

PDA 기반 천식관리 시스템 개발에 관한 연구

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Study of PDA based Personal Asthma Management System Development

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Abstract

Self management of chronic asthma is of great importance, since the disease could lead the patient into an emergent situation. In the present study, we describe design and implementation of a personal digital assistant(PDA) based asthma management system for personal application including symptom and medication to prevent from the potential exacerbation of the disease. The software program was written by the Visual C++ tool in the mobile computing environment and Object Store was applied for data management. User friendly GUI environment was provided for the patient to input his/her daily condition and self treatment such as medication for successful management. The input screen design substituted for keyboard input to a mouse in order to easy to select an item and minimize the keyboard input. The implementation results of this system., Real-time data collection and process were possible and be able to have been carried effectively out a continuous symptom, a medication of asthma patients, risk management.

1. INTRODUCTION

Enterprises in many countries are investing in mobile communication and network technology with a great interest. As a result, mobile technology has solved many environmental problems previously existed[1]. Many researchers tried to develop self-management systems in medical field for those patients with chronic diseases requiring continuous management[2][3][4]. Asthma may be one of the typical chronic diseases which require daily management. It is an inflammatory disease carrying with various symptoms such as

respiratory distress, cough, stridor, etc., sometimes causing severe crisis due to bronchial obstruction, leading to death[5].

The present study adapted a PDA to implement a system as it can be conveniently carried in any place at any time[6] and has an excellent computing capability compared to the mobile phone. It was aimed to develop a personal management system for asthma patients based on PDA to self perform efficient management.

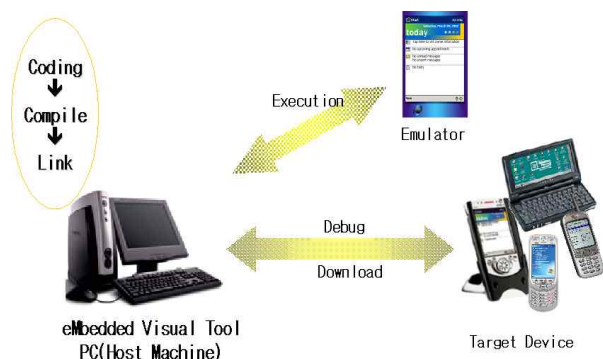


Fig. 1 System development environment

II. System design

2.1 Design principle and environments

The system was designed considering the interface with the patients to manage their daily condition and to make management program easily accessible. It has daily check-out system for management list enabling continuous management with minimized keyboard input by replacing as many inputs with mouse key-in as possible.

The developmental environment of the system is shown in Figure 1. eMbedded Visual Tool 3.0 was introduced[7][8], "HP iPAQ H2210" was selected as the PDA model for implementing programs, and Object Store embedded in PDA was applied for data management supporting small scale DB functions.

2.2 System configuration

The system consisted with 4 sub management modules of personal information, symptom, medication, and self-care as shown in figure 2. The data flowchart was structured such that the informations coming from each of the 4 input processes were used to recognize the disease condition in the diagnosis process and to provide the data for responses to conditions such as emergency. Statistics process forms graphs and comparative tables showing with list of various asthma conditions.

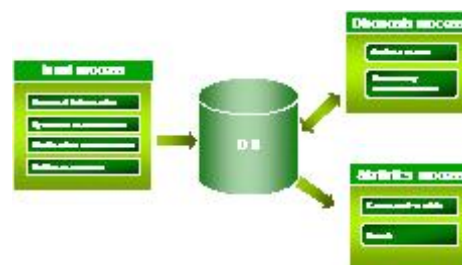


Fig. 2 Data flowchart

III. System implementation

3.1 User interface

The size(240×320mm) of PDA screen causes many restrictions in graphic design. Thus, it was necessary and important to optimize the screen contents. The user interface with icon menus was the first consideration of graphic, focusing on mouse input rather than keyboard, and scrolling the screen up and down rather than right and left. A few screen examples are shown in Figure 3.



Fig. 3 User interface screen

3.2 Personal information management

Personal information management module was composed of 4 sub menus of private information, family history, family doctor, and test results. It forms a process continuously storing renewed informations in DB.

Private information module having the data on the patient including job list is subdivided in detail, for example, the symptom diary module is used to find out if the patient was exposed to any environments related to asthma. Gender, weight, and height can be used for estimating the normal 'peak expiratory flow rate', and the tele-

phone numbers of family and friends stored in the system could be useful in case of the emergent situation.

3.3 Symptom management

Symptom management module consists of symptom record, record of peak expiratory flow, evaluation of asthma stage, and symptom progress graph. Daily symptom information is stored in the daily module DB and graph shows daily and monthly changes of each symptom by the graph module. Such graphs visualize the degree of changes in symptom easily detectable. Peak expiratory flow(PEF) rate is an important diagnostic parameter which should be daily measured, thus an alarm function was set up to direct the patient to measure PEF at same times everyday.



Fig. 4 Peak Expiratory Flow(PEF) rate screen.

3.4 Medication management

Medication management module consists of emergency medicine, control medicine, and direction of use depending on different types of medication. Emergency medicine included input of medication item, time, dosage, PEF value after taking the medication, and cause of provocation. The control medicine records oral or inhaling medications, dosage, frequency of use, and failure of everyday medication, and it shows a comparative table over different days confirming if the patient took the control medicine regularly. The direction of use for inhaling medicines of different types, such as, Dry powder inhaler, Metered dose inhaler, and Spacer can be demon-

strated by slide animation for best comprehension.

3.5 Self management

Self management sets up lists of symptom and risk factor management. The symptom management list corresponding to self-caring consists of 'yes' or 'no' response to the exposure of risk factors related to asthma. Such input contents are marked whenever necessary and evaluated in score, which may provide directions for medication at different dosage. Replying each question can also be seen with a simple click for satisfactory self-care.

IV. CONCLUSIONS AND THE FUTURE WORK

This study developed self management system for asthma patient based on PDA. It has 4 main menus: personal information, symptom diary, medication management, and self care, implemented to self manage both the acute and chronic symptoms of the disease. The present system developed on a PDA would be efficient and convenient for self management of asthma patients. The future task should be to perform disease management by the patients themselves carrying the PDA in daily life. Wireless communication functions may be added to transfer and communicate the data with integrated server located remote in the health care institute to extend the usefulness of the present management system.

ACKNOWLEDGEMENT

This study was supported by a grant of the Korea Health 21 R&D project, Ministry of Health & Welfare, Republic of Korea.

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