

The Role of AI in Enhancing Health Information Management

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ABSTRACT

Artificial intelligence (AI) has transformed healthcare by enhancing the management, analysis, and use of massive volumes of health data. This study investigates AI's involvement in health information management (HIM) and its implications for clinical decision-making, data processing, and efficiency. It investigates how AI-powered techniques such as machine learning (ML) and natural language processing (NLP) have improved healthcare services, ranging from diagnostics to data management. The study also examined ethical concerns, data security and privacy issues, and the legal foundation for AI applications in healthcare. The paper predicted future trends and the education that HIM professionals will need to efficiently utilize AI technologies.

Keywords: Artificial Intelligence (AI), Health Information Management (HIM), Machine Learning (ML), Natural Language Processing (NLP), Data Privacy.

INTRODUCTION

Artificial intelligence (AI) is increasingly being adopted across various industries worldwide. One of the most significant applications of AI is in healthcare. AI in healthcare is being used by medical professionals for the treatment and prediction of chronic diseases, rapidly speeding up various biological studies, assisting in the fast discovery of new drugs, and enabling more efficient diagnostic and screening tools. This adoption of AI is expected to grow as the technology continues to make advancements. Health information, particularly considering security and privacy, is of utmost concern regardless of where data is used or stored. Health information is also expected to continue growing due to the continuous generation of health information from health records spanning multiple major medical pillars such as electronic medical records, clinical research records, genetic databases, and collective medical knowledge shared among healthcare providers. To manage and make such an enormous amount of health information useful, it is essential to develop systems that can deal with it, as well as individuals with adequate expertise in managing, analyzing, and presenting health information. One of the notable systems that emerged due to the increasing availability and demand for health information is health information management (HIM) [1, 2]. HIM is an intersection of healthcare, information sciences, computer science, and management. Various tools are available allowing medical professionals to cope with the increasing health information, with the potential to enhance patient care and increase efficiency. However, to ensure proper development and use of such tools, it is necessary to recognize how AI in healthcare is simultaneously affected by ethics, laws, and regulations. It is important to also understand how health information may ultimately be maintained and utilized by health information professionals, and be inclusive of quality and protection for stakeholders. The HIM roles and activities may alter as new opportunities and associated threats arise. This paper reviews the role of AI, particularly its ethical considerations, and how it will affect HIM practice and education, followed by suggestions for future directions. [3, 4].

Fundamentals of Health Information Management

The main components of health information management include the collection, storage, transmission, presentation, and usage of data. In clinical settings, health information is employed for patient care by trying to collect the most accurate and timely information and employing it for the care of that patient. In a hospital, a physician's office, or any other healthcare provider, individual health information is fed into one or more health information systems that can store, manage, and display this data in some form or

other. These systems could range from entirely paper-based systems to some that are a hybrid of both paper and electronic systems, to entirely electronic ones [5, 6]. When the electronic storage and management of health data occurs, the amount of legal and ethical standards that must be met increases significantly. Concern for the privacy of patient health data is a growing concern, and healthcare providers are under increasing pressure to ensure that they comply with the terms of the sharing of this data. In addition to making sure that data is stored and transmitted in an ethical and legal manner, healthcare organizations are concerned with the interchange of information between themselves and other healthcare organizations. Another key component of health information management is the principles of health informatics. Health informatics supports health goals by achieving pharmacy, nursing, and medicine objectives with various computer technologies. These computer technologies comprise electronic health records, telemedicine, and decision support systems AI studies for the development of health data management processes. In today's age of the Internet, information technology practice has been slowly expanding to all fields. This is also true for the field of health services. The aim of health information technology is to create a strong health knowledge management system that will help in being efficient and improving over time. This is available as health informatics. The ultimate aim is to make informatics more efficient. While this is correct, the steps involved are automation and informatics. Informatics aims to determine the computational and scientific grounds of drugs and pursues a cure methodology that is challenging for full process automation. Information technology completes the process of management and serves as well as the purposes of automation. Generally, relative informatics scholars would participate in the availability of the science of knowledge and e-information. Cancer informatics: Application of informatics for cancer-related activities. The section on health informatics would concentrate on clinical aspects [7, 8].

Artificial Intelligence: Concepts And Applications

Artificial intelligence (AI) is a collection of technologies that allow computer systems to perform tasks or make decisions that would usually require some level of human intelligence. The use of AI in health information management can have applications that range from diagnostic support to predictive analytics. This technology can be utilized to process large volumes of clinical and healthcare data in order to predict patient outcomes. General AI technologies can encompass part of or all of the health record life cycle and can support numerous tasks including intake, coding, transcription, security, decision-making, and analytics [9, 10]. AI technologies utilized in health information management are primarily machine learning (ML) and natural language processing (NLP). In the health sector, predictive analytic models that use ML have predictions that focus on patient outcomes or perhaps hospital costs resulting from patient illness. One important application of AI in health management is supporting decision-making and predictive analytics. Common applications in healthcare include support for diagnosis, therapy selection, surgery design, and care planning. Because of the potential of the technology in improving healthcare and managing health data, it is paramount to understand the evolution of AI technologies and their applications in healthcare. Despite major attention and significant investment, only a few AI systems have made it to the market and are used in practice. Limitations and challenges are due to various reasons, from concerns about privacy and security to the ethics of AI that can potentially replace human skill and judgment, as well as the important task of achieving alignment with healthcare professionals' workflows and needs. Healthcare professionals are crucial in driving patient-centered design and acceptance, as both the medical professional and patient input are essential in the identification of disease- or patient-oriented solutions [11, 12].

Integration of AI in Health Information Management

Today, many documents and records in healthcare organizations only exist in hardcopy format, which poses a critical issue of storage and essentially creates a significant amount of manual data entry. AI technologies have already started to reduce or even resolve both challenges by combining the use of computer vision and natural language processing. Computer vision can be directly applied to handle the hardcopy issue because it is a technology that automatically understands the use of images and animated environments to enable computers to recreate the same process. This technology can help to convert hard copies, such as patient forms, into easily retrievable electronic formats or even structured data. A very common application in medical forms is Optical Character Recognition, which extracts text from images and converts it into editable and searchable text, thus enabling further natural language processing analysis. Natural language processing technology is used for analyzing and structuring the text data. In AI development, it has been used in pervasive health and clinical environments in a wide number of applications, including document retrieval, clinical information extraction, corresponding paraphrase generation, question answering, document summarization, and healthcare applications [13, 14]. The combination of computer vision and natural language processing is already transforming health

information management by dramatically reducing the amount of time a human takes typing in patient records, which consequently increases the quality, accuracy, efficiency, and granularity of the documentation process. Extracting structured data from medical notes has been the most common and extensively researched application using both technologies. But one huge unexpected breakthrough in current pandemic medicine that uses both in the detection of SARS-CoV-2 has occurred, in which many researchers have made great progress in terms of classification and severity of disease progression from abnormal lung computed tomography images. Researchers have speculated that these technologies will eventually enable the development of non-interval-based decision support systems that scan and interpret medical images in real-time. The automation of tangible visual tasks is a significant advancement toward the goal of improving health information management both in hospitals and remote judicial hospitals where there is a common shortage of radiologists and clinicians [15, 16].

Benefits and Challenges of AI in Health Information Management

Recent years have witnessed numerous initiatives around the globe where automation and advances in technology in general and artificial intelligence (AI), in particular, have been introduced to the healthcare industry to counteract inefficiency and improve the quality of health information management and patient care services. The advantages of applying AI to health information management complement the outlined aim. Opportunistic approaches to predictive and prescriptive analytics in the context of AI may find application in preventing certain morbidities, managing healthcare resources, and probably predicting outcomes, and supporting critical decision-making across various categories of healthcare providers. A supportive environment for these initiatives is built when industry stakeholders are willing to utilize merged real-world healthcare data for research purposes. The real added benefits of AI investment will be observed by identifying anticipated improvements in terms of the outcomes and possibly patient satisfaction, time efficiency, and reduction of costs associated with the current status quo [17, 18].

CONCLUSION

AI is critical to the advancement of health information management, providing innovative solutions for data processing, decision support, and improving patient care. AI improves HIM system efficiency by automating operations, increasing accuracy, and streamlining clinical workflows. However, achieving the full potential of AI integration requires addressing ethical concerns, and privacy difficulties, and matching AI tools with the demands of healthcare practitioners. As AI evolves, health information management professionals must be prepared to handle new technologies while maintaining patient data safety, security, and regulatory compliance. Properly balancing technological improvements with ethical and regulatory considerations will enable AI's long-term inclusion in healthcare.

REFERENCES

1. Arefin S. Chronic disease management through an AI-powered application. *Journal of Service Science and Management*. 2024 Jul 16;17(4):305-20.
2. Battineni G, Sagaro GG, Chinatalapudi N, Amenta F. Applications of machine learning predictive models in the chronic disease diagnosis. *Journal of personalized medicine*. 2020 Mar 31;10(2):21. [mdpi.com](https://doi.org/10.3390/jpm1002021)
3. Hübner UH, Wilson GM, Morawski TS, Ball MJ, editors. *Nursing Informatics: A health informatics, interprofessional and global perspective*. Springer Nature; 2022 Jul 25.
4. Chen PT, Lin CL, Wu WN. Big data management in healthcare: Adoption challenges and implications. *International Journal of Information Management*. 2020 Aug 1;53:102078.
5. Neelima S, Govindaraj M, Subramani DK, ALkhayyat A, Mohan DC. Factors Influencing Data Utilization and Performance of Health Management Information Systems: A Case Study. *Indian Journal of Information Sources and Services*. 2024;14(2):146-52. [researchgate.net](https://doi.org/10.3390/ijis14020146)
6. Zaabar B, Cheikhrouhou O, Jamil F, Ammi M, Abid M. HealthBlock: A secure blockchain-based healthcare data management system. *Computer Networks*. 2021 Dec 9;200:108500.
7. Hick JL, Hanfling D, Wynia MK, Pavia AT. Duty to plan: health care, crisis standards of care, and novel coronavirus SARS-CoV-2. *Nam Perspectives*. 2020;2020.
8. Keshta I, Odeh A. Security and privacy of electronic health records: Concerns and challenges. *Egyptian Informatics Journal*. 2021 Jul 1;22(2):177-83.
9. Sheikh A, Anderson M, Albala S, Casadei B, Franklin BD, Richards M, Taylor D, Tibble H, Mossialos E. Health information technology and digital innovation for national learning health and care systems. *The Lancet Digital Health*. 2021 Jun 1;3(6):e383-96. [thelancet.com](https://doi.org/10.1016/S2662-4665(21)00100-0)
10. Rajpurkar P, Chen E, Banerjee O, Topol EJ. AI in health and medicine. *Nature medicine*. 2022 Jan;28(1):31-8.

11. Locke S, Bashall A, Al-Adely S, Moore J, Wilson A, Kitchen GB. Natural language processing in medicine: a review. *Trends in Anaesthesia and Critical Care*. 2021 Jun 1;38:4-9. [[HTML](#)]
12. Pandey B, Pandey DK, Mishra BP, Rhmann W. A comprehensive survey of deep learning in the field of medical imaging and medical natural language processing: Challenges and research directions. *Journal of King Saud University-Computer and Information Sciences*. 2022 Sep 1;34(8):5083-99. [sciencedirect.com](#)
13. Senbekov M, Saliev T, Bukeyeva Z, Almabayeva A, Zhanaliyeva M, Aitenova N, Toishibekov Y, Fakhradiyev I. The recent progress and applications of digital technologies in healthcare: a review. *International journal of telemedicine and applications*. 2020;2020(1):8830200. [wiley.com](#)
14. Secinaro S, Calandra D, Secinaro A, Muthurangu V, Biancone P. The role of artificial intelligence in healthcare: a structured literature review. *BMC medical informatics and decision making*. 2021 Dec;21:1-23. [springer.com](#)
15. Boecking B, Usuyama N, Bannur S, Castro DC, Schwaighofer A, Hyland S, Wetscherek M, Naumann T, Nori A, Alvarez-Valle J, Poon H. Making the most of text semantics to improve biomedical vision-language processing. In *European conference on computer vision 2022 Oct 23* (pp. 1-21). Cham: Springer Nature Switzerland. [[PDF](#)]
16. Esteva A, Chou K, Yeung S, Naik N, Madani A, Mottaghi A, Liu Y, Topol E, Dean J, Socher R. Deep learning-enabled medical computer vision. *NPJ digital medicine*. 2021 Jan 8;4(1):5. [nature.com](#)
17. Lee D, Yoon SN. Application of artificial intelligence-based technologies in the healthcare industry: Opportunities and challenges. *International journal of environmental research and public health*. 2021 Jan;18(1):271. [mdpi.com](#)
18. Hakimi M, Amiri GA, Shamsi SE. Artificial Intelligence and Public Health: Addressing Pharmacy Practice Challenges and Policy Issues. *British Journal of Pharmacy and Pharmaceutical Sciences*. 2024 Jun 30;1(1):09-21.

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