

Application and Research of Big Data Technology in Intelligent Ward

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Abstract: With the rapid development of information science and technology and the progress of the health service industry, the integration of medical services and new technologies such as big data technology has become more in-depth, and the construction of smart hospitals and smart wards has received more and more attention and application. This article conducts in-depth research and analysis on the application and exploration of big data technology in smart wards and explores the role of big data technology in improving the quality, efficiency, and cost of medical services in smart wards, as well as the application prospects and challenges of big data technology in patient monitoring, disease prevention, and diagnosis and treatment processes in smart wards. The focus is on analyzing and studying the use of big data technology to assist in the construction of smart neonatal surgery wards. This article aims to provide useful references and lessons for the construction and development of smart wards.

Keywords: Smart ward; Neonatal surgery; Big data technology; Medical service quality

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1. Introduction

With the continuous advancement of medical informatization and intelligence, smart wards, as an important part of medical services, can improve the quality of medical services, enhance the efficiency of medical management, and reduce costs. As early as September 2020, the National Health Commission issued the "Notice on Further Strengthening the Nursing Work in Medical Institutions," requiring medical institutions to accelerate the construction of nursing informationization. The rapid development of communication technology and networks provides necessary technical support and opportunities for the development of smart wards. As a rapidly developing technology tool, big data technology has broad application prospects in the field of medical health. Therefore, exploring the application and exploration of big data technology in smart wards can help to further tap its potential in improving the service level and management efficiency of smart wards, and promote

the development of medical informatization and intelligence.

At present, the research on the application and exploration of big data technology in smart wards at home and abroad is still limited. Previous studies have conducted preliminary discussions on the construction of smart wards, including the application of smart devices, the construction of information systems, and data collection ^[1]. Some studies focus on the application of big data technology in data analysis in smart wards, trying to use data mining, machine learning and other technologies to analyze and predict patient data. Patient monitoring and management in smart wards is an important research direction. There are studies attempting to achieve real-time monitoring and management of patient's physiological parameters through big data technology ^[2,3]. Although some studies have explored the application of big data technology in smart wards, there are still many challenges and unresolved issues, such as weak research on data privacy protection and data security. Therefore, further in-depth research on the application of big data technology in smart wards is of great significance for promoting the development of smart wards and improving the level of medical services.

For the construction of smart wards, two main aspects are considered: hardware and software. In terms of hardware, the first step is to introduce advanced medical equipment, including intelligent monitoring instruments, remote diagnostic devices, intelligent drug management systems, etc., to achieve the digitization and intelligence of medical equipment. Secondly, it is necessary to build an information platform, such as electronic medical record systems and medical data centers, to achieve interconnectivity and sharing of medical information and improve medical efficiency. Finally, it is necessary to create an intelligent environment, through intelligent building management systems, intelligent perception technology, etc., to enhance the comfort and safety of the ward. At the software level, the development of medical information management software is required to achieve real-time monitoring, data analysis, and processing of medical information, thereby improving the intelligence level of medical decision-making. Realize patient-centered, build an intelligent medical service platform, and realize functions such as online appointments, remote diagnosis and treatment, and self-service. The most important thing is to ensure the security and privacy of medical information by introducing technologies such as data encryption and permission control to safeguard the security of patient information ^[4]. The construction of smart wards in hospitals requires policy support and guarantees. The government can introduce relevant policies to provide financial support and subsidies for the construction of smart wards in hospitals, reduce construction costs, and encourage hospitals to invest in smart construction.

2. Big data technology assists in the construction of intelligent wards for neonatal surgery

Compared with smart wards in other departments, neonatal surgery smart wards have some special requirements and needs. Newborns have high requirements for environmental temperature and humidity, and smart wards need to be able to monitor and control the temperature and humidity in the room in real-time to ensure the comfort and health of newborns. The intelligent ward for neonatal surgery needs to be equipped with various medical equipment specifically designed for infants, such as ventilators, monitors, etc., and customized equipment interfaces and accessories suitable for infants' use. Considering that newborn patients usually require family care, smart wards need to provide space for family members to rest and dine, and ensure the connection and closeness between family members and patients. Due to the weak immune system of newborns and their sensitivity to infection risks, smart wards need to have isolation and protection facilities to ensure the safety and

health of patients. The medical staff in the neonatal surgery smart ward need to have a high level of professional nursing skills and be able to provide personalized care and treatment according to the special physiological and medical needs of newborns. Therefore, the intelligent ward for neonatal surgery has special requirements in terms of hardware facilities, equipment allocation, nursing level, and service content that are different from those of other departments' intelligent wards. It requires customized design and management based on the special characteristics and needs of neonatal patients.

Big data technology is used to assist in the construction of smart wards for neonatal surgery, utilizing sensors, monitoring equipment, and other technologies to achieve real-time collection and monitoring of physiological parameters and disease data of neonatal patients, ensuring that medical staff have a comprehensive understanding of the patient's situation, and improving nursing quality and treatment effectiveness. Real time physiological parameter data of newborn patients can be collected, such as heart rate, respiratory rate, body temperature, etc. These data are transmitted to the central monitoring system in real-time through big data technology, and medical staff can grasp the patient's condition at any time. Real time analysis of patient's physiological data, through the establishment of warning models, when abnormal situations or risk warnings occur, the system can promptly issue warning information to remind medical staff to take corresponding measures to ensure patient safety^[5]. By analyzing patients' growth and development data, nutrient intake, etc., personalized nutrition plans can be developed to ensure that newborns receive sufficient nutritional support, and promote recovery and development. Big data technology can help establish an interactive platform for family members, providing them with real-time information on the patient's condition and treatment progress, as well as professional education and guidance to enhance their support and understanding of the patient.

By using big data technology to analyze and mine patient data, set warning models, achieve early warning and risk assessment of patient conditions, timely discover and intervene in potential problems, and reduce the occurrence of medical accidents and complications. By combining the individual characteristics and disease data of neonatal patients, big data technology is used to develop personalized treatment plans for each patient, improve treatment effectiveness, and reduce the waste of medical resources^[6]. It can also establish a comprehensive electronic medical record system to achieve centralized management and sharing of patient medical record data while building a medical knowledge base to provide real-time reference information and support for medical staff, standardize diagnosis and treatment processes, and improve medical quality. Through the utilization of big data technology, it can optimize the planning and allocation of medical resources, including the rational allocation of drugs, equipment, human resources, etc., to improve resource utilization efficiency, reduce waste, and lower medical costs. Through the above measures, the neonatal surgery smart ward can achieve data-driven intelligent management and high-quality medical services, improve medical quality, efficiency, and patient experience, and provide safer, more convenient, and humanized medical care services for neonatal patients.

3. Existing problems and challenges faced

There are still many problems and difficulties in the construction of smart wards with the help of big data. The technology equipment and systems used in smart wards are updated quickly, and hospitals need to constantly update their equipment and systems, otherwise they may not be able to maintain their technical level and service quality. Smart wards involve a large amount of personal health information and medical data of patients,

and hospitals need to strengthen data security management and privacy protection to avoid data leakage and infringement ^[7-9]. The construction and maintenance of smart wards require technical talent support, and hospitals may face the dilemma of talent shortage and high-cost training, which affects the normal operation and development of smart wards. The construction of smart wards requires a large amount of capital investment and related equipment procurement, and hospitals may face problems such as insufficient construction funds and financial difficulties. Some patients may have distrust or discomfort towards the technology equipment and systems in smart wards. Hospitals need to strengthen publicity and patient education to increase patients' acceptance of smart healthcare.

The application of big data technology in smart wards can bring many benefits, but there are also some difficulties and challenges. In the process of applying big data technology, medical institutions need to process a large amount of personal health data of patients, including medical records, diagnosis and treatment records, etc. Ways to ensure the security and privacy of these data is an important issue. The quality and integrity of medical data are crucial for the accuracy of big data analysis results, but medical data often comes from different systems, departments, and formats, and how to effectively integrate and clean it is a challenge.

Medical institutions need to comply with relevant regulations and standards when collecting, storing, and processing medical data, including data security laws, medical information management norms, etc. Effective data governance is a difficult point. The application of big data technology in smart wards requires professional technical personnel to support and maintain it, but currently, the demand for big data technology in the medical industry is increasing, and the supply of talent is relatively insufficient. The implementation of big data technology in smart wards requires a significant investment of funds and resources, and medical institutions need to balance the investment and expected returns to ensure that the investment can achieve a reasonable return.

4. Prospects and future direction

As an important component of digital and intelligent construction in medical institutions, smart wards have enormous development potential and broad prospects. Based on big data and artificial intelligence technology, smart wards will be able to provide personalized medical services for each patient, including personalized diagnosis and treatment plans, personalized medication recommendations, etc., to improve treatment effectiveness and patient satisfaction ^[10-13]. In the future, the smart ward will be committed to building a closer doctor-patient interaction mechanism, realizing more convenient communication and collaboration between doctors and patients and improving the medical experience through Internet platforms, mobile applications and other tools. With the continuous development and application of technologies such as artificial intelligence, the Internet of Things, and big data, smart wards will become more intelligent, including intelligent monitoring devices, intelligent medical equipment, and intelligent medical record systems. In the future, smart wards will achieve the integration and sharing of medical data, making it easier for medical institutions, doctors, and patients to share medical information, promoting the optimization of medical resource allocation, and improving medical efficiency ^[14-16]. Smart wards will gradually develop towards the direction of medical and health management, including not only medical treatment, but also disease prevention, health management, and long-term care services, achieving comprehensive medical and health management.

Therefore, in the future, smart wards will present a trend of digitization, intelligence, personalization,

interconnectivity, and comprehensiveness, providing medical institutions with more efficient and humane medical services, laying the foundation for promoting the development of a comprehensive intelligent medical model. Big data technology has broad application prospects in patient monitoring, disease prevention, and diagnosis and treatment processes in smart wards, but it also faces challenges such as data security and privacy protection, data quality and accuracy, technical standards and interoperability, as well as training and technical support for medical staff. Addressing these challenges will further promote the application and development of big data technology in the medical field.

Disclosure statement

The authors declare no conflict of interest.

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