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Application and Challenges of Artificial Intelligence in Healthcare in the New Era

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ABSTRACT

Healthcare work mainly focuses on providing services to the public, addressing the impact of diseases, ensuring people's living standards and health. The application of modern technology in the new era offers more support for this work, including artificial intelligence. This article first analyzes the advantages of AI applications in healthcare in the new era, then explores its application adjustments based on this. Finally, combining the above content, it discusses suggestions for addressing related challenges, including strengthening information security management, establishing standardized maintenance systems, emphasizing targeted applications, optimizing system construction, and improving healthcare linkage capabilities, aiming to address current work issues, leverage the advantages of AI technology, and promote the steady development of healthcare.

KEY WORDS: healthcare; artificial intelligence; Information security management; System construction

Preface:

Artificial Intelligence (AI) is an important product of the continuous development of modern society. It mainly focuses on using information technology devices and programs to simulate and extend human intelligence, replacing or semi-replacing traditional manual operations and improving work efficiency [1]. Regarding healthcare work, due to the development of modern pharmaceutical and pathological medical content, a considerable portion of health knowledge, medication methods, and nursing skills can be organized through artificial intelligence to supplement routine healthcare work, improve the quality and richness of information presentation, and

enhance service capabilities for the public and the medical system [2]. Given the overall shortage of medical resources and large populations in various countries, this advantage deserves attention, and analyzing the application and challenges of AI in healthcare in the new era is even more necessary.

1. Advantages of AI applications in healthcare in the new era

1.1 High level of automation

The direct advantage of applying AI technology in healthcare in the new era lies in its high level of automation, which can proactively provide knowledge related to various medical treatments, nursing,

medications, health maintenance, and chronic disease prevention, eliminating the hassle of frequent manual operations. For example, elderly patients trying to understand the "dietary requirements for diabetes" can be covered by routine healthcare services, but staff must provide various types of knowledge offline, including oral instruction and handing out brochures. With the support of AI technology, hospitals can centrally organize electronic data related to "diabetic dietary requirements" in advance. When patients inquire about these information, medical staff can use computers or smartphones to retrieve these information with one click and directly send digital resources to patients, improving the automation and efficiency of healthcare-related tasks [3].

1.2 Low application threshold

The application of AI technology in healthcare in the new era also offers the advantage of a relatively low barrier to entry. This advantage is reflected in two aspects: first, the development level of artificial intelligence and other supporting technologies is high and mature, allowing them to be widely applied in medical institutions across the country without the need for complex system design and research. They are suitable for work models in one region and have potential and reference value in other regions. Second, intelligent devices in modern society have become widely popularized, providing a healthy foundation for the intelligent development of healthcare work [4]. For example, when people try to learn about "hypertension prevention," they can use home computers, personal phones, tablets, etc. to access medical organization databases, communicate with medical staff, download smart service software, and obtain relevant information. The threshold is low, the process is simple, and the methods are convenient.

1.3 Expandability

In the new era, the application of artificial intelligence in healthcare has the advantage of scalability. This advantage refers to AI technology mainly relying on computer and network technologies to provide services, not being limited by factors such as time or space, and offering greater service flexibility [5]. Under normal work conditions, people need to access healthcare-related knowledge via hotline calls or by visiting service areas of medical organizations, with obvious time and space constraints. Supported by artificial intelligence technology, as long as the databases provided by medical organizations remain open or intelligent programs are set without abnormalities, the public can access them anytime and anywhere, significantly enhancing the scalability of healthcare work. At the same time, nursing, medication, sports and health care, and dietary management can all be presented through AI technology, offering a wide range of applicable scenarios and further improving service capabilities [6].

2. Challenges in the application of artificial intelligence in healthcare in the new era

2.1 Information security risks exist

In the new era, applying AI technology in healthcare work faces risks of information leakage, including patient information and medical organization data. In general, although artificial intelligence technology can temporarily operate independently from the internet, it requires networked operations to maximize its effectiveness. In the networked mode, various types of data, user resources, and medical data simultaneously face threats from network viruses, malicious programs, and hackers, which may lead to the loss of personal information. Some people lack awareness and ability to prevent internet risks, and the risk of information loss and leakage has further increased. At the same time, during the ongoing operation of

AI technology, valuable data generated may also be stolen and applied in illegal domains [7].

2.2 High difficulty in construction and maintenance management

AI technology relies on modern information equipment and internet services for its work. With a wide service scope, construction and operation and maintenance costs are also high. Some large-scale medical organizations and service institutions can still bear related expenses, while smaller township health centers and village clinics often find it difficult to obtain sufficient funds for AI system construction and operation. Taking a township with a population of 10,000 as an example, it is necessary to establish archives for a considerable portion of residents to provide medical and health care services. To meet the healthcare needs of different residents, various resources must be collected and processed and integrated. To ensure effective system operation and maintenance, technical personnel and key technical experts must be assigned to participate in management. The total investment during the construction and operation cycle reaches several hundred thousand yuan, placing a heavy economic burden [8].

2.3 Complex user circumstances

From a fundamental perspective, narrow healthcare focuses on providing services related to drug treatment, aiming to improve patients' quality of life; in a broader sense, it involves nursing, self-management, disease prevention, and other aspects, and needs to serve all populations within the region. In practice, different populations have varying needs for healthcare, involving individual conditions, health management awareness, epidemic prevention, and many other aspects, which to some extent increases the complexity of healthcare work. Although current AI technology offers good data organization and proactive service capabilities, patient needs are often difficult to quickly identify, and AI services are relatively less targeted. For example, when a patient suddenly develops an acute condition with multiple chronic diseases simultaneously, even if it is not life-threatening, expert consultations are still needed to provide precise treatment plans. AI often struggles to accurately complete assessments and analyses, and its overall value in healthcare is relatively limited.

2.4 Lack of multimodal processing capability

The characteristic of healthcare work is that the quality of its services is directly related to patients' safety, so it must be handled with utmost caution. In the usual offline work mode, medical staff can conduct detailed analyses based on patients' symptoms, medical records, and laboratory test results, completing multimodal procedures, including TCM observation, listening, questioning, and pulse-taking. Under the AI service model, intelligent software collects patient information in a simple way, mainly relying on text and sensible pulse and heart rate data, with other aspects of information not being well considered. The analysis results and subsequent processing plans may lack comprehensiveness. For example, if a patient experiences an increased heart rate after exercise, the smart software cannot determine the cause of the heart rate fluctuations and may mistakenly interpret them as "abnormal heart rate, cardiomyopathy," etc., delaying treatment. The lack of multimodal processing capabilities is the main reason why AI technology cannot fully replace conventional healthcare models, and it is a key focus for subsequent work.

3. Recommendations for addressing the challenges of AI application in healthcare in the new era

3.1 Strengthen information security management

In the future, efforts will be made to leverage the advantages of artificial intelligence technology to serve healthcare work in the new era, advocating first strengthening information security management and seeking breakthroughs through comprehensive protection, including authorization protection for medical organizations, intelligent protection for work systems, and proactive protection for users.

Medical organizations responsible for organizing healthcare work should establish a sound authorization mechanism, designate personnel, responsible persons, and related managers for AI systems, provide authorization to relevant personnel, and prevent other illegal individuals from breaking into databases or stealing information. AI work systems should be equipped with intelligent firewalls. All programs and files attempting to enter the system must undergo firewall review and release only after approval without exceptions, preventing hazardous elements from entering the system and causing damage. On the user side, the main focus is on general publicity targeting this group, informing users about online risks and security issues to pay attention to when applying AI technology to healthcare or accessing related services, including avoiding logging in unsafe environments and protecting personal authorization codes and account information. Enhance information security management through an integrated approach of medical organization, work systems, and users.

3.2 Standardize construction and operation and maintenance systems

In the new era, healthcare work involves complex service content and needs to be carried out long-term. The construction and operation of AI work systems face significant economic pressure. In the future, it is advocated to analyze the construction and operation systems and improve their standardization as a basic approach to controlling expenditures. The core measures are unified construction and decentralized operation and maintenance.

Localities can use city-level health departments as the core to collect and analyze local healthcare work information across various regions, assess the needs for AI technology construction, and formulate work plans tailored to local conditions. During this process, a detailed analysis of the funding needs for building AI work systems across regions was conducted to cut unnecessary expenses. For computers configured within the system, a host + extension model can be used to reduce the cost of purchasing a high-performance computer comprehensively. If funds remain tight, phased construction can be adopted to gradually complete the AI work platform. After platform construction is completed, local management departments participate in operation and maintenance according to usage needs. Each independently working AI system adopts a local management mechanism, with users independently organizing operations and maintenance. Higher-level departments only provide supervision and necessary technical guidance to avoid fund misuse and inadequate operation and maintenance.

3.3 Emphasize application targeting

Given the varying healthcare needs of different populations, it advocates focusing on the specificity of AI applications in healthcare organization, adopting differentiated database service models, and building different access links to map systems to provide management support.

During the construction of AI systems, multiple independent databases can be built based on the general characteristics of

different groups, each equipped with AI operation modules independently to provide intelligent services based on the actual situation of visitors. The database can be designed by age, including categories such as infant and toddler healthcare and elderly healthcare, or by service characteristics into chronic disease healthcare, epidemic healthcare, etc. Each database independently stores corresponding information and continuously collects and enriches its content. The intelligent operation logic of databases can be the same, providing intelligent services and various valuable healthcare information through keyword retrieval processing, user information memory services, and associative search, thereby enhancing the platform's service capabilities.

After database construction is completed, several links are opened based on access information. In cases of frequent access or congestion on conventional links, mapping technology can be used, allowing visitors to view and browse information in the database through mapping via virtual channels outside the database. While ensuring smooth access, the specificity of each sub-database and intelligent services is enhanced to meet the personalized needs of different patients.

3.4 Improving healthcare linkage capabilities

Given the current lack of multimodal processing capabilities in artificial intelligence technology, efforts should be made to enhance healthcare linkage capabilities to maximize its positive role in healthcare work, improving service efficiency through remote and terminal coordination.

In practice, it advocates building a local IoT work system, centered on local health management departments, with IoT workstations established. Hospitals, health centers, and clinics at all levels within the region serve as nodes within the IoT, maintaining constant connectivity with IoT workstations. Each node independently organizes internal management work, including healthcare. After related work is carried out, residents within each node routinely receive healthcare services. When their needs are special and the local AI system cannot provide services, the information is sent to the remote management office of the node, where staff analyze and provide services. Staff at this node are still unable to provide corresponding services and may continue to provide information to higher authorities for assistance. To ensure the real-time level of healthcare services, intelligent systems should be connected to the public, providing tools such as smart wristbands for elderly people with chronic diseases and multiple comorbidities, to perceive patients' conditions in real time. Even if a patient has a severe episode or falls into a coma, intelligent tools can remotely provide location information and vital signs, making it easier for staff within the corresponding node to provide services based on the intelligent information and further optimizing the extension of healthcare services in the new era.

Conclusion:

In summary, in healthcare work in the new era, AI offers diverse application advantages, characterized by high automation, low application threshold, scalability, and rich applicable scenarios, which should be addressed in practical work. Currently, the application of AI technology in healthcare work is still promising, but there are issues of information leakage, high construction and operational costs, and different users' situations vary. AI cannot provide multimodal services. No responses have been taken. Future work advocates strengthening information security management, optimizing system construction and establishing standardized

maintenance systems, emphasizing the relevance of technology applications, and finally seeking breakthroughs from a collaborative perspective to improve the synchronization of all medical processes, leverage the advantages of artificial intelligence technology, and enhance the overall level of healthcare work.

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