Global Trends in Science and Technology

ISSN : 3079-5761
Volume 1, Number 1, January, 2025
https://doi.org/10.70445/gtst.1.1.2025.143-159

# Future of Health Informatics: Bridging Technology and Healthcare

**Mohammed Javeedullah**[1*]

[1]New England College 98 Bridge Street, Henniker, NH 03242

[1]JMohammed3_GPS@nec.edu

**Corresponding Author**

**Mohammed Javeedullah**
JMohammed3_GPS@nec.edu

**Article History:**
Submitted: 08-03-2025
Accepted: 31-03-2025
**Published: 04-04-2025**

**Keywords**
Health Informatics, Electronic Health Records, Artificial Intelligence, Machine Learning, Interoperability.



## ABSTRACT

Health informatics is transforming healthcare by integrating technology, data analytics, and healthcare delivery systems. The review examines healthcare informatics development through discussions of EHRs as well as telehealth and mobile health device implementation. Medical diagnostic innovation along with patient treatment along with data security improvement have emerged through developing technologies such as artificial intelligence (AI) machine learning (ML) and block chain systems and the Internet of Medical Things (IoMT). These advanced healthcare technologies bring important advantages to medical care together with operational effectiveness yet the barriers of data protection along with system interface capabilities and official requirements and staff capability development persist. The potential of health informatics to develop an advanced healthcare platform depends on conquering current obstacles that launch its complete capabilities. The review stresses the requirement for innovation together with teamwork to achieve full benefits of health informatics solutions within the healthcare sector.

## INTRODUCTION

Health informatics represents a multidisciplinary discipline which unites healthcare expertise with information technology functionality as well as data science capabilities to optimize patient treatment and medical workflows and clinical decisions in health institutions. The field uses information and communication technologies (ICT) for effective healthcare delivery while promoting health efforts and ensuring safe patient information handling [1]. The use of health informatics systems allows clinical personnel to use data for creating evidence-based treatments and personalized care and

ISSN : 3079-5761
Volume 1, Number 1, January, 2025
https://doi.org/10.70445/gtst.1.1.2025.143-159

operational resource optimization within healthcare settings.

The digital era has clearly demonstrated the critical role of health informatics because health data volume continues to escalate rapidly. Several forms of healthcare data flow into systems from electronic health records (EHRs) and wearable devices as well as telehealth platforms and laboratory information systems and health management applications [2]. Healthcare delivery requires seamless operation to extract, store, analyze and share data which enables high-quality service delivery. Healthcare providers achieve better patient results alongside lowered expenses through operational improvements when they apply data-based knowledge to their work [3].

The use of traditional paper records within healthcare systems previously produced multiple problems such as teams working inefficiently because of duplicated efforts and documentation mistakes. The medical sector started moving towards digital systems during late twentieth century because enhanced computing capabilities along with enhanced healthcare requirements created the necessity for more effective medical services [4]. EHRs introduced a key development which allowed healthcare providers to document record information jointly and retrieve and exchange patient data in present time. The digital revolution allowed healthcare professionals to develop full health informatics solutions which reshaped medical services' delivery approach [5].

Health informatics currently contains four main domains about clinical informatics together with bioinformatics and public health informatics and consumer health informatics. The healthcare domains operate separately to address medical requirements which include clinical decision support and disease surveillance and telemedicine and patient engagement services [6]. Health informatics significantly contributes to population health management by utilizing predictive analytics and big data technologies to recognize patterns and stop diseases alongside optimizing health services delivery.

Rising technological progress in health informatics coupled with healthcare requirements drives the necessity for this study. New technological breakthroughs in AI together with machine learning and block chain and the Internet of Medical Things (IoMT) stand ready to transform health informatics therefore demanding exploration of its future path. This paper gives a complete summary of modern health informatics patterns and upcoming developments as well as obstacles while revealing how new developments can link technology to healthcare to provide advanced quality care [7].

## BACKGROUND AND EVOLUTION OF HEALTH INFORMATICS

Health informatics experienced rapid development through the last several decades because of technological progress while healthcare requirements increased together with the necessity to improve patient care efficiency. Medical organizations initiated their first computer applications for

ISSN : 3079-5761
Volume 1, Number 1, January, 2025
https://doi.org/10.70445/gtst.1.1.2025.143-159

administrative and financial purposes during the 1960s. Gradually hospitals started directing their efforts toward clinical applications that resulted in the creation of electronic health records (EHRs) alongside health information systems [8].

Healthcare organizations started implementing computerized systems during the 1980s and 1990s to oversee patient records and develop procedural efficiencies and minimize procedural errors. The initial healthcare systems demonstrated poor interoperable capabilities since they failed to maintain standards for proper integration [9]. Limited interoperability between healthcare professionals prevented them from effectively exchanging as well as analyzing patient records. New personal computer technologies developed during the 1990s and networked environments enabled healthcare organizations to implement advanced systems which facilitated information sharing between departments as well as facilities [10].

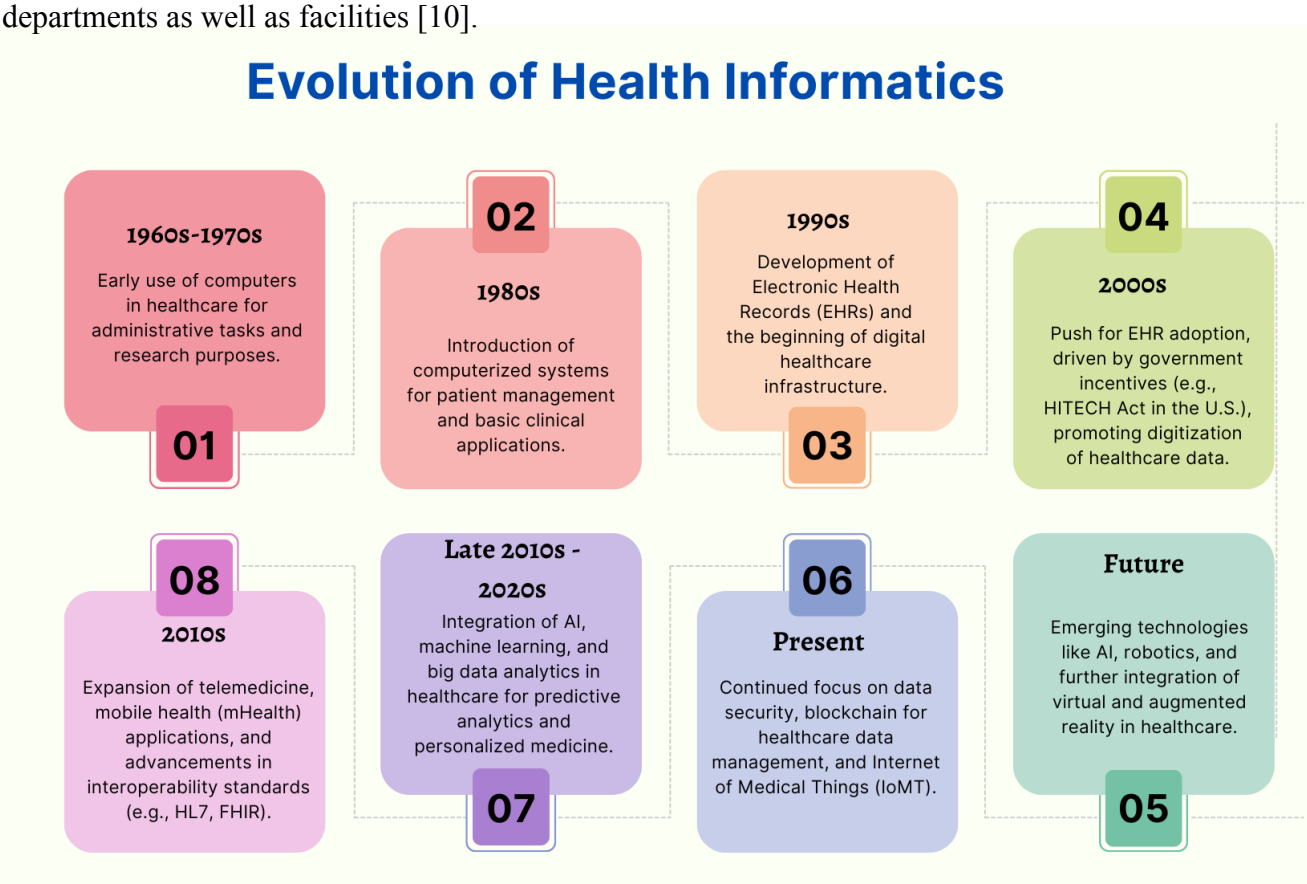


Figure: 1 showing evolution of health informatics

EHR adoption reached a primary achievement during the early 2000s through worldwide initiatives. Total worldwide governmental support emerged for electronic healthcare records because of their proven benefits in care coordination and cost reduction as well as patient safety improvement [11]. Healthcare providers in the United States received financial benefits through the Health Information Technology for Economic and Clinical Health (HITECH) Act to implement EHR systems with certification. Healthcare digitization started its wide-scale growth at this point [12].

ISSN : 3079-5761
Volume 1, Number 1, January, 2025
https://doi.org/10.70445/gtst.1.1.2025.143-159

Health informatics keeps expanding its scope during contemporary times because it includes telehealth services together with mobile applications and wearable devices and advanced analytical applications. Predictive analytics along with personalized care emerges from artificial intelligence (AI) and machine learning integration [13]. Modern healthcare/data collection processes benefit from three particular technologies including cloud computing platforms, blockchain solutions and Internet of Medical Things (IoMT) devices.

The development of health informatics technology created a basis for data-led healthcare which leads to improved clinical decisions while boosting patient involvement in their health care process and disease oversight. Healthcare informatics will face additional barriers in its advancement because data privacy and network compatibility issues join digital access limitations [14].

## CURRENT TRENDS IN HEALTH INFORMATICS

Health informatics has experienced rapid development because of combining advanced technologies with healthcare systems. Healthcare trends now revolutionize the way patient information is handled and processed for better medical care delivery and patient results. Healthcare systems have experienced a substantial digital revolution among all other health trends [15]. EHRs function as modern healthcare system core infrastructure which provides patients with continuous access to their medical documents through central storage facilities. Health information technology through electronic health records serves to unite patient care by eliminating unnecessary work and delivering complete medical information in current times. The existing issues about interoperability and usability continue to present ongoing challenges [16].

Telehealth along with remote monitoring solutions increased their importance during the COVID-19 pandemic period. People can conveniently use virtual consultations combined with mobile health apps and remote patient monitoring systems and inexpensive solutions for chronic disease care as well as post-surgical recovery support and mental healthcare interventions [17]. Remote care tools enable better healthcare service delivery especially to people residing in underserved rural areas and medically isolated locations. Medical advances in mobile health (mHealth) technologies now equip patients to adopt self-management of their health by using application programs and wearable electronic equipment which track their vital signs along with their medication use and fitness performance [18].

Global Trends in Science and Technology

ISSN : 3079-5761
Volume 1, Number 1, January, 2025
https://doi.org/10.70445/gtst.1.1.2025.143-159

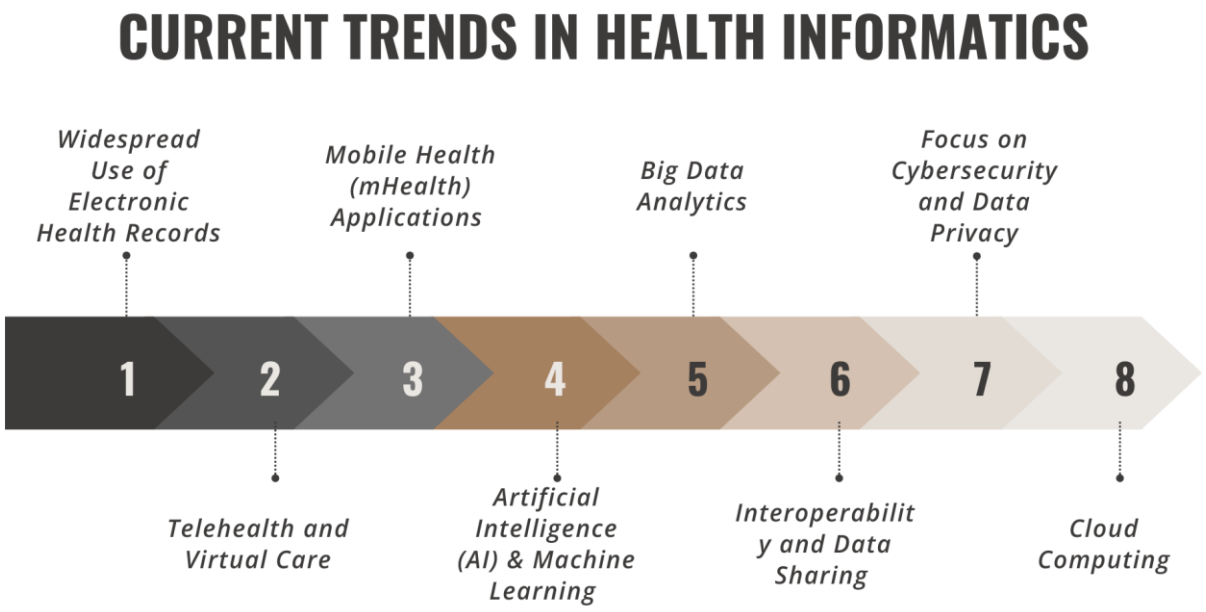


Figure: 2 showing current trends in health informatics

Health informatics continues transforming due to artificial intelligence (AI) and machine learning (ML) implementations. AI tools guide clinical decisions and carry out administrative work as well as process large datasets to project patient outcomes. Through AI algorithms healthcare personnel receive support in disease diagnosis alongside the identification of high-risk patients as well as personalized treatment selection. Through predictive analytics healthcare providers identify potential medical issues during time they are still manageable [19].

Health informatics functions best when staff can easily share information and data across different systems. Fast Healthcare Interoperability Resources (FHIR) works to simplify health data sharing standards which establishes a smooth information exchange between various health systems. Healthcare providers gain better care coordination capabilities through access to patient data from any system origin [20]. The importance of data privacy together with cybersecurity has grown significantly because healthcare systems continue their digitization. Patient data security demands strong protection systems which must obey regulatory standards while requiring perpetual surveillance of threats as well as sensitive data breaches [21].

Health informatics is undergoing changes that will produce healthcare services which provide customized treatments through improved operational efficiency along with broader accessibility. The path forward faces hurdles because security threats require improvement along with agreement standards among health systems and adjustments to regulate changes in the industry [22]. Digital transformation efforts will create conditions where data-based intelligence enables both patient users

ISSN : 3079-5761
Volume 1, Number 1, January, 2025
https://doi.org/10.70445/gtst.1.1.2025.143-159

and health practitioners to achieve superior healthcare results.

## EMERGING TECHNOLOGIES AND INNOVATIONS

Various emerging technological assets will define the course of health informatics progress by delivering transformative healthcare delivery while maximizing patient outcomes while simplifying clinical workflow processes. Digital innovation initiatives currently produce healthcare system transformations to enhance patient dataset collection processes as well as analytical capacities [23].

The Internet of Medical Things (IoMT) stands as an exciting emerging technology because it describes medical devices alongside their applications that exchange data through internet networks. Shopping devices under the Internet of Medical Things (IoMT) category receive and track immediate health parameters through wearable fitness trackers and smart implants and remote monitoring devices [24]. The analytics system evaluates patient information for ongoing illness surveillance and medicine compliance tracking as well as customized healthcare services. The implementation of Internet of Medical Things will minimize hospital admissions while providing timely medical care to achieve better health results for patients [25].

Health data management gets better through the emerging block chain technology which provides both security and transparency for information systems. This technology provides distributed and resistant data storage which maintains privacy and integrity of medical records [26]. Medical organizations can use block chain technology to ensure safe data exchange between providers and improve billing processes and defend against unauthorized access to healthcare data. Patients have enhanced privacy through block chain technology because the platform lets them manage health record accessibility [27].

Health informatics experiences a transformative impact from Artificial Intelligence (AI) and Machine Learning (ML) because these technologies generate predictions as well as deliver clinical choices with automated document handling capabilities. AI algorithms work with extensive datasets to conduct disease diagnosis and make patient forecast estimates and suggest medical treatment approaches [28]. Healthcare professionals benefit from AI because the technology analyzes medical images while identifying initial disease warnings and develops individual treatment solutions. When fed with new data resources ML models enhance their accuracy levels gradually [29].

Global Trends in Science and Technology
ISSN : 3079-5761
Volume 1, Number 1, January, 2025
https://doi.org/10.70445/gtst.1.1.2025.143-159

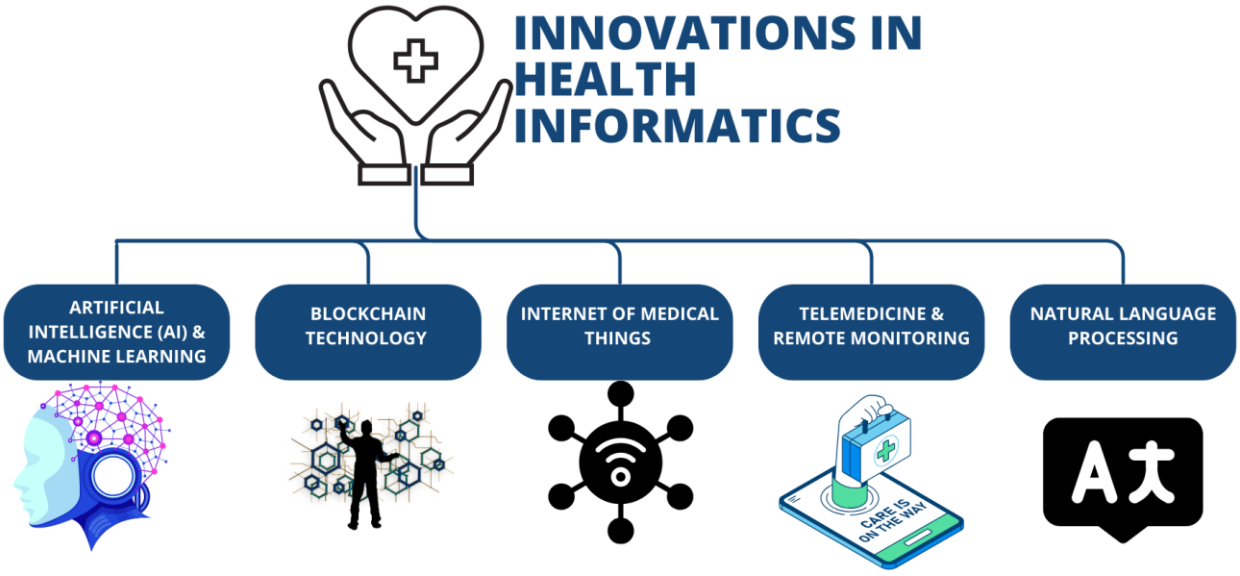


Figure: 3 showing innovations in health informatics

Healthcare professionals embrace both VR and AR technologies as effective solutions in their medical practice. Medical professionals utilize VR technology for treatment of pain and mental health therapy and surgical training objectives. Doctors can benefit from AR applications as they provide anatomical patient information during surgery which makes their operations more precise and decreases the associated risks [30]. Through cloud computing institutions access flexible and economical systems to handle health data storage and management. The technology allows immediate data access and supports medical video calls combined with the ability to unify healthcare practitioners [31]. New emerging technologies develop healthcare into a system that utilizes patient-specific data while offering individual care to each patient. Healthcare organizations need to resolve problems linked to data privacy together with regulatory compliance and digital access limitations for successful implementation [32].

## BENEFITS OF HEALTH INFORMATICS IN HEALTHCARE

The healthcare landscape transformed under health informatics through better patient care and better decisions in medicine and superior operational performance. The main advantage arises from utilizing data-driven support systems which enhance medical results for patients [33]. Healthcare providers exploit electronic health records combined with predictive analytics to detect vulnerable patients therefore ensuring they deliver proper interventions on time while monitoring the treatment success. The preventive method helps decrease medical mistakes and raise patient protective measures [34]. Health informatics brings great advantages through its applications in systems that deliver precise

ISSN : 3079-5761
Volume 1, Number 1, January, 2025
https://doi.org/10.70445/gtst.1.1.2025.143-159

medical care to individual patients. Healthcare practitioners can fine-tune personalized treatment strategies through the combination of advanced analytics and artificial intelligence which incorporates genetic information and life-style-specific data on their patients. Precise approach in health care decreases the need for experimental treatments by delivering targeted therapies [35].

The main benefit of health informatics systems includes improved care coordination because they establish seamless communication channels between healthcare providers. A healthcare system's interoperability enables instant patient information sharing which stops duplicate work and maintains medical care continuity [36]. Health informatics systems maintain full medical records transfer between primary care and specialist care so patients experience reduced diagnostic times and decreased possibility of healthcare mistakes [37].

The use of health informatics improves both healthcare expense management and operational workflows. Healthcare organizations achieve cost-effectiveness through the automation of administrative duties which boosts productivity by eliminating human mistakes and decreasing workload. Medical system operates more efficiently because this efficiency reduces healthcare expenses at the same time healthcare providers have more time to dedicate to treating their patients [38].

Health informatics enables better patient involvement through self-management tools which include mobile health applications and patient portal access systems. Through these digital platforms patients can monitor their health information and get in touch with medical staff and educational content which builds patient self-mastery in their health care [39].

The platform helps healthcare providers with population health management as its additional valuable feature. Health informatics systems use combined data from multiple sources to find consistent patterns and trends which allows authorities to create preventive public health programs. Health informatics performs complete data analysis to address community health issues successfully and in advance [40]. Health informatics enhances healthcare delivery efficiency with benefits including better patient outcomes and lower costs and stronger healthcare professional alliances. The integration of contemporary technologies and analytic principles through this system makes it possible to create an efficient healthcare delivery system which prioritize patient needs [41].

## CHALLENGES AND BARRIERS IN HEALTH INFORMATICS

The system needs effective resolution of multiple technical obstacles to achieve complete organization-wide connection and benefit extraction from its implementation. Data privacy along with cybersecurity issues represents one of the main significant obstacles which exists today. Healthcare digitization leads to an increasing danger of data security incidents and cyber threats [42].

ISSN : 3079-5761
Volume 1, Number 1, January, 2025
https://doi.org/10.70445/gtst.1.1.2025.143-159

All sensitive healthcare information that includes personal medical records along with identity information must remain free from unauthorized accessibility. Organizations face significant difficulties when they aim to meet requirements established by both HIPAA for U.S. data privacy and the European GDPR data protection rules. Organizations need to spend resources on developing strong security systems which combine encryption features with multi-factor authentication technology besides executing periodic audits [43].

The obstacles involving data exchange interoperability pose major technical challenges. Healthcare institutions maintain unique EHR systems that guard patient data through different proprietary software platforms which resist efficient information exchange among institutions. The absence of healthcare standards creates problems with patient care organization and disrupts treatment follow-up which results in uncoordinated medical services [44]. The adoption of Fast Healthcare Interoperability Resources (FHIR) and Health Level Seven (HL7) efforts attempts to solve interoperability problems though these solutions face challenges before extensive implementation [45]. Healthcare organizations face major challenges because standards and compliance rules are extremely intricate to understand. Healthcare organizations deal with an intricate set of laws that change depending on the country and geographical region they operate in. The continuous changes in healthcare standards together with policies prevent healthcare providers from remaining in compliance. The extensive regulations slow down the rollout of new solutions while creating a negative impact on entrepreneurial support for modern medical technology [46].

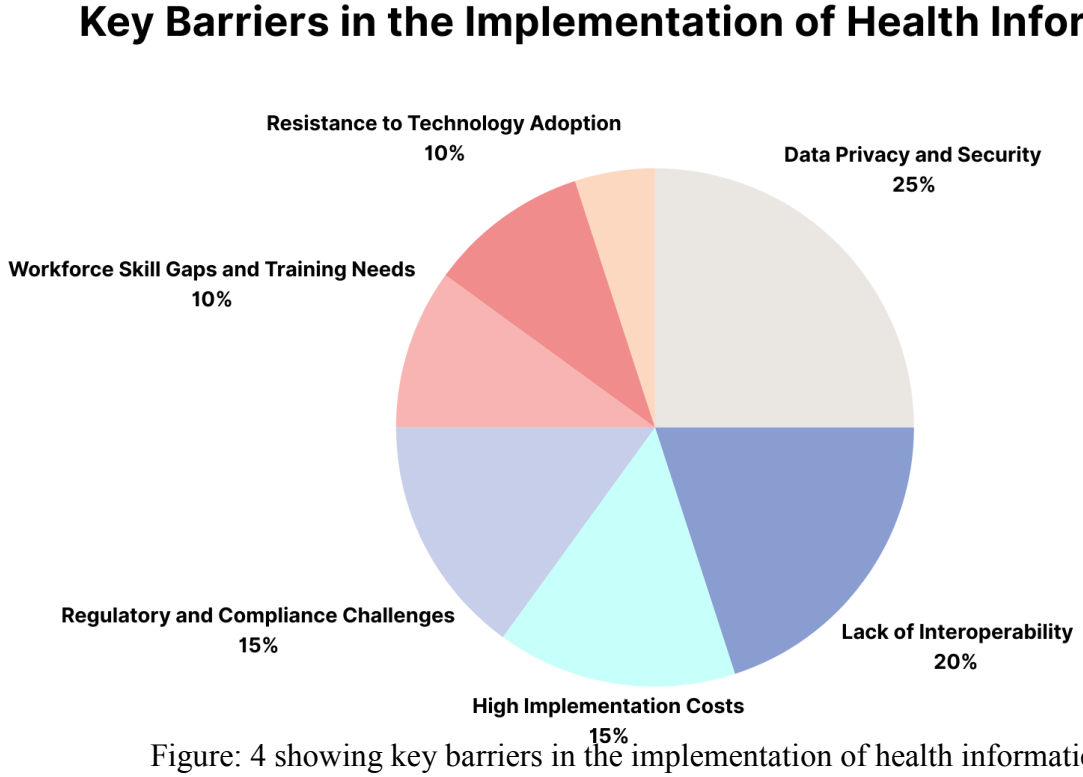


Figure: 4 showing key barriers in the implementation of health informatics

ISSN : 3079-5761
Volume 1, Number 1, January, 2025
https://doi.org/10.70445/gtst.1.1.2025.143-159

The health informatics field is affected by both skill deficiencies and insufficient medical staff. The absence of appropriate learning opportunities for healthcare staff creates barriers to their effective utilization of health informatics systems which results in inefficient and underutilized processes. Experienced healthcare staff need proper training while IT experts must link their work with clinical staff for proper implementation success [47]. Furthermore the expensive cost of implementation blocks many healthcare facilities along with smaller medical groups. The implementation of advanced information systems including EHRs and analytics software and cybersecurity needs considerable financial backing [48]. The successful implementation of health informatics depends on resolving current challenges because it will unlock its complete potential to serve patients with high-quality and data-based personalized care [49].

## FUTURE DIRECTIONS AND OPPORTUNITIES IN HEALTH INFORMATICS

Health informatics development leads to promising new directions in healthcare which will revolutionize medical service delivery but also deliver better clinical results and provide solutions to active system problems. Future healthcare solutions will aim to deliver individualized efficient and data-based care through new technological and analytical systems that target healthcare's main challenges [50].

The implementation of artificial intelligence (AI) with machine learning (ML) technology represents a major chance for clinical use. Artificial intelligence enables processing of massive datasets so it discovers patterns which humans lack ability to detect. These emerging technologies create the possibility to transform diagnostic procedures as well as medical treatment design and individual medical solutions [51]. AI models serve to forecast patient outcomes as well as create individual medical solutions together with the ability to spot early-stage conditions of cancer or neurological disorders before standard clinical practices do. Exact medical predictions become better through AI because its continuous learning capacity increases as data volume grows to deliver improved healthcare services [52].

Precision medicine stands as an area with great future prospect. Healthcare providers gain access to personalized treatment solutions through genomic data and wearable device and electronic medical record analysis. Joint efforts between AI and bioinformatics advancements enable better patient diagnosis as well as customized treatment plans that enhance healthcare effectiveness and minimize side effects [53].

Telehealth along with virtual care services will endure ongoing development. The worldwide acceptance of telemedicine surged because of COVID-19 yet this remote healthcare delivery method will continue to play a vital role in medical service provision [54]. Telehealth platforms will

ISSN : 3079-5761
Volume 1, Number 1, January, 2025
https://doi.org/10.70445/gtst.1.1.2025.143-159

experience upcoming developments which will enhance accessibility thus enabling patients to access healthcare professionals through their remote systems. Remote monitoring tools together with IoMT devices will enable health professionals to keep constant 24/7 track of patients which enables them to deliver individualized care and interrupt potential adverse events early on [55].

Healthcare data management gets enhanced through secure and transparent methods because of block chain technology developments. The decentralized data storage features of blockchain address privacy concerns alongside interoperability problems because it enables patient-controlled secure systems for data storage. Such data security practices will build digital health system trust and enable the exchange of medical information while also serving HIPAA and GDPR requirements [56].

Public health management based on data analysis will achieve higher sophistication through big data analytical applications. Health authorities using large health datasets gain the ability to search for patterns while forecasting disease outbreaks and creating specific treatment strategies. Health informatics will shape a better patient care system while decreasing healthcare expenses and expanding access to medical services [57]. Achieving these opportunities depends on addressing present technological barriers alongside safeguarding data and delivering proper training to staff members.

## CONCLUSION

Health informatics functions as the core foundation of contemporary healthcare delivery that leads to improved patient services together with operational success and enhanced medical results. Healthcare institutions worldwide keep adopting digital transformation and employ AI along with IoMT and block chain technologies to transform the healthcare delivery methods. Health informatics enables medical personnel to use extensive data collections for creating better decisions in healthcare delivery while tailoring medical treatments and monitoring diseases actively.

Health informatics has undergone evolutionary progress to create substantial positive changes in healthcare service access while strengthening quality performance and increasing safety measures. Healthcare providers benefit from Electronic Health Records and clinical decision support systems because these systems connect care better while decreasing errors which results in enhanced patient results. Telehealth systems together with mobile health applications now increase healthcare availability especially for vulnerable demographic groups. The complete realization of healthcare innovations depends on resolving issues that include data security as well as system integration difficulties and regulatory requirements compliance needs.

Artificial intelligence alongside machine learning and block chain technologies provide modern healthcare with better diagnosis tools and individual treatment approaches together with more secure

ISSN : 3079-5761
Volume 1, Number 1, January, 2025
https://doi.org/10.70445/gtst.1.1.2025.143-159

patient data management solutions. The innovative changes bring forth enhanced operational efficiency and patient control and spending cuts to healthcare systems. New healthcare transformation opportunities arise from advancing technologies which may transform the sector to be more individualized and based on data and accessible for patients.

The field moves fast yet numerous major obstacles block its path. Healthcare facilities face substantial data security risks because digital healthcare expansion creates stronger possibilities for medical data breaches and cyber intrusions. Different healthcare IT systems cannot communicate efficiently which limits data sharing abilities between them thus affecting coordinated medical care. Furthermore, the high cost of implementation and the need for a skilled workforce pose additional challenges to the widespread adoption of health informatics.

Health informatics holds a positive outlook toward future healthcare because it provides multiple possibilities to advance medical service delivery. Stakeholders need to collaborate on existing challenges so healthcare can achieve maximum potential by becoming more proficient and secure and focused on patient-centered outcomes. Continuous field development will result in healthcare system transformation into a dynamic interconnected model which benefits both patients and healthcare providers.

## REFERENCES

[1]. Ilori, O., Nwosu, N. T., & Naiho, H. N. N. (2024a). Enhancing IT audit effectiveness with agile methodologies: A conceptual exploration. Engineering Science & Technology Journal, 5(6), 1969-1994.

[2]. Johnson, E., Seyi-Lande, O. B., Adeleke, G. S., Amajuoyi, C. P., & Simpson, B. D. (2024). Developing scalable data solutions for small and medium enterprises: Challenges and best practices. International Journal of Management & Entrepreneurship Research, 6(6), 1910-1935.

[3]. Kemp, A. H., & Fisher, Z. (2022). Wellbeing, whole health and societal transformation: theoretical insights and practical applications. Global Advances in Health and Medicine, 11, 21649561211073077.

[4]. Melton, G. B., McDonald, C. J., Tang, P. C., & Hripcsak, G. (2021). Electronic health records. In Biomedical Informatics: Computer Applications in Health Care and Biomedicine (pp. 467-509): Springer

[5]. Murphy S, Churchill S. Bry L, et al. instrumenting the health care enterprise for discovery research in the genomic era. Genome Res. (2019) 19:1675–81. doi: 10.1101/gr.094615.109

ISSN : 3079-5761
Volume 1, Number 1, January, 2025
https://doi.org/10.70445/gtst.1.1.2025.143-159

[6]. Hripcsak G, Duke JD, Shah NH, et al. Observational Health Data Sciences and Informatics (OHDSI): opportunities for observational researchers. Stud Health Technol Inform. (2015) 216:574–8.

[7]. Quang D, Chen Y, Xie X. DANN: a deep learning approach for annotating the pathogenicity of genetic variants. Bioinformatics. (2014) 31:761–3. doi: 10.1093/bioinformatics/btu703

[8]. Zeng T, li R, Mukkamala R, Ye J, Ji S. Deep convolutional neural networks for annotating gene expression patterns in the mouse brain. BMC Bioinformatics. (2015) 16:147. doi: 10.1186/s12859-015-0553-9

[9]. Ditzler G, Polikar R, Rosen G. Multi-layer and recursive neural networks for metagenomic classification. IEEE Trans Nanobiosci. (2015) 14:608–16. doi: 10.1109/TNB.2015.2461219

[10]. Raghupathi W, Raghupathi V. Big data analytics in healthcare: promise and potential. Health Information Sci Syst. (2014) 2:3. doi: 10.1186/2047-2501-2-3

[11]. Muller H, Freytag J-C. Problems, methods, and challenges in comprehensive data cleansing. Humbolt University of Berlin, Berlin, Germany. (2003). Available online at: https://tarjomefa.com/wpcontent/uploads/2015/06/3229-English.pdf

[12]. Holzinger A, Simonic KM, editors. Information Quality in e-Health. 1st ed. Graz: Springer (2011). doi: 10.1007/978-3-642-25364-5

[13]. Meredith D, Clifton D, Charlton P, Brooks J, Pugh C, Tarassenko L. Photoplethysmographic derivation of respiratory rate: a review of relevant physiology. J Med Eng Technol. (2011) 36:1–7. doi:10.3109/03091902.2011.638965

[14]. Hunt XJ, Emrani S, Kabul IK, Silva J. Multi-task learning with incomplete data for healthcare (2018). arXiv[Preprint].arXiv:1807.02442. doi: 10.48550/arXiv.1807.02442

[15]. Zhuang F, Qi Z, Duan K, Xi D, Zhu Y, Zhu H, et al. A comprehensive survey on transfer learning. Proc IEEE. (2020) 109:43–76. doi: 10.1109/JPROC.2020.3004555

[16]. Qin J, Qichao M, Shi Y, Wang L. Recent advances in consensus of multiagent systems: a brief survey. IEEE Trans Indus Electron. (2016) 12:1. doi: 10.1109/TIE.2016.2636810

[17]. Zheng Y, Zhao Q, Ma J, Wang L. Second-order consensus of hybrid multi-agent systems. Syst Control Lett. (2019) 125:51–8. doi: 10.1016/j.sysconle.2019.01.009

[18]. Kwak GH, Hui P. DeepHealth: Review and challenges of artificial intelligence in health informatics. arXiv [Preprint]. (2019). arXiv: 1909.00384. doi: 10.48550/arxiv.1909.00384

[19]. Hersh WR, Cimino J, Payne PR, Embi P, Logan J, Weiner M, et al. Recommendations for the use of operational electronic health record data in comparative effectiveness research. EGEMS. (2013) 1:1018. doi: 10.13063/2327-9214.1018

ISSN : 3079-5761
Volume 1, Number 1, January, 2025
https://doi.org/10.70445/gtst.1.1.2025.143-159

[20]. Sara Siegel, "2024 Global Health Care Sector Outlook," Deloitte, 2024. [Online]. Available: https://www.deloitte.com/global/en/Industries/life-sciences-health-care/analysis/global-health-careoutlook.html

[21]. Karla C Maita et al., "The Impact of Digital Health Solutions on Bridging the Health Care Gap in Rural Areas: A Scoping Review," Perm J. 2024 Aug 13; 28(3):130–143. [Online]. Available: https://pmc.ncbi.nlm.nih.gov/articles/PMC11404635/

[22]. Oleg Bestsennyy et al., "Telehealth: A quarter-trillion-dollar post-COVID-19 reality?" McKinsey & Company, July 9, 2021. [Online]. Available: https://www.mckinsey.com/industries/healthcare/our-insights/telehealth-aquarter-trillion-dollar-post-covid-19-reality

[23]. Laura Piggott et al., "Impact of telehealth implementation on medical non-consultant hospital doctors training experience," BMC Medical Education volume 24, Article number: 1154 (2024). [Online]. Available: https://bmcmededuc.biomedcentral.com/articles/10.1186/s12909-024-05824-1

[24]. Amoozegar J, Blumenfeld B, Brown S. et al. Building Data Capacity for PatientCentered Outcomes Research in HHS: A Formative Evaluation of 2012-2016 Projects. Washington, DC: Division of Healthcare Quality and Outcomes Office of Health Policy/ASPE/HHS (2017).

[25]. Ogunyemi OI, Meeker D, Kim H-E, et al. Identifying appropriate reference data models for comparative effectiveness research (CER) studies based on data from clinical information systems. Med Care. (2013) 51(8 Suppl 3):S45–52. doi: 10.1097/MLR.0b013e31829b1e0b

[26]. Danciu I, Cowan JD, Basford M, et al. Secondary use of clinical data: the Vanderbilt approach. J Biomed Inform. (2014) 52:28–35. doi: 10.1016/j.jbi.2014.02.003

[27]. Masys DR, Harris PA, Fearn PA, et al. designing a public square for research computing. Sci Transl Med. (2012) 4:149fs32. doi: 10.1126/scitranslmed.3004032

[28]. Bokolo, A. J. (2021). Application of telemedicine and eHealth technology for clinical services in response to COVID- 19 pandemic. Health and technology, 11(2), 359-366

[29]. Fernandez-Luque, L., Kushniruk, A. W., Georgiou, A., Basu, A., Petersen, C., Ronquillo, C., Alhuwail, D. (2020). Evidencebased health informatics as the foundation for the COVID-19 response: a joint call for action. Methods of information in medicine, 59(06), 183-192

[30]. Martínez-Pérez, B., de la Torre-Díez, I., López-Coronado, M., Sainz-de-Abajo, B., Robles, M., and García-Gómez, J.M. (2014). Mobile clinical decision support systems and applications: A literature and commercial review. J Med Syst. 38(1),

ISSN : 3079-5761
Volume 1, Number 1, January, 2025
https://doi.org/10.70445/gtst.1.1.2025.143-159

[31]. Miah, S.J., Hasan, J., and Gammack, J. G. (2016). On-Cloud Healthcare Clinic: An e-health consultancy approach for remote communities in a developing country, Telematics and Informatics, 34 (1), 311-322

[32]. Mosa, A. S. M., Yoo, I., and Sheets, L. (2012). A Systematic Review of Healthcare Applications for Smartphones, BMC Med Information Decision Making, 12 (67), 2-31

[33]. Nadri, H., Rahimi B., Timpka T., Sedghi S., (2017). The top 100 articles in the medical informatics: a bibliometric analysis. J Med Syst, 41 (10) 150

[34]. Nair, L.R., Shetty, S. D., and Shetty, S. D. (2018). Applying spark based machine learning model on streaming big data for health status prediction, Computers and Electrical Engineering, 65, 393–399

[35]. Nguyen, A., Mosadeghi, S., and Almarioa, C.V. (2017). Persistent digital divide in access to and use of the Internet as a resource for health information: Results from a California population-based study, International Journal of Medical Informatics, 103, 49–54

[36]. Nowell, L. S., Norris, J. M., White, D. E., & Moules, N. J. (2017). Thematic Analysis: Striving to Meet the Trustworthiness Criteria. International Journal of Qualitative Methods, 16(1), 1609406917733847.

[37]. O'donoghue, J. and Herbert, J. (2012). Data management within mHealth environments: Patient sensors, mobile devices, and databases, Journal of Data and Information Quality (JDIQ). 4 (1): 5

[38]. Parveen, D. (2014). SMARTHealth India: development and field evaluation of a mobile clinical decision support system for cardiovascular diseases in rural India, JMIR mHealth uHealth, 2, (4), 2014, e54.

[39]. Phan, N., Dou, D., Wang, H., Kil, D., and Piniewski, B. (2017). Ontology-based deep learning for human behaviour prediction with explanations in health social networks, Information Sciences, 384, 298–313

[40]. Richesson R, Krischer J. Data standards in clinical research: gaps, overlaps, challenges and future directions. J Am Med Inform Assoc. (2007) 14:687–96. doi: 10.1197/jamia.M2470

[41]. Kathryn Mercer, Lora Giangregorio, Eric Schneider, Parmit Chilana, Melissa Li, and Kelly Grindrod. 2016. Acceptance of Commercially Available Wearable Activity Trackers Among Adults Aged Over 50 and With Chronic Illness: A Mixed-Methods Evaluation. JMIR Mhealth Uhealth 4, 1 (Jan. 2016), e7.

ISSN : 3079-5761
Volume 1, Number 1, January, 2025
https://doi.org/10.70445/gtst.1.1.2025.143-159

[42]. Cheryl Merzel and Joanna D'Afflitti. 2003. Reconsidering community-based health promotion: promise, performance, and potential. Am. J. Public Health 93, 4 (April 2003), 557–574

[43]. Maletsabisa Molapo, Melissa Densmore, and Limpho Morie. 2016. Designing with Community Health Workers: Enabling Productive Participation through Exploration. In Proceedings of the First African Conference on Human Computer Interaction (Nairobi, Kenya) (AfriCHI'16). Association for Computing Machinery, New York, NY, USA, 58–68

[44]. Enid Montague and Jennifer Perchonok. 2012. Health and wellness technology use by historically underserved health consumers: systematic review. J. Med. Internet Res. 14, 3 (May 2012), e78.

[45]. Andrea G Parker and Rebecca E Grinter. 2014. Collectivistic health promotion tools: Accounting for the relationship between culture, food and nutrition. Int. J. Hum. Comput. Stud. 72, 2 (Feb. 2014), 185–206.

[46]. Jennifer Perchonok and Enid Montague. 2012. The Need to Examine Culture in Health Technology. Proc. Hum. Fact. Ergon. Soc. Annu. Meet. 56, 1 (Sept. 2012), 1847–1851.

[47]. Kambatla K, Kollias G, Kumar V, Grama A. Trends in big data analytics. J Parallel Distrib Comput. (2014) 74:2561–73. doi: 10.1016/j.jpdc.2014.01.003

[48]. Fitzmaurice G, Ravichandran C. A primer in longitudinal data analysis. Circulation. (2008) 118:2005–10. doi: 10.1161/CIRCULATIONAHA.107.714618

[49]. . Drezner K, McKeown L, Shah GH. Assessing Skills and Capacity for Informatics: Activities Most Commonly Performed by or for Local Health Departments. J Public Health Manag Pract 2016; 22 Suppl 6, Public Health Informatics:S51-S57.

[50]. Brownson RC, Samet JM, Bensyl DM. Applied epidemiology and public health: are we training the future generations appropriately? Ann Epidemiol 2017; 27(2):77-82.

[51]. Hawkes N. Public supports commercial access to patient records when public benefit is clear. BMJ 2016; 352:i1414.

[52]. Martin EG, Begany GM. Opening government health data to the public: benefits, challenges, and lessons learned from early innovators. J Am Med Inform Assoc 2017; 24(2):345-51.

[53]. Leider JP, Shah GH, Williams KS, Gupta A, Castrucci BC. Data, Staff, and Money: Leadership Reflections on the Future of Public Health Informatics. J Public Health Manag Pract 2017; 23(3):302-10.

ISSN : 3079-5761
Volume 1, Number 1, January, 2025
https://doi.org/10.70445/gtst.1.1.2025.143-159

[54]. Baker EL, Brand W, Davidson A, LaVenture M, Singletary V, Smith P. Building the Business Case for Public Health Information Systems. J Public Health Manag Pract 2016; 22(6):603-6.

[55]. Bae J, Ford EW, Kharrazi HHK, Huerta TR. Electronic medical record reminders and smoking cessation activities in primary care. Addict Behav 2017; 77:203-09.

[56]. Phelps C, Madhavan G, Rappuoli R, Levin S, Shortliffe E, Colwell R. Strategic Planning in Population Health and Public Health Practice: A Call to Action for Higher Education. Milbank Q 2016; 94(1):109-25.

[57]. DeSalvo K, Wang YC. Health Informatics in the Public Health 3.0 Era: Intelligence for the Chief Health Strategists. J Public Health Manag Pract 2016; 22 Suppl 6, Public Health Informatics: S1-S2.