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Application and Challenges of Intelligent Nursing Technology in an Aging Society

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Abstract:With the aging of the global population and the increase in the burden of chronic diseases, the traditional nursing model faces unprecedented challenges, especially in the context of growing nursing needs and shortage of human resources. Intelligent nursing technology has emerged, aiming to improve the efficiency and quality of nursing services and meet the diverse nursing needs in an aging society through the integration of modern information technology. The intelligent nursing system integrates cloud computing, the Internet of Things, big data, artificial intelligence and other technologies, and realizes personalized, continuous and intelligent nursing services by collecting, analyzing and processing patient health data in real time. The system can predict potential health risks through data analysis and remotely monitor the health status of patients, thereby reducing dependence on human resources and improving the speed of nursing response. In addition, the intelligent nursing system has self-learning and error correction functions, and can continuously optimize nursing plans based on real-time data to provide patients with efficient and comprehensive nursing services. However, although my country's "Internet + nursing service" has made certain progress, it still faces many challenges in terms of imperfect security management system, inconsistent charging standards, and differences in service quality between regions and institutions. This article will explore the current status and challenges of intelligent nursing in an aging society, and propose corresponding countermeasures in order to promote the further development of intelligent nursing technology.

Keywords: Intelligent Nursing Technology, Aging Society, Elderly Care, Healthcare Innovation, Challenges and Solutions

1. INTRODUCTION

Globally, the aging population and the increasing burden of chronic diseases have indeed brought unprecedented challenges to the medical and health service systems of various countries. The traditional nursing model is difficult to cope with the growing nursing needs and human resource shortages. The rise of smart nursing is to solve these problems and provide effective solutions for an aging society. Smart nursing is a comprehensive nursing model that integrates modern information technology. It aims to improve the quality and efficiency of nursing through advanced technical means and meet the diverse needs of nursing objects. Smart nursing is centered on information technology, artificial intelligence and communication technology, including cloud computing, the Internet of Things, the Internet, big data and blockchain, and uses these technologies to collect, integrate, analyze and present a large amount of information (data) generated in nursing services. In the nursing process, the smart nursing system can not only obtain and process the physical health status of the nursing object in real time, but also predict potential health risks through data analysis. With the help of IoT devices and sensors, nursing staff can remotely monitor the health indicators of the nursing object, reduce dependence on human resources, and improve response speed. In addition, the smart nursing system has the ability to learn and correct errors autonomously, and can continuously update and optimize nursing plans to improve the intelligence level of services, providing nursing objects with more efficient, comprehensive, continuous, intelligent and personalized nursing services. For example, AI algorithms can automatically adjust care plans based on patients' health data and implement personalized interventions to meet the unique needs of each care recipient.

This intelligent model not only improves the quality of care, but also provides a feasible path to alleviate global medical resource shortages and improve public health levels. Although my country's "Internet +" continuing care services have achieved certain results, especially in improving the efficiency of medical resource utilization and alleviating the shortage of medical manpower, they have shown great potential. However, compared with international advanced standards, they are still in the exploration and trial stage, and there are still many aspects that need to be improved. Domestic scholars pointed out that in the process of promoting "Internet + nursing services", my country faces a series of practical challenges, such as imperfect security management system, lack of the unified regulations on charging standards, and differences in service quality between regions and institutions.

1. Imperfect security management system is a key issue that cannot be ignored in the development of "Internet + nursing services". Since Internet nursing involves a large amount of personal health information and data of patients, how to ensure the privacy and security of data is crucial. At present, the risk of data leakage and information abuse still exists, and it is urgent to establish more perfect privacy protection measures and network security protection mechanisms to ensure the safe flow of information in the Internet environment, so as to protect patients' personal information from being illegally obtained or misused.

2. The problem of inconsistent charging standards has affected the popularization and standardization of "Internet + nursing services". At present, there are obvious differences in the charging standards for Internet nursing services in different regions and medical institutions in China, and there is a lack of unified normative guidance, which not only causes trouble for patients, but also brings pricing confusion to service providers. Reasonable and unified charging standards will help promote the sustainable development of services, make patients more receptive to Internet nursing services, and provide a clear basis for charging for service agencies in various places.

3. Uneven service quality is another important factor affecting the effect of "Internet + nursing services". There are large differences in the allocation of nursing resources, technical

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levels, and the capabilities of practitioners in different regions, resulting in different service quality between regions. Especially in remote areas, medical resources are relatively scarce, professional nursing staff are insufficient, and the quality and coverage of Internet nursing services are often low. To solve this problem, it is necessary to strengthen the training of nursing staff nationwide, improve the Internet technology application capabilities of the grassroots medical institutions, narrow the service gap between regions, and ensure that all patients can enjoy high-quality Internet nursing services.

In the Figure 1, intelligent nursing framework is referred. This is the basis of the whole study.

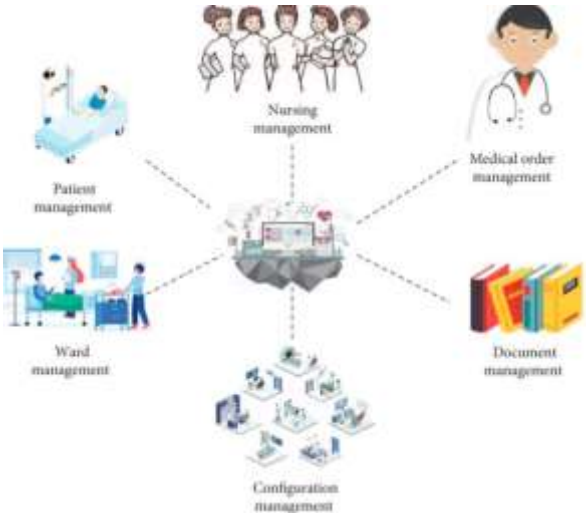

Figure. 1 The Intelligent Nursing (Image Source: https://www.researchgate.net/figure/Main-functions-of-the-intelligent-nursing-system_fig3_362903251)

2. THE PROPOSED METHODOLOGY

2.1 The Concept of Smart Nursing

Smart nursing is a comprehensive nursing system that integrates a variety of information technologies. It is patient-centered and is committed to providing efficient, convenient, and personalized nursing services to meet the people's growing health needs. This nursing system not only improves the quality and efficiency of nursing services, but also optimizes resource allocation through data-driven and intelligent analysis, making nursing services more precise and humane. Therefore, smart nursing has become an important part of the construction of smart hospitals and runs through all aspects of modern hospital nursing work. The core of smart nursing lies in combining modern nursing with advanced information technologies such as the Internet of Things, cloud computing, big data, and artificial intelligence, and through these technologies, it can be seamlessly applied in core business scenarios such as clinical nursing, nursing management, smart wards, continuing care, and nursing management. For example, in clinical nursing, the smart nursing system can monitor the patient's health indicators in real time, provide early warning information in a timely manner, and enable nursing staff to respond to the patient's health status at the first time. At the same time, smart nursing can also achieve standardized management of the nursing process to ensure that the quality of all nursing links reaches consistent high standards. In smart wards, smart nursing uses IoT devices to achieve interconnection between bedside nursing equipment and monitoring equipment, helping nursing staff to understand the patient's status in real time and provide nursing intervention in a timely manner, reducing the workload of nursing staff. In terms of continuing care, smart care can provide continuous care services to patients after discharge through remote monitoring and data tracking, helping patients obtain necessary health guidance and risk prevention during recovery, thereby reducing the rate of readmission. In addition, the smart care system also has significant advantages in nursing management. Through information technology, the work content and performance of nurses can be scientifically managed to ensure the quality and consistency of nursing services. Smart care can also analyze the workload and scheduling of nurses through artificial intelligence algorithms, provide decision support for managers, and reasonably allocate human resources.

2.2 The Problems and Challenges in Development of Smart Nursing in China

The promotion and application of smart nursing does face many technical bottlenecks, which limits its comprehensive popularity in the medical field. Although our country has made significant progress in the field of information technology, especially in cloud computing, big data, Internet of Things, etc., which has gradually approached the international level, the widespread application of these technologies in medical care still faces a series of challenges. For example, data interconnection is the key to the development of smart nursing. However, in actual operations, information systems between different medical institutions often have compatibility issues, making it difficult to effectively integrate data and limiting the full realization of smart nursing. In addition, the security of medical information also needs to be strengthened. Smart care involves a large amount of sensitive patient data. If data protection measures are not in place, there will be risks of information leakage and privacy infringement, which will affect patients' trust in smart care. Therefore, building a sound information security system and improving the level of data protection are important parts of the promotion of smart nursing.

The popularity of smart nursing also needs to be further improved. At present, due to the uneven economic development level and medical resource allocation in various regions of my country, the development of smart nursing in different regions shows obvious differences. In first-tier cities and economically developed areas, the infrastructure of smart nursing is relatively complete, equipment updates are rapid, technology investment is sufficient, smart nursing application scenarios are more extensive, and patient experience is relatively good; while in remote or economically underdeveloped areas, affected areas Limited by factors such as insufficient investment in technology funds and low acceptance of information technology by medical staff, the development of smart nursing is relatively lagging behind. For example, medical institutions in rural areas are limited by backward infrastructure, lack of smart equipment, and lack of professional and technical personnel, making it difficult to realize the full application of smart care, leading to a further widening gap between urban and rural patients in nursing experience and service quality. In addition, the promotion of smart nursing also needs to overcome the dual shortage of technology and human resources. Smart nursing not only requires high-level information system support, but also requires professional nursing staff with information technology capabilities. At present, some medical staff are relatively unfamiliar with the technical operation of smart nursing, and the training system is not yet fully mature. Nursing staff need time to adapt when faced with new

equipment and systems, and there are even differences in acceptance of new technologies. Therefore, strengthening the information technology training of nursing staff so that they can master the operation and application of smart nursing systems becomes the basic guarantee for the popularization of smart nursing.

2.3 An Example Technology: Smart Infusion System

The smart infusion system is an innovative nursing tool based on information automation technology, which can realize the automated management of a series of infusion processes from infusion verification, infusion replacement to disinfection. As an important part of smart nursing in clinical applications, smart infusion systems not only effectively reduce the workload of nursing staff, but also significantly improve the efficiency of nursing work, freeing nursing staff from repetitive and time-consuming mechanical labor. , allowing them to devote more energy to comprehensive patient care. The smart infusion system uses high-precision sensors, intelligent controllers, data analysis platforms and other technical means to achieve real-time monitoring and precise management of the infusion process. In actual operation, the smart infusion system can automatically identify the infusion bag and infusion time, automatically check the type and dosage of infusion drugs, prevent medication errors caused by human factors, and further improve the safety of infusion. For example, when the infusion is nearing the end or an infusion blockage occurs, the system can automatically send out an alarm to remind the nursing staff to promptly replace the medicinal solution or handle abnormal situations to ensure the continuity and safety of the infusion process. In addition, the intelligent infusion system can customize the infusion speed according to the patient's needs and adapt to personalized medical needs, thereby optimizing the treatment effect.

The smart infusion system also realizes automatic collection and analysis of infusion data through a big data platform, providing strong support for clinical management and nursing decision-making. The system can automatically record the patient's infusion data in the electronic medical record, making it easier for nursing staff to query the patient's infusion history and drug usage at any time, and helping doctors and nursing staff make more accurate judgments during the diagnosis and treatment process.

2.4 The Suggestions for Intelligent Nursing Technology in an Aging Society

Here are some suggestions:

1. Develop personalized intelligent monitoring systems. Aiming at various health problems of the elderly, such as cardiovascular, diabetes, joint diseases, etc., the intelligent care system should meet the needs of different patients through personalized monitoring.

2.Develop smart walking aids and smart home care equipment. For elderly people with limited mobility, smart walking aids, smart wheelchairs and home care equipment can greatly improve their quality of life. For example, smart wheelchairs using sensors and artificial intelligence technology can help the elderly move autonomously according to their needs, with functions such as obstacle avoidance and path planning.

3.Strengthen data security and privacy protection. With the large-scale application of smart nursing devices, the health data involving the privacy of the elderly is increasing. How to ensure the security of data has become an important issue in the promotion of smart nursing technology. Therefore, a strict data security and privacy protection mechanism should be established in the development and implementation of smart nursing systems, including data encryption, identity authentication, and permission management, to ensure that the personal information of the elderly is not leaked or abused.

3. CONCLUSION

As an important solution to cope with the aging society and the burden of chronic diseases, intelligent nursing technology has shown broad application prospects. By integrating advanced technologies such as cloud computing, big data, the Internet of Things, and artificial intelligence, smart nursing can provide personalized and precise nursing services, greatly improving the quality and efficiency of nursing services. However, although smart nursing technology has made significant progress in some areas of my country, its popularization and application still face a series of challenges such as technology, safety, talent and regional differences. First of all, data security and privacy protection issues need to be resolved urgently, and a complete security management mechanism needs to be established to ensure the safe flow of patient health information. Secondly, differences in charging standards and uneven service quality in different regions have affected the sustainable development of smart nursing services. Therefore, the government and relevant institutions should strengthen policy formulation, promote the standardization of smart care across the country, and narrow regional gaps. At the same time, strengthening the technical training of nursing staff and improving their acceptance and operational capabilities of intelligent nursing systems are also key factors in promoting the popularization of the intelligent nursing.

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