DESIGN AND IMPLEMENTATION OF A HOME TELECARE SYSTEM FOR THE MANAGEMENT OF CHRONIC DISEASE IN THE HOME

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Abstract: We have developed a home clinical workstation and associated WEB infrastructure for the management of chronic disease at home [1]. The modular system is attached to a low cost PC and allows patients to measure their own ecg, blood pressure, lung function, body temperature and weight. A wearable triaxial accelerometer provides both an alarm function and a continuous recording of ambulatory patterns and energy expenditure. In addition the system has facilities for administering a range of customised questionnaires, accessing validated health education WEB sites and generating daily logs of health related activities. All functions can be scheduled remotely by a physician to fit in with patients’ normal patterns of daily activities. Medications management and remote prescribing is also possible.

Keywords: Home Telecare, e-Telehealth, Chronic Disease, Biomedical Instrumentation

Introduction

American statistics demonstrate that 80% of all deaths and 90% of all illnesses are attributed to chronic disease at a cost of $470 billion per annum (1995). The impact of chronic disease on morbidity and healthcare costs will increase as the population ages. The international trend that has emerged regarding the care of individuals with chronic disease is the increasing use of active disease management intervention strategies [5]. In this paper we describe the development of a Home Telecare System designed to help manage chronic disease in the home [2]. A schematic diagram of the home telecare system is shown in Figure 1. below.

Materials and Methods

The Home Telecare system consists of a home clinical workstation, a wearable ambulatory monitoring unit, a home personal computer (PC), a 56kb modem and access to the Internet. The wearable triaxial accelerometer has been reported on elsewhere [3,4,8].

The home PC interface was specifically designed for ease of use, even by elderly and frail patients. A sophisticated yet easy to use graphical user interface was developed whereby all functions are accessed via large easy to see graphical icons on the screen. The patient’s doctor can fully control the scheduling of all recordings and can manage medications remotely over the WEB. The patient is scheduled to periodically use the home clinical workstation to measure important physiological parameters of weight, body temperature, blood pressure, lung function and ecg. Quality of life and functional health status are measured using standardised questionnaire tools delivered on the home PC and completed by the patient. Specialised questionnaire tools are used to ask routine clinical questions specifically relating to the disease condition. Patients maintain an electronic diary of all of their medical consultations.

Patient data may be reviewed from any computer by authorised physicians using simple browsers. Access to the server is controlled by password and if required, by biometric identification (iris scan technology). Individuals may log on as a system administrator, master clinician, researcher or patient physician. category has access to a different subset of the database. Thus researchers have access to all de-identified patient data, the master clinician to ALL patient data and the individual

Figure 1. Schematic Diagram of Home Clinical Workstation and supporting network infrastructure
physicians only to their own patients. Physicians can view all original data and can edit automatically derived results such as systolic and diastolic pressures. A typical review screen is shown in Figure 2 below.

Results

We have developed a sophisticated and comprehensive system for active management of chronic disease, which promotes compliance by scheduling clinical measurements, the taking of medications and access to health information as well as the recording of daily logs. Systems were installed first in Sydney and after a series of initial problems were resolved, in Wagga Wagga. All patients recruited were able to successfully use the home telecare system and data was collected in every case for at least six months. Numerous case studies were identified where the availability of a longitudinal patient record was able to either prevent hospitalisation or rapidly reduced the severity of the symptoms.

Discussion and Conclusions

A comprehensive home telecare system has been developed and trialed on a representative population of patients suffering from CHF and COPD. The useability, functionality and effectiveness of the system was demonstrated from both patient, clinician and operational aspects. Although a detailed evaluation of health care outcomes and cost benefits of the clinical trial was beyond the scope of this project, individual case studies suggest that this home telecare system could have a profound impact on the active management of complex and chronic disease at home.

REFERENCES