requirements.

Blockchain-Based Models for Continuous Health Monitoring: Uppal et al. developed a blockchain-based model for endless health observation using the interplanetary file system. [23] This model addresses interoperability challenges and ensures secure, continuous health data monitoring in a decentralized framework.

Dynamic Bayesian Network Model for Resilience Assessment: Shah et al. present a dynamic Bayesian network model for flexibility evaluation in blockchain-based IoMT. [24] This model addresses encounters related to security, resilience, and adaptability in healthcare systems, emphasizing the importance of a dynamic approach to healthcare infrastructure.

Digital Care in Next-Generation Networks: Digital care explores next-generation networks, highlighting conditions and future directions. [25] This perspective is essential for understanding the evolving landscape of healthcare delivery and ensuring the adaptability of healthcare systems in the digital era.

I**ncremental Federated Learning for Infectious Diseases Monitoring**: Incremental amalgamated learning contributes insights into infectious disease monitoring, highlighting the potential of collaborative, privacy-preserving approaches in healthcare data analysis. [26] This aligns with the broader goal of creating intelligent and interoperable systems for healthcare surveillance.

AI in Physical Rehabilitation: Sumner et al. conducted an organized evaluation on the application of AI in physical rehabilitation, highlighting the promise of AI in developing rehabilitation outcomes. [27] This analysis aids the intelligence of AI's role in improving patient care and aligns with the broader theme of intelligent integration in healthcare.

Insights into the Internet of Medical Things (IoMT): It focuses on data mixture, security problems, and results. [28,29] This analysis addresses the challenges of interoperability and security in IoMT, contributing valuable insights to the broader discourse on intelligent healthcare systems.

Understanding Medical 4.0 Implementation: Akhtar et al. offer a unified multi-criteria decision-making method for understanding Medical 4.0 implementation. [30] This analysis provides a comprehensive perspective on the enablers shaping the implementation of intelligent, interoperable, and sustainable healthcare systems.

The related works reveal a rich needlepoint of analysis contributions focused on the integration of AI, interoperable systems, and sustainable practices in healthcare. From envisioning patient-centric immunization systems to addressing security challenges in Smart IoT applications, these studies collectively contribute to the ongoing discourse on reshaping healthcare delivery in the digital era.

3. Evolving Healthcare Considerations

This comprehensive analysis leads the way to the integration of AI, interoperable systems, and sustainable practices in healthcare. It will follow established guidelines, including inclusion and exclusion criteria, data extraction, thematic synthesis, comparative analysis, and conceptual framework development. As shown in Figure 1, the analysis will acknowledge potential limitations and ethical considerations, undergo validation through an iterative process, and synthesize insights to provide a holistic understanding of AI-driven, interoperable, and sustainable healthcare systems.

Figure 1: Evolving Healthcare Considerations.

Systematic Literature Review: An organized literature review was conducted to examine the existing body of knowledge on the integration of AI, interoperable systems, and sustainable practices in healthcare. The analysis will adhere to established guidelines, ensuring a rigorous and structured approach to identifying, screening, and evaluating relevant studies. [15,17,19]

Inclusion and Exclusion Criteria: It is determined to include studies available in peer-reviewed journals, conference proceedings, and reputable sources from the time period between 2020 and 2024. Studies focusing on AI applications in healthcare, interoperable systems, sustainability, and the interplay of these elements will be prioritized. The exclusion criteria will involve studies lacking relevance to the analysis focus or not meeting predefined quality standards.

Data Extraction: Data extraction will engage systematically gathering appropriate data from chosen findings, entering the authors, publication year, analysis design, methodologies, key findings, and implications. [4,11–14,16–18,20–28] This process will be conducted meticulously to ensure a comprehensive overview of the contributions made by each finding.

Thematic Synthesis: The extracted data will be thematically synthesized to determine recurrent themes, patterns, and gaps in the literature. This synthesis will be guided by the key elements of intelligent integration, challenges in AI adoption, interoperability, sustainability, and the broader implications for healthcare transformation. [4,11-14,16-18,20–28]

Comparative Analysis: A comparative analysis will be conducted to assess similarities, differences, and advancements across studies. This approach will aid in identifying evolving trends, emerging technologies, and areas where consensus or divergence exists within the literature. [15,19,20]

Framework Development: A conceptual framework developed based on the synthesized findings, providing a visual representation of the relationships between AI, interoperable systems, and sustainable practices in healthcare. [4,11–14,16–18,20–28] This framework [31] will be an instrument for understanding the complex interplay of these elements and guiding future analysis endeavours.

Limitations and Ethical Considerations: The analysis will acknowledge potential limitations such as publication bias and variations in analysis methodologies across studies. Ethical considerations will be paramount, ensuring that the data extraction process respects the intellectual property rights of authors and adheres to ethical standards. [4,11–14,16–18,20–28]

Validation and Iterative Process: This methodology will undergo validation through an iterative process involving feedback from peer reviewers and subject matter experts. This iterative approach will enhance the reliability and robustness of the analysis, ensuring that it captures the nuanced dynamics of intelligent integration in healthcare. [15,19]

Synthesis of Insights: The final stage will involve synthesizing insights derived from thematic analysis, comparative assessment, and conceptual framework development. This synthesis will contribute to a holistic understanding of the state-of-the-art in AI-driven, interoperable, and sustainable healthcare systems. [15,19]

This methodology aims to provide a comprehensive and structured analysis of the literature, offering valuable insights into the current landscape, challenges, and opportunities in the integration of AI, interoperable systems, and sustainable practices in healthcare.

4. Comprehensive Investigations

A transformational revolution is underway in the healthcare industry, facilitated by the seamless incorporation of technologies such as AI, interoperable systems, and sustainable practices. The convergence of these elements plays a pivotal role in reshaping healthcare delivery, optimizing resource utilization, and fostering a patient-centric approach, as illustrated in Figure 2.

Intelligent Integration in Healthcare: The concept of intelligent integration in healthcare heralds a new era where disparate systems collaboratively contribute to a more efficient and holistic patient care ecosystem. [11] This change in basic assumptions envisions the creation of patient-centric, interoperable immunization information systems that transcend traditional boundaries, ensuring the seamless exchange of vital health data. [11]

AI and Healthcare Transformation: The incorporation of AI into healthcare practices represents a monumental leap towards precision medicine and optimized resource utilization. [13] Leveraging AI, healthcare providers can streamline diagnostics, personalize treatment plans, and enhance overall patient outcomes. [14]

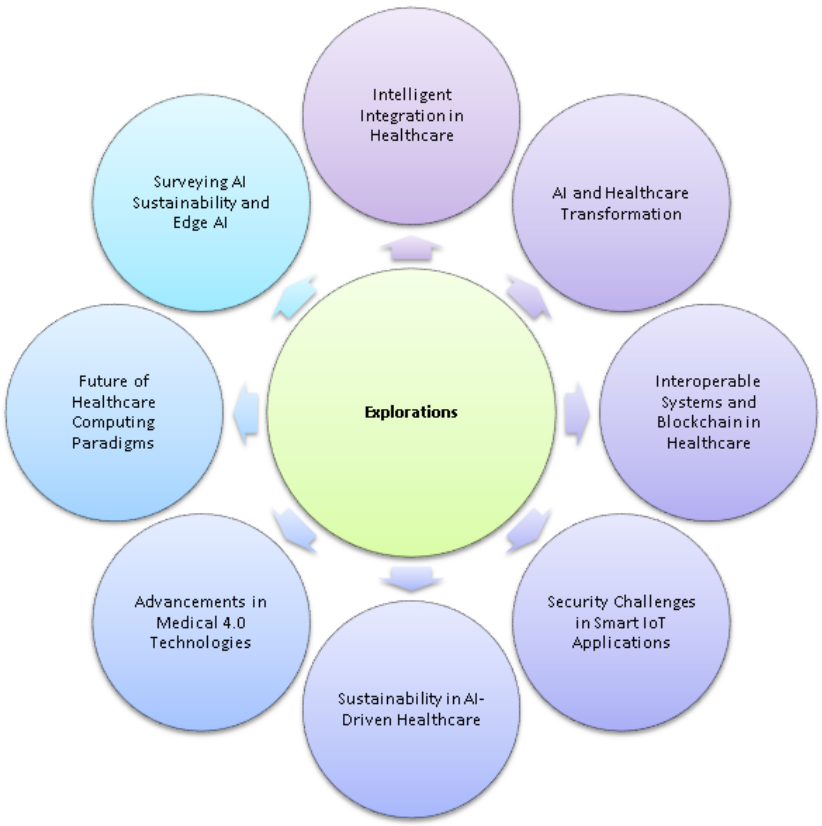

Figure 2: Comprehensive Exploration.

Interoperable Systems and Blockchain in Healthcare: The need for interoperability extends beyond AI integration, with blockchain-based decentralized e-health systems presenting novel opportunities and challenges. [4] Interoperability and synchronization management of these systems become critical components in realizing the full potential of blockchain in healthcare. [4,15]

Security Challenges in Smart IoT Applications: As healthcare systems embrace the IoT, security concerns become paramount. [16] The survey on security challenges in Smart IoT applications underscores the necessity for a comprehensive analysis to fortify the resilience of these interconnected healthcare ecosystems. [16]

Sustainability in AI-Driven Healthcare: The rise of AI in healthcare must be tempered with a commitment to sustainability. [18] As we explore the capabilities of AI in healthcare and social services, it becomes imperative to address environmental sustainability concerns associated with data-driven health analysis. [17,18]

Advancements in Medical 4.0 Technologies: The transition towards Medical 4.0 technologies represents a milestone in healthcare evolution. [14] By understanding the features, capabilities, and applications of these technologies, healthcare systems can adapt to the changing landscape and harness the benefits of innovation. [14]

Future of Healthcare Computing Paradigms: The evolution of computing models for medical situation applications underscores the importance of aligning technological advancements with the unique demands of healthcare delivery. [19] This forward-looking perspective aims to chart a course for the integration of emerging technologies in a sustainable manner. [19]

Surveying AI Sustainability and Edge AI: A comprehensive survey on AI sustainability and edge AI provides insights into emerging trends and challenges. [20,21] These insights are critical for shaping the discourse on sustainable AI implementation in healthcare and beyond. [20,21]

This embarks on a complete analysis interplay between AI, interoperable systems, and sustainable practices in the digital era is evident. By synthesizing findings from a myriad of studies and surveys, we aim to contribute valuable insights that can inform and guide the ongoing transformation of healthcare towards a more efficient, patient-centric, and sustainable future.

5. Comparisons and Challenges

The comparison of findings is shown in Figure 3. with the previous investigation reveals a nuanced understanding of the practical implications of integrating AI, interoperable systems, and sustainable practices in healthcare. The synthesis of insights from the related work offers a basis for evaluating the progress made in the field and identifying key practical implications for healthcare practitioners, policymakers, and technology developers.

Figure 3: Comparison of Findings.

Patient-Centric Systems: Previous analysis, as highlighted, [11] emphasizes the importance of envisioning patient-centric, interoperable immunization information systems. The practical implication is the need to prioritize the development of systems that empower patients, facilitate seamless information exchange, and enhance the overall healthcare experience.

AI-Driven Transformations: The transformative potential of AI in healthcare, as explored by Lim & Rahmani, [12] is reaffirmed. Practical implications revolve around the implementation of AI-driven solutions to improve diagnostics, treatment plans, and resource optimization, aligning with the broader goal of enhancing patient outcomes. [13,14]

Blockchain for Interoperability: Analysis on blockchain-based decentralized e-health systems 4 and interoperability challenges [15] underscores the practical significance of addressing data exchange issues. The implication is the imperative for healthcare systems to invest in interoperable solutions, leveraging blockchain to enhance transparency, security, and synchronization. [4,15]

Security Challenges and Regulatory Compliance: Security challenges in Smart IoT applications [16] and the need for regulatory compliance are critical considerations. The practical implications highlight the obligation for healthy security procedures and adherence to regulatory frameworks to encourage AI-driven healthcare solutions. [16]

Sustainability in AI-Driven Healthcare: Insights into the environmental sustainability of data-driven health investigations [17,18] underscore the upright and realistic implications of sustainable AI implementation. The findings emphasize the importance of aligning technological advancements with sustainability goals, acknowledging the environmental impact of AI in healthcare. [17,18]

Medical 4.0 Technologies: Advancements in Medical 4.0 technologies [8] offer practical insights into features, capabilities, and applications. The practical implication is the strategic adoption of these technologies in order to reshape healthcare delivery, optimizing resource utilization and improving patient care. [8]

Computing Paradigms and AI Sustainability: The future of healthcare computing paradigms [19,20] and surveys on AI sustainability 20 provide practical guidance for the integration of emerging technologies. The practical implications involve aligning computing paradigms with sustainability goals, ensuring scalability, and addressing emerging challenges in AI sustainability. [19,20]

Wireless Solutions and Blockchain-Based Models: The exploration of wireless standard-compliant e-health solutions [22], blockchain-based models for continuous health monitoring, [25] and dynamic Bayesian network models [26] offers practical solutions for specific healthcare needs. The implications involve the adoption of wireless solutions, decentralized monitoring, and dynamic approaches for resilience assessment in healthcare systems. [22–24]

Digital-Care in Next-Generation Networks: It provides practical insights into the evolving environment of healthcare delivery. Practical implications involve understanding the requirements and future directions for implementing digital care solutions within advanced network infrastructures. [25]

Incremental Federated Learning and AI in Physical Rehabilitation: Studies on incremental federated learning [26] and AI in physical rehabilitation [27] offer practical approaches for collaborative data analysis and improving rehabilitation outcomes. The implications include adopting privacy-preserving approaches and leveraging AI for personalized rehabilitation programs. [26,27]

Internet of Medical Things (IoMT): Insights into the IoMT [29] highlight practical aspects regarding data fusion, security, and results. The practical implication involves addressing interoperability and security challenges in IoMT, ensuring continuous, secure health data monitoring. [29]

Integrated Multi-Criteria Decision-Making for Medical 4.0: The implementation of Medical 4.0 via a combined multi-standards decision-making method [30] offers practical enablers for stakeholders. The implications involve utilizing a structured decision-making framework for effective implementation of intelligent, interoperable, and sustainable healthcare systems. [30]

The comparison of findings with previous analysis reveals a cohesive narrative on the practical implications of intelligent integration in healthcare. Stakeholders can draw from these insights to make informed decisions, implement interoperable systems, address security challenges, and foster sustainability in the era of AI-driven healthcare. The practical implications underscore the need for a collaborative, patient-centric approach that embraces technological advancements while ensuring ethical, secure, and sustainable healthcare practices. There are more challenges confronting the integration of AI, interoperable systems, and sustainable practices in healthcare. These include:

- **Interoperability:** It ensures seamless data exchange and interoperability between disparate healthcare systems and remains a formidable challenge.

- **Security and Privacy:** It safeguards patient data from cybersecurity threats. Maintaining privacy standards poses significant hurdles.

- **Regulatory Compliance:** It navigates complex regulatory frameworks. Ensuring compliance with healthcare regulations adds layers of complexity to technology implementation.

- **Resource Allocation:** It optimizes resource allocation while maintaining sustainability goals. It requires careful planning and coordination.

- **Ethical Considerations:** It addresses ethical implications related to AI decision-making, data usage, and patient consent. It presents ongoing challenges.

- **Technological Complexity:** It manages the complexity of integrating AI algorithms, blockchain technology, and IoT devices. It demands expertise across multiple domains.

6. Conclusions

The article explores the intersection of AI, interoperable systems, and sustainability in healthcare analysis by providing a comprehensive understanding for practitioners, policy-makers, and technology developers. It highlights the transformative potential of intelligent integration in patient-centric, technologically advanced, and sustainable healthcare solutions. The article highlights patient-centric approaches, AI-driven transformations, blockchain interoperability, security challenges, sustainability considerations, and the integration of Medical 4.0 technologies. It serves as a roadmap for advancing healthcare through intelligent integration, advocating for patient-centric systems, robust security, sustainability, and strategic implementation of evolving knowledge. This analysis contributes to shaping a future where AI, interoperable systems, and sustainability converge, redefining healthcare delivery for a healthier, more connected world.

References and notes

[1] Breidenbach M, Engelbrecht R, Hasman A, et al. Development of a flexible and interoperable architecture to customize clinical solutions targeting the care of multimorbid patients. In: *ACM International Conference Proceedings Series*. 2022:12–17. https://doi.org/10.1145/3563137.3563157.

[2] Taimoor N, Rehman S. Reliable and Resilient AI and IoT-Based Personalised Healthcare Services: A Survey. *IEEE Access*. 2022;10:535–563. https://doi.org/10.1109/ACCESS.2021.3137364.

[3] Szczepaniuk H, Szczepaniuk EK. Cryptographic evidence-based cybersecurity for smart healthcare systems. *Information Sciences*. 2023;649:119633. https://doi.org/10.1016/j.ins.2023.119633.

[4] Biswas S, Sharif K, Li F, Latif Z, Kanhere SS, Mohanty SP. Interoperability and Synchronization Management of Blockchain-Based Decentralized e-Health Systems. *IEEE Transactions on Engineering Management.* 2020;67(4):1363–1376. https://doi.org/10.1109/TEM.2020.2989779.

[5] Pimenta N, Chaves A, Sousa R, Abelha A, Peixoto H. Interoperability of Clinical Data through FHIR: A review. *Procedia Computer Science.* 2023;220:856-861. https://doi.org/10.1016/j.procs.2023.03.115.

[6] Alshamrani M. IoT and artificial intelligence implementations for remote healthcare monitoring systems: A survey. *Journal of King Saud University - Computer and Information Sciences.* 2022;34(8):4687–4701. https://doi.org/10.1016/j.jksuci.2021.06.005.

[7] Boikanyo K, Zungeru AM, Sigweni B, Yahya A, Lebekwe C. Remote patient monitoring systems: Applications, architecture, and challenges. *Scientific African.* 2023;20. https://doi.org/10.1016/j.sciaf.2023.e01638.

[8] Sowmitha R, Shanmuga RS, Harshini R, Arjuna S, Ram KC. Artificial Intelligence in Smart cities and Healthcare. *EAI Endorsed Transactions on Smart Cities.* 2022;6(3). https://doi.org/10.4108/eetsc.v6i3.2275.

[9] Jang JS, Kim N, Lee SH. Scalable and Interoperable Platform for Precision Medicine: Cloud-based Hospital Information Systems. *Healthcare Informatics Research.* 2022;28(4):285–286. https://doi.org/10.4258/hir.2022.28.4.285.

[10] Madanian S, Nakarada-Kordic I, Reay S, Chetty T. Patients' perspectives on digital health tools. *PEC Innovation.* 2023;2:100171. https://doi.org/10.1016/j.pecinn.2023.100171.

[11] Atkinson KM, Mithani SS, Bell C, Rubens-Augustson T, Wilson K. The digital immunization system of the future: imagining a patient-centric, interoperable immunization information system. *Therapeutic Advances in Vaccines and Immunotherapy.* 2020;8:1–15. https://doi.org/10.1177/2515135520967203.

[12] Lim S, Rahmani R. Toward semantic IoT load inference attention management for facilitating healthcare and public health collaboration: A survey. *Procedia Computer Science.* 2020;177:371–378. https://doi.org/10.1016/j.procs.2020.10.050.

[13] Sciarretta E, Mancini R, Greco E. Artificial Intelligence for Healthcare and Social Services: Optimizing Resources and Promoting Sustainability. *Sustainability.* 2022;14(24):16464. https://doi.org/10.3390/su142416464.

[14] Haleem A, Javaid M, Singh RP, Suman R. Medical 4.0 technologies for healthcare: Features, capabilities, and applications. *Internet of Things and Cyber-Physical Systems.* 2022;2:12–30. https://doi.org/10.1016/j.iotcps.2022.04.001.

[15] Reegu FA, Reeg L, Kumar V, et al. Interoperability Requirements for Blockchain-Enabled Electronic Health Records in Healthcare: A Systematic Review and Open Research Challenges. *Security and Communication Networks.* 2022;2022:9227343. https://doi.org/10.1155/2022/9227343..

[16] Tariq N, Khan FA, Asim M. Security Challenges and Requirements for Smart Internet of Things Applications: A Comprehensive Analysis. *Procedia Computer Science.* 2021;191:425–430. https://doi.org/10.1016/j.procs.2021.07.053.

[17] Samuel G, Lucassen AM. The environmental sustainability of data-driven health research: A scoping review. *Digital Health.* 2022;8:20552076221111297. https://doi.org/10.1177/20552076221111297.

[18] Richie C. Environmentally sustainable development and use of artificial intelligence in health care. *Bioethics*. 2022;36(5):547–555. https://doi.org/10.1111/bioe.13018.

[19] Alekseeva D, Ometov A, Arponen O, Lohan ES. The future of computing paradigms for medical and emergency applications. *Computer Science Review.* 2022;45:100494. https://doi.org/10.1016/j.cosrev.2022.100494.

[20] Chen Z, Wu M, Chan A, Li X, Ong YS. Survey on AI Sustainability: Emerging Trends on Learning Algorithms and Research Challenges [Review Article]. IEEE Computational Intelligence Magazine. 2023;18(2):60–77. https://doi.org/10.1109/MCI.2023.3245733.

[21] Singh R, Gill SS. Edge AI: A survey. *Internet of Things and Cyber-Physical Systems.* 2023;3:71–92. https://doi.org/10.1016/j.iotcps.2023.02.004.

[22] Martínez I, González F. Wireless standard-compliant e-health solution for elderly people with multiuser identification. *Heliyon.* 2023;9(4). https://doi.org/10.1016/j.heliyon.2023.e15394.

[23] Uppal S, Kansekar B, Mini S, Tosh D. HealthDote: A blockchain-based model for continuous health monitoring using interplanetary file system. *Healthcare Analytics.* 2023;3:100175. https://doi.org/10.1016/j.health.2023.100175.

[24] Shah C, Ibne Hossain NU, Khan MM, Alam ST. A dynamic Bayesian network model for resilience assessment in blockchain-based internet of medical things with time variation. *Healthcare Analytics.* 2023;4:100280. https://doi.org/10.1016/j.health.2023.100280.

[25] Ahmad R, Hämäläinen M, Wazirali R, Abu-Ain T. Digital-care in next generation networks: Requirements and future directions. *Computer Networks.* 2023;224:109599. https://doi.org/10.1016/j.comnet.2023.109599.

[26] Javed I, Iqbal U, Bilal M, et al. Next Generation Infectious Diseases Monitoring Gages via Incremental Federated Learning: Current Trends and Future Possibilities. *Computational Intelligence and Neuroscience.* 2023;2023:1102715. https://doi.org/10.1155/2023/1102715.

[27] Sumner J, Lim HW, Chong LS, et al. Artificial intelligence in physical rehabilitation: A systematic review. *Artificial Intelligence in Medicine.* 2023;146(2022):102693. https://doi.org/10.1016/j.artmed.2023.102693.

[28] Huang C, Wang J, Wang S, Zhang Y. Internet of medical things: A systematic review. *Neurocomputing.* 2023;557:126719. https://doi.org/10.1016/j.neucom.2023.126719.

[29] Ahmed SF, Bin Alam MS, Afrin S, et al. Insights into Internet of Medical Things (IoMT): Data fusion, security issues and potential solutions. *Information Fusion.* 2024;102:102060. https://doi.org/10.1016/j.inffus.2023.102060.

[30] Akhtar MN, Haleem A, Javaid M, Vasif M. Understanding Medical 4.0 implementation through enablers: An integrated multi-criteria decision-making approach. *Informatics in Health.* 2024;1(1):29–39. https://doi.org/10.1016/j.infoh.2023.11.001.

[31] Janbi N, Katib I, Mehmood R. Distributed artificial intelligence: Taxonomy, review, framework, and reference architecture. *Intelligent Systems with Applications.* 2023;18:200231. https://doi.org/10.1016/j.iswa.2023.200231.