New Trends, Dilemmas and Countermeasures in the Application of Artificial Intelligence Technology in the Field of Combined Medical and Nursing Services

Zhengfeng Yang[1,2], Zhen Wen[3], Xiaolong Lu[1,2], Bo Liu[1,2], Runhua Liu[1,2,*]

[1]*Department of Health Services Management, Guizhou Medical University, Guiyang, China*
[2]*Center of Medicine Economics and Management Research, Guizhou Medical University, Guiyang, China*
[3]*International College, Dhurakij Pundit University, Bangkok, Thailand*
[*]*Corresponding author: liurunhua@gmc.edu.cn*

Abstract: *The application of AI technology in the field of healthcare integration has triggered great changes, this paper explores the new trends in the application of AI technology in the field of healthcare integration, and finds that the application of AI technology in the field of healthcare integration faces the developmental dilemmas of data privacy and security issues, lack of unified technical standards, low acceptance by patients, ethical and moral issues, high technical costs and low sustainability. To this end, this paper proposes that countermeasures should be taken to strengthen data security and privacy protection, establish unified technical standards and norms, enhance patient education and communication, strengthen ethical and moral management, and expand cooperation and investment.*

Keywords: *artificial intelligence; healthcare integration; smart healthcare; data privacy; ethics and morality*

1. Introduction

At present, China's aging population is a serious problem, and the combination of existing medical services and elderly services is inefficient and unable to meet the needs of the elderly.(Jin and Liu et al., 2023). Artificial Intelligence (AI) technology empowers the development of healthcare integration services, improves the efficiency and quality of healthcare services, and becomes a key force in promoting the development of healthcare integration services. The integration of AI technology has revolutionised the field of healthcare integration, with new trends such as intelligent medical decision support, intelligent health monitoring, nursing robots and telemedicine services emerging.AI technology has been applied in several healthcare integration service scenarios, showing great potential to improve the efficiency of healthcare services and improve patient experience. AI applications have been of great value in intelligent diagnosis and treatment, intelligent image recognition, research and development of intelligent drugs and intelligent health management(Li and Zhang et al., 2020). AI technology is being aggressively applied to healthcare, and it is expected that many of the healthcare delivery activities currently provided by clinicians and administrators will be taken over by Artificial Intelligence in the next few years(Reddy and Fox et al., 2019).AI in health care reshapes the relationships among technologies, physicians, and patients(Yang and Ngai et al., 2024)However, issues such as data privacy, varying technical standards, low patient acceptance, ethical and moral issues, and technology costs have gradually emerged as dilemmas restricting the in-depth application of AI in the field of healthcare integration. This study aims to explore the new trends of AI in healthcare integration, analyse the current dilemmas faced, and propose corresponding countermeasures to provide reference for policy formulation and practice in the field of healthcare integration[1-3].

2. New Trends in the Application of AI Technology in the Field of Healthcare Integration

2.1 Intelligent Medical Decision Support Scenarios Expanding

Smart medical decision support systems are reshaping the healthcare industry, providing customised diagnostic advice and enhancing diagnostic accuracy by analysing patients' clinical data and history.In order to improve the medical speed, treatment efficiency, and treatment success rate of the medical

platform, the intelligent medical system has become a system platform widely used in major hospitals(Yin and Xu et al., 2023).It uses big data and personal health information to predict disease risks in advance and promote early treatment. The real-time monitoring function ensures that the patient's status is continuously assessed, providing timely health warnings and reducing medical complications. The system also combines the latest medical research to provide doctors with scientific treatment recommendations and customised personalised treatment plans to enhance efficacy. With the rapid development of AI, this system has become a core force in enhancing the quality of healthcare services, reducing costs and improving patient experience.

2.2 Gradual deepening of the integration of intelligent health monitoring and health management

The integration of intelligent health monitoring technology and health management is gradually deepening, bringing comprehensive innovation to individual health, and the interactivity, convenience and health decision-making accuracy of visual health monitoring products are higher than that of traditional health monitoring products(Su, 2023).Intelligent devices capture key indicators such as heart rate, blood pressure and exercise in real time, providing detailed health information to doctors and health managers, enabling them to more accurately assess and respond to health issues. The combination of AI and big data analytics further deepens the mining of health data to customise personalised health management programmes. Applications such as health management apps improve the efficiency and effectiveness of health management by analysing user data and providing targeted diet and exercise advice. In medical information data collection, intelligent self-powered sensor technology expands the scope of retrieval and improves the accuracy and reliability of the system (Yin and Xu et al., 2023).As technology continues to advance, this convergence trend will bring more health benefits to individuals and groups.

2.3 Widening application of intelligent robots in nursing and medical fields

The application of intelligent robots in the medical field is developing rapidly, significantly enhancing the work efficiency of healthcare workers with their precision and high efficiency. The medical and healthcare industry is currently developing into digitization. nursing robots can effectively improve the overall medical efficacy,patients can enjoy personalized medical services(Guo and Li, 2022).They effectively reduce the burden of healthcare workers in performing tasks with high repetitiveness and stringent precision requirements. Using advanced perception technology and AI algorithms, the robots are able to quickly analyse medical data, provide decision support, and improve the accuracy of diagnosis and treatment. The continuous working ability of intelligent robots, which is not affected by fatigue and emotions, ensures the continuity and stability of medical services, optimises the allocation of resources, shortens the waiting time of patients, and improves patient satisfaction. Especially in the field of surgery, intelligent robots realise minimally invasive surgery through precise operation, reducing risks and speeding up the recovery process. With the continuous progress of technology, intelligent robots will play an increasingly important role in the medical field and promote the continuous improvement of medical service quality.

2.4 AI Drives the Popularisation and Promotion of Telemedicine Services

With the continuous development of the Internet and information technology, telemedicine has gradually become a popular medical model, which has always attracted much attention(Liu and Wang et al., 2023). AI is leading the innovation of telemedicine services, dramatically improving medical efficiency and quality. Intelligent diagnostic systems combined with machine learning algorithms give doctors the ability to diagnose diseases quickly and accurately and treat them in a timely manner, effectively reducing the waste of medical resources. Telemedicine platforms and smart devices break geographical constraints, allowing patients to conveniently access healthcare services wherever they are, alleviating the problem of uneven distribution of healthcare resources.AI's data processing and learning capabilities provide solid technical support for telemedicine services, facilitating the extensive and efficient use of resources. Telemedicine virtual reality technology has become a high-tech hot spot in the information age and a new trend in the development of the medical industry(Gao and Lyu et al., 2022)As the technology matures and the policy environment is optimised, AI will become a key driver for the development of telemedicine services and the effective use of medical resources[4-5].

3. Dilemmas faced in the application of AI in the field of technology healthcare integration

3.1 Data privacy and security issues

The rapid expansion of artificial intelligence poses significant challenges in terms of data security and privacy(Villegas-Ch and García-Ortiz, 2023). The data privacy problem in the application of AI in the integration of healthcare mainly stems from the sensitivity of personal medical data. Medical information covers highly private data such as an individual's medical records, diagnostic results, drug prescriptions, etc. Once this information is leaked or improperly used, it will bring huge economic losses and reputation risks to the individual, and even have a serious impact on his or her life and work. The storage and transmission of medical data may be subject to a variety of security risks such as data leakage, data tampering, and data loss, and these issues pose a great challenge to data security. The uncertainty and complexity of AI algorithms increase the risk of data security, and any slightest loophole or tampering may lead to incorrect diagnosis and treatment plans, posing a serious threat to patients' health.

3.2 Lack of unified technical standards and norms

Another dilemma faced by AI in the application of healthcare integration is the lack of unified technical standards and specifications. Different medical institutions, research institutes or vendors develop their own different technical standards and specifications during the development and application of AI technology, which leads to difficulties in data exchange, sharing, and collaborative cooperation between different systems in the same field, thus restricting the promotion and development of AI technology in the application of healthcare integration. The lack of unified technical standards and specifications may also lead to the existence of important issues such as data security and privacy protection. The lack of consistent standards and specifications to guide the development of combined healthcare applications increases the risk of data leakage and security breaches. Lack of clear privacy protection standards may also lead to misuse or unauthorised access to personal healthcare data, compromising patients' interests and privacy.

3.3 Low patient acceptance

The problem of low patient acceptance is mainly rooted in their insufficient knowledge of AI technology. Lack of in-depth understanding of AI technology makes patients lack a clear understanding of how the technology works and the application scenarios, which in turn creates distrust or scepticism, especially the concern that personal privacy and medical data may be leaked or misused, which further exacerbates their resistance to the technology. Some patients are concerned that AI technology may replace the work of human healthcare professionals, leading to a loss of human touch and care in healthcare services. This concern stems from worries about the impact of technology on humanistic care in the healthcare field and doubts about whether AI can truly replace humans in healthcare work, which in turn triggers a sense of resistance.

3.4 Ethical and moral issues cannot be ignored

The application of AI technology may pose potential risks to patients' private data, including data leakage and misuse, which involves respecting and protecting individuals' right to privacy. AI works in medical decision-making in a way that is difficult to explain, which makes it difficult for doctors and patients to understand and trace the system's decision-making process, to determine whether the basis for decision-making is reasonable or not, and the lack of transparency in decision-making may bring about biases or misunderstandings, affecting the results of medical decision-making.

When healthcare professionals are too focused on using AI technology for diagnosis and treatment, they tend to view the patient as a collection of cases and data rather than as an individual with emotions and needs, and are prone to neglecting the need to establish emotional connections and communication with patients. This indifferent and mechanised attitude may bring uneasiness and alienation to the patient, and even affect the patient's treatment effect and recovery mindset[6-8].

3.5 High technology costs and low sustainability

The development and application of AI technology requires a large amount of R&D, data processing, and hardware and software equipment procurement costs. Especially in the medical and elderly care

fields, the high requirements for safety and accuracy require more technical costs to ensure the reliability and stability of the system. These high technology costs become a major challenge for healthcare and senior care organisations when introducing AI technology. The rapid development and updating of AI technology has resulted in fast technology updates and short life cycles, which require continuous investment in updating and maintenance costs, placing a huge burden on healthcare and senior care organisations. The specific needs of AI technologies in healthcare and elderly care require them to be able to adapt to the complexity of healthcare environments and the diversity of the needs of the elderly, which requires continuous optimisation and improvement, further adding to the challenge of sustainability.

4. Countermeasures for AI Technology to Promote the Development of Healthcare Integration

4.1 Strengthen ethical and moral management

Healthcare organisations and AI technology providers should work together to establish strict data protection measures to ensure the security and confidentiality of patients' private data. Researchers and technical teams developing AI systems should be committed to explaining the system's working principles and decision-making process, and improving the transparency of AI decision-making so as to enhance the credibility and traceability of decisions. In the process of using AI technology by healthcare professionals, emphasis should be placed on establishing an emotional connection with the patient, focusing on the patient's emotional and psychological state, and avoiding treating the patient simply as a collection of cases and data. In order to ensure that the ethical and moral issues of AI technology are properly handled, healthcare organisations should set up special ethical committees to ensure that the application of the technology complies with ethical standards. Supervisory mechanisms and complaint channels should be established to monitor the process of applying AI technology, and potential ethical and moral issues should be identified and resolved in a timely manner.

4.2 Expanding Co-operation and Investment

In order to promote the in-depth research and development and wide application of AI technology in the field of healthcare integration, healthcare integration institutions should strengthen cooperation with technology companies, research institutes, and investment institutions, so as to reduce the cost of research and development and improve the overall work efficiency through resource sharing. Close co-operation between healthcare-integrated organisations and investors will inject more funds and resources into technology research and development, accelerate technology innovation and marketing, and thus enhance the sustainability of the technology. In order to ensure the long-term development of AI technology, healthcare-integrated organisations need to formulate clear development plans and strategic goals. The direction of the application of the technology in the field of healthcare integration should be clearly defined, and the partners and investment projects should be selected in a targeted manner, so as to ensure that the development of the technology is consistent with the vision and goals of the healthcare integration organisations, and at the same time to guarantee the sustainability of the technology and the consistency of the direction of development[9-10].

5. Summary

This paper systematically explores the application of AI in the field of healthcare integration, revealing the new trends, dilemmas and possible countermeasures in this emerging field, and providing references for policy formulation and practice in the field of healthcare integration. Future research should further explore the specific application of AI technology in the field of healthcare integration, assess the actual impact of different countermeasures, and continuously monitor the new challenges that may be brought about by the development of the technology.

Acknowledgement

References

[1] Gao, J. J. and C. Lyu, et al. (2022). "Telemedicine virtual reality based skin image in children's

dermatology medical system." COMPUTATIONAL INTELLIGENCE 38 (1): 229-248.

[2] Guo, C. X. and H. Li (2022). "Application of 5G network combined with AI robots in personalized nursing in China: A literature review." FRONTIERS IN PUBLIC HEALTH 10.

[3] Jin, Y. C. and D. M. Liu, et al. (2023). "Prediction Model of Elderly Care Willingness Based on Machine Learning." MATHEMATICS 11 (3).

[4] Li, Y. W. and T. N. Zhang, et al. (2020). "Artificial intelligence-aided decision support in paediatrics clinical diagnosis: development and future prospects." JOURNAL OF INTERNATIONAL MEDICAL RESEARCH 48 (9).

[5] Liu, P. and F. Z. Wang, et al. (2023). "Trends and frontiers of research on telemedicine from 1971 to 2022: A scientometric and visualisation analysis." JOURNAL OF TELEMEDICINE AND TELECARE 29 (9): 731-746.

[6] Reddy, S. and J. Fox, et al. (2019). "Artificial intelligence-enabled healthcare delivery." JOURNAL OF THE ROYAL SOCIETY OF MEDICINE 112 (1): 22-28.

[7] Su, Y. H. (2023). "Visualization design of health detection products based on human-computer interaction experience in intelligent decision support systems." MATHEMATICAL BIOSCIENCES AND ENGINEERING 20 (9): 16725-16743.

[8] Villegas-Ch, W. and J. García-Ortiz (2023). "Toward a Comprehensive Framework for Ensuring Security and Privacy in Artificial Intelligence." ELECTRONICS 12 (18).

[9] Yang, Y. K. and E. Ngai, et al. (2024). "Resistance to artificial intelligence in health care: Literature review, conceptual framework, and research agenda." INFORMATION & MANAGEMENT 61 (4).

[10] Yin, Y. D. and G. H. Xu, et al. (2023). "A 5G-Enabled and Self-Powered Sensor Data Management Scheme for the Smart Medical Platform System." IEEE SENSORS JOURNAL 23 (18): 20904-20915.