

Design and Implementation of Post-hospital Tracking Management System Based on Internet of Things Data Acquisition

Junxi Chen, Shaogeng Zeng *, Linqing Xian

Lingnan Normal University School of Computer and Intelligent Education, Guangdong Zhanjiang, 524048

Abstract: Chronic disease refers to a class of chronic noninfectious diseases with long course, complicated condition, easy recurrence and difficult to be completely cured. In the course of treatment of chronic diseases, patients often face problems such as increased drug resistance and multiple complications. The traditional post - hospital management of chronic diseases has the limitation that doctors cannot know the real -time status of patients in time, which has become one of the main reasons why many families of chronic disease patients fall into the dilemma of “poverty due to illness, and return to poverty due to illness”. In order to solve this problem, this project combines the acquisition and transmission technology of the Internet of Things and the development of mobile platform to realize the one -click synchronization of the health data of patients with chronic diseases and the post- hospital tracking management platform of the hospital. By opening up the online communication channels for home rehabilitation treatment of chronic disease patients and rehabilitation therapists and physicians, responsible rehabilitation therapists and physicians can evaluate the health status and rehabilitation situation of patients in combination with their real-time health data, and timely adjust rehabilitation treatment plans. In addition, all historical health records, communication and doctor’s advice programs can be recorded on the platform, which facilitates the referral and follow -up treatment of patients, and also provide a basis for determining responsibility for medical disputes.

Keywords: Chronic diseases; Post-hospital tracking; Internet of Things; Mobile platforms; Health data synchronization; Rehabilitation

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Introduction

At present, in China, the main prevention and control modes of chronic disease prevention and control include the Xiamen three division co-management mode, Beijing Changping mode, Shanghai Jing ‘an Traditional Chinese Medicine mode and other chronic disease-oriented health management modes. Although these models or approaches have achieved certain results, at present, China’s home rehabilitation treatment for chronic diseases is in the initial stage of development, the promotion rate is not high enough in the country, management and products are also many deficiencies, and there are also problems such as the imperfect domestic public medical management system, few channels and low coverage rate. There are still many loopholes in the follow-up management of chronic hospitals.

There are many kinds of chronic disease management models in foreign countries, and the rudiment of chronic disease management model has already been explored and formed. Finland provides health management for chronic disease patients through communities,

schools, food factories and the media. In the United States, insurance companies organize doctors to conduct comprehensive health management for insured patients. In the United Kingdom, general practitioners are the main practitioners, and social care institutions are used to conduct health education and health promotion for community residents. However, foreign hospitals mainly popularize the large-scale prevention and control management in the community, which cannot go into the needs of individual patients, and it is difficult to accurately conduct long-term and detailed data statistics on individual physical indicators. After patients are discharged from chronic hospitals, it is difficult for doctors to check patients' recent physical conditions and make appropriate feedback and evaluation.

In view of the current situation at home and abroad, this project further visualized the health data uploaded by patients to the platform, so as to facilitate doctors to view the historical data of patients at any time, achieve the goal of one-to-many adjustment of treatment plan, and achieve the effect of real-time tracking of patients' later conditions after discharge.

Overview

The chronic hospital post-tracking platform is a bridge of communication for doctors to learn about patients' chronic diseases in time, and it is also a convenient way for patients to self-test at home. The main purpose is to enable hospitals to obtain patients' health information in a timely manner, and achieve the effect of early detection, timely registration and effective treatment for patients with chronic diseases after the hospital. The design of this project is mainly to solve the problems of the hospital's difficulty in real-time tracking and management of patients with chronic diseases after they see a doctor, the problem that the health information of patients is not synchronized with the hospital's case files, and the problems of the chronic disease patients who need to return to the hospital for multiple times in the process of treatment, such as excessive travel expenses and long time. This project intends to connect the portable Bluetooth temperature gun, blood pressure meter, blood glucose meter, blood lipid meter and other testing equipment supporting Bluetooth protocol and analyze the device and data through the self-developed wechat mini program, and automatically connect the device to the hospital's HIS system, so as to realize the remote real-time automatic synchronization of patients' chronic disease health records. After medical treatment, patients with chronic diseases can self-test their health data at home and report it with one click through wechat mini program, so as to realize the remote real-time supervision of patients' health status by medical staff after discharge.

This project has many advantages such as data synchronization, data indentation, and data visualization analysis. In this platform, the health data independently uploaded by patients with one click is automatically synchronized to HIS system in real time, and these health data traces are archived to establish a patient-centered and complete health file. At the same time, the data will be further visualized and analyzed in the form of line chart, pie chart and other forms for doctors to view at any time, which is conducive to doctors to observe the dynamic changes and change rules of patients' uploaded data more clearly and intuitively, so as to analyze patients' conditions and adjust their rehabilitation treatment plan in time.

Design

This product is a chronic hospital post-management platform developed based on wechat mini program and Web. Patients with chronic diseases can test "blood glucose, blood lipids and blood pressure" at home by using POCT device supporting Bluetooth protocol, and then upload various health data directly to the mini program through Bluetooth for patients' confirmation. Then, according to the hospital of the patient, whether to upload the tested health data to the special server for chronic diseases after hospital built by the hospital and automatically synchronize it to the patient's health file in real time, the responsible doctor can access HIS system through the Internet or Intranet to obtain the real-time health data of the patient. So that the hospital can obtain the patient's health information in a timely manner and make appropriate adjustments to the patient's medical plan.

The software design part is realized by wechat mini program and web page. Considering that for patients with chronic diseases and their responsible doctors, our team took into account the low equipment configuration of some patients with chronic diseases, this project adopted wechat mini programs that are familiar to the public to display the data. The mini program hardly occupies the memory of users' mobile phones, which can provide users with a good experience, especially those with low equipment. At the same time, through the configuration of VPN, the responsible doctor of the patient can access the data management system of the hospital's Web background through the external network outside the hospital, and obtain and view the real-time data of the patient in HIS management system, so as to provide consultation and monitoring for the patient anytime and anywhere, which is conducive to the follow-up treatment of the chronic disease patients after the hospital.

The devices use Bluetooth connect to mini program. As one of the low-cost communication specifications for short-range hardware devices, Bluetooth has been widely favored by the electronics industry for its advantages of low power consumption, high

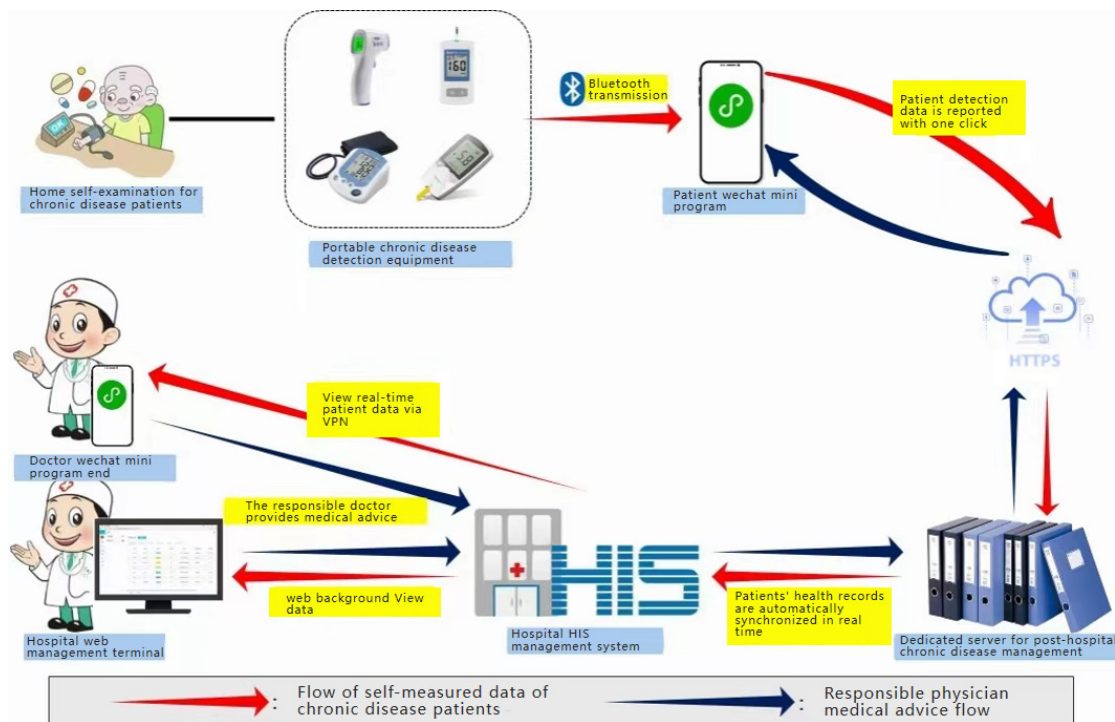


FIG.1 Structure diagram of post-tracking platform system in chronic hospitals

performance, low cost and stable transmission. In addition, the portable detection equipment for chronic diseases used in this project is also used for data transmission through Bluetooth to receive detection data in the patient's wechat mini program.

In terms of hardware design, patients first use mobile phones to detect their health status through POCT (instant detection) devices that support Bluetooth protocol for chronic diseases (such as Bluetooth temperature gun, blood pressure meter, blood glucose meter, blood lipid meter). After receiving the data, the device will transmit the data to the mini program through Bluetooth communication, and wait for the patient to check and upload it with one click, so as to realize the remote real-time supervision of the patient's health status by the medical staff after discharge.



FIG. 2 Resident health data acquisition device

Summary

This project is beneficial for doctors to obtain patients' health data at any time and to establish complete health records for elderly patients with chronic diseases. The biggest difficulty in the management of chronic diseases in the elderly lies in the lack of patient-centered and complete health records. The management system of chronic diseases in the elderly can provide the most basic and important data support for subsequent management services of chronic diseases in the elderly through the establishment and foundation of this file.

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