

Application of Mobile Technology and Information Management in Emergency Pre-Examination and Triage

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Abstract: The primary objective of emergency pre-examination and triage is to provide the most appropriate clinical service to patients with acute and critical illnesses while ensuring the optimal utilization of limited medical resources. With the advancement of medical information technology, mobile technology, and information management, these features have been gradually incorporated into emergency pre-examination and triage and have shown promising outcomes. In this article, the benefits of implementing mobile technology and the current status of integrated information management to provide a reference for the future development and enhancement of emergency pre-examination and triage are reviewed.

Keywords: Pre-examination and triage; Emergency; Mobile technology

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1. Introduction

Emergency pre-examination and triage are used by emergency triage nurses to quickly and accurately assess a patient's condition to classify and triage them. This ensures that patients receive the best care in the shortest possible time and maximizes the effective utilization of limited emergency medical resources. Due to the increasing demand for emergency services, the available resources in the emergency department are often insufficient, leading to overcrowding and potentially adverse patient outcomes as they are not treated promptly ^[1]. With the advancement of medical information technology, mobile technology has been widely implemented in emergency pre-examination and triage and has shown positive outcomes. It can reduce congestion in the emergency department and enable patients to obtain better medical resources during the diagnosis and treatment process, thus ensuring the rational use of limited resources to maximize effectiveness ^[2]. Medical information technology has gradually gained widespread attention and has become an integral part of medical information management. In some foreign countries, the emergency pre-examination and triage system has reached a relatively well-developed and complete stage and has effectively utilized information

management technology, significantly improving the triage effect. However, in China, its development has yet to be standardized and perfected, and there is a lack of effective integration of information management technology in the medical field ^[3].

2. Mobile technology

2.1. Mobile technology concept

Mobile technology comprises various aspects, such as wireless local area network (LAN) and terminal devices. These components facilitate the transmission of data signals, including voice and videos, over long distances. This technology offers numerous benefits, including secure and convenient transmission, and is well-suited to market demands and societal needs. The current advancements in mobile technology can potentially improve the implementation of emergency pre-examination and triage, making it more convenient for medical staff to transmit data.

2.2. Service platform

2.2.1. Mobile applications

Mobile applications have become essential in our lives, especially services that connect mobile phones to the Internet. These apps are rapidly developing and have shown significant potential for growth. Chronic diseases like diabetes and hypertension are common clinical public health problems that can cause severe damage to a patient's physical and mental health. Effective health management is crucial in treating and controlling these diseases in the long run. To do so, mobile applications can implement a specific medical service model to closely monitor the patient's disease indicators, provide guidance and intervention, and encourage patients to participate in their health management. This can help correct unhealthy lifestyle habits and effectively improve their condition.

2.2.2. Personal digital assistant (PDA)

A personal digital assistant (PDA) is a compact mobile device with dynamic functions. It can be used in various ways to improve the efficiency of medical-related work and is becoming an important tool in hospitals. Although PDA technology is more advanced in some countries like Europe and the United States, it is still in its early stages regarding clinical application in China. However, some large hospitals are researching to validate the effectiveness of PDA technology in multi-faceted hospital management, including outpatient and emergency intravenous infusion, blood transfusion, and more. There have been promising results. Additionally, PDAs can offer an advantage through the hospital's emergency care mechanism in the clinical rescue of critically ill patients ^[4].

3. Application of mobile technology in emergency pre-examination and triage

Emergency department congestion is a frequent issue in many hospitals in China, which can cause significant delays in treating critically ill patients. Therefore, it is crucial to utilize mobile technology to effectively address the shortcomings of existing systems and provide high-quality medical care to reduce congestion in the emergency department.

3.1. Use of triage methods

The emergency department is open around the clock and deals with a variety of urgent medical issues, such as

stroke and severe trauma. Time is crucial when treating critical illnesses as the time of treatment can directly affect patient outcomes. In hospital intensive care units (ICU), utilizing mobile and remote ICUs can help conserve limited rescue resources. By using mobile technology such as wireless monitoring equipment and communication networks, multiple links, including first aid and treatment, can be integrated into one system. This approach can help effectively triage critically ill patients and complete diagnosis and treatment promptly. The real-time transmission of patient physiological parameters can also provide medical staff with crucial data to effectively treat patients.

3.2. Re-engineering the pre-inspection process

The primary objective of pre-screening is to rapidly identify and prioritize patients based on their medical condition. A well-developed triage system can accurately diagnose and treat patients promptly, thus reducing time wastage. Effective triage is crucial in facilitating the successful diagnosis and treatment of patients. Traditionally, pre-screening nurses triage patients rely on their experience for patient treatment. However, a study by Liu et al. demonstrated that mobile technology could automatically classify and evaluate patient diagnosis and treatment information, enabling the triage process to be completed efficiently ^[5]. Both nurses and patients find this technology to be highly supportive and convenient. Additionally, emerging online payment methods such as Alipay and WeChat have replaced traditional queue-based payment methods. This enhances the efficiency of diagnosis and treatment, reduces the hospital's labor costs, and improves service quality promptly. Ultimately, these changes will benefit the hospital's long-term growth and development.

3.3. Collection of patient information

In the emergency department, collecting accurate patient information can be challenging due to high patient flow and short stay times. This can result in ineffective use of medical data in clinical practice. However, mobile technology such as PDA can collect, store, and summarize medical information during patient treatment. This helps accelerate the data collection time and improves data integrity, thus providing valuable clinical data. Additionally, the 3G network can be used for information linkage, allowing remote guidance from experts during out-of-hospital emergencies to ensure patient safety. This can also promote data sharing between the in-hospital and out-of-hospital emergency systems, thus contributing to improved clinical treatment.

3.4. Closed-loop management

The emergency department faces numerous challenges due to the unpredictable and varying nature of patients, their mobility, and varying lengths of stay. This leads to an increased workload and difficulty in managing emergency services. However, with the help of mobile technology and information management systems, the flow and behavior of patients during their treatment can be easily monitored and recorded. This enables control of the status of the patient's treatment, improves work efficiency, and overcomes previous management blind spots. Overall, utilizing such technology can improve the management quality in the emergency department ^[6,7].

4. Evaluation of the effectiveness of mobile technology in emergency pre-examination and triage

Integrating mobile technology in emergency pre-examination and triage can enhance the nurses' efficiency and accuracy in streamlining patient treatment and data management, thus elevating hospital administration.

5. Current status of emergency pre-examination and triage information management at home and abroad

5.1. Current status of foreign emergency pre-examination and triage information management

Pre-examination and triage were initially used for injury examination of American soldiers and have since been adopted in hospitals with continuous improvement and development. In the early 1970s, pre-examination and triage focused on evidence-based medicine, and various multi-faceted studies were conducted to determine its efficacy. Currently, several foreign emergency pre-examination and triage systems are relatively well-developed.

5.1.1. Application of the Emergency Severity Index (ESI)

The Emergency Severity Index (ESI) is a tool used in the United States to triage patients in emergency departments. It was developed in the late 1990s and categorizes patients into five levels based on their expected prognosis. This helps healthcare providers allocate resources and personnel quickly according to patient needs. The ESI is reliable and feasible. However, it tends to under-triage more often than over-triage, and there is still room for improvement in its application.

5.1.2. Application of the Canadian triage and acuity scale (CTAS)

The Canadian CTAS (Canadian triage and acuity scale) is based on the Australian Preliminary Test Scale (ATS) and triages based on patient complaints, symptoms, and other indicators. It is divided into 5 condition levels and clarifies the patient's waiting time at each level. If the patient's condition changes or the treatment time exceeds the ideal waiting time, the patient's condition will then be re-evaluated and graded. With the continuous development and improvement of information technology, the Children's Emergency Pre-screening Scale and the Electronic Pre-screening Triage System (E-Triage) have also been derived. After continuous revision, they can be applied to triage various diseases and are feasible and highly reliable.

5.2. Current status of domestic emergency pre-examination and triage information management

Currently, there is no unified and standardized information management system for emergency pre-examination and triage in China. However, some hospitals have developed information management systems based on specific situations, applied emergency triage standards, and achieved positive outcomes^[8]. The development and implementation of information management systems for emergency pre-examination triage in China are at par with the average level of developed countries. However, there still exists a significant gap in information system technology. Therefore, to develop a domestic emergency pre-examination triage information system, a standardized management system needs to be established by drawing upon well-developed experiences in foreign countries and combined with the specific operating conditions of the country.

5.3. Effects of the information management system (emergency pre-examination and triage)

Effective management of information systems can significantly improve the quality of emergency pre-examination and triage in hospitals. This can be achieved by providing evidence-based medical guidance and enhancing triage accuracy. Despite these advantages, there are a few challenges that need to be addressed. For instance, there is a need for the establishment of standardized triage protocols and a better quality of pre-examination and triage. An enhanced scientific evaluation system should be implemented and the training

system for nurses must be improved. Therefore, to enhance the application of emergency pre-examination and triage information management systems and establish uniform emergency triage protocols, developing an emergency triage nurse admission system and a quality control system is crucial.

6. Summary

The medical industry is constantly evolving with the introduction of new technology and care models, resulting in streamlined processes and better-quality services for patients. The utilization of mobile technology in emergency pre-examination and triage can enhance the treatment process and improve the doctor-nurse-patient relationship. However, in China, the emergency pre-examination and triage system is still under development. By drawing upon experiences from foreign countries and combining them with domestic medical and emergency systems, a developed system that fully utilizes mobile technology can be developed for emergency pre-examination and triage in China. Additionally, it is important to continually improve and standardize the information management of emergency pre-examination and triage to prevent errors caused by insufficient medical knowledge and the presence of similar symptoms among different diseases to prioritize patient safety.

Disclosure statement

The authors declare no conflict of interest.

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