

Integrating Hospital Medical Care Data with Pharmaceutical Education Materials for Diabetes Self Management

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Summary

Diabetic patients need long-term treatment and follow-up exams as well as appropriate self-care pharmaceutical education to get the disease under control and to prevent possible complications. Pharmaceutical treatment plays an essential role in diabetes. If patients don't understand the medicines and dosages they take, their blood glucose control may be affected. In addition, the possibility for developing hypoglycemia may be increased. In this paper, we enhance the POEM system, previously developed for diabetic patient education, by providing diabetic patients' pharmaceutical education. The new system integrates both diabetic patients' pharmaceutical education information and medical care information to provide them with more comprehensive personalized medication information so that they can access the on-line system afterwards. It also strengthens patients' understanding towards pharmaceutical functions, side-effects and relevant knowledge thus increasing patients' adherence of medication orders and having better control in their blood glucose levels.

Keywords: *Diabetes, Pharmaceutical Education, Internet Application*

Introduction

Diabetes is a chronic, complicated disease. Many diabetic patients may result in amputation or even death due to this disease. According to the Bureau of Public health, the mortality amounts to 40.58% per 100,000 people in 2004 [1]. Asia has the highest diabetic prevalence rate - 57% [2,3]. However, several studies have shown that the chances and dangers of developing diabetic complications can be prevented or delayed through appropriate glucose control and self-management education [4, 5, 6, 7]. Medication treatment is essential as the condition is aggravated [8, 9]. It also suggests that only 15.3% of the diabetic patients understand the functions of their pharmaceuticals and 19.4% of them know the side-

effects their medicines render [10]. The biggest side-effect of Antidiabetic Agents may result in Hypoglycemia. Patients' risks of developing side-effects from taking diabetic medications will increase if they don't understand the dosages and functions of the medicines. Therefore, it is important to provide the patients consistent self management education and to remind them when unusual condition being detected.

According to the data collected by clinical pharmaceutical education providers, diabetic patients in large don't have abundant information in relations to medicine use (72%), it is therefore imperative for diabetic patients to have good pharmaceutical education in order to have better result of glucose control.

According to an Internet survey performed by Taiwan Health Reform Foundation [11,12], the top two most "want-to-know" pieces of medical information for Taiwanese people are a comprehensive medical records (for example, lab results, prescriptions, ... etc) and a complete label of pharmaceutical functions and uses on their medicine bags since more than 1/3 of the population don't recognize enough medical information put on them. The survey implies that there's a great need and awareness for pharmaceutical education. The on-line patient self management education program and clinical care information designed by this research team have been proven to be effective in involving patients or patients' family members to actively search on-line for their medical records as well as for diabetic pharmaceutical educational information so that patients can have more accurate fasting glucose and HbA1C control [13,14].

It is thus critical to integrate patients' medical records with pharmaceutical information so as to provide and reinforce proper medication information and achieve acceptable blood glucose control. Since pharmaceutical treatment is a key for diabetes, it is essential for patients to know the names and use of their medicines so as to better prevent side effects and advert drug interactions.

The main purpose of this study is to provide appropriate drug information by linking their prescribed medicines with their photos, directions of use and instructions to enhance pharmaceutical education in a hospital. Through accessing the on-line pharmaceutical education information, patients can have better knowledge with their medicines, and hence adhere to

their orders better. Moreover, the system will also provide an automatic reminder service for medication intake and routine check-ups.

Materials and Methods

The pharmaceutical education on-line service system for diabetes designed by this research team is further developed based on the existing system (Patient-oriented Education Management (POEM) system for diabetes) [13]. Firstly, data of lab results and prescriptions are gathered. Secondly, diabetic pharmaceutical information and related educational materials are developed and lastly, with the assistance of Internet technology, diabetic patients can search on-line for appropriate pharmaceutical information as well as suitable pharmaceutical education without time limitation. This new system has been practiced in the metabolic center of a medical center in Taipei city.

The previous POEM system developed by our research team mainly integrates each patient's hospital medical data including visit date, lab results, the received pharmaceutical education materials and next visit date as a patient education profile, and then transfer to an Internet server. The education profile is then presented on the Internet. After leaving the hospital, the patient can access the education profile on-line by entering their usernames and passwords. The diabetes pharmaceutical education system extends the POEM system by providing comprehensive pharmaceutical information for patients' prescribed medicines.

1 Establishing electronic diabetic pharmaceutical education information

Traditionally, all the diabetic pharmaceutical education was given orally by the health care educators in the hospital or done by patents' reading on pharmaceutical education bulletin boards (see Figure 1). This is in no way sufficient for patients to learn comprehensively about the disease within such short period of diabetic pharmaceutical education. It is necessary for diabetic patients to strengthen their cognition of medicine because most diabetic patients combine hypertension with Hyperlipidemia.



Figure 1 – Traditionally pharmaceutical-board education for diabetes in hospital

The electronic diabetic pharmaceutical education information has been established in this study. We collect 150 pharmaceutical instruction leaflets for diabetic pharmaceutical

treatment from a medical center. These pharmaceutical instruction leaflets include: Antihypertension Agents, Antihyperlipidemic Agents, Oral Antidiabetic Agents and insulin. All pharmaceutical instructions leaflets are transformed into electronic pharmaceutical information after checked by metabolism's physicians and pharmacists. This electronic pharmaceutical information is established including the database of drugs' appearance (by utilizing the digit camera to obtain the digital picture of drugs') and knowledge base of pharmaceutical instructions (for example, trade name, generic name, supplier, indication, pharmacology, side effect, dosage forms, usage consumption and precautions).

2 Integration of prescribed medicines and pharmaceutical education

The system provides patients with opportunities to search on-line for pharmaceutical information and knowledge in need. This is done by clicking on the desired medicine code number, then the system will automatically link the patients to the pharmaceutical webpage which comprises of drug appearance photo data bank and drug use instructions (such as functions, side-effects, dosages, forms of drugs, methods for intake and attentions).

The system is organized systematically consequently assists patients to find pharmaceutical information and relevant knowledge with ease.

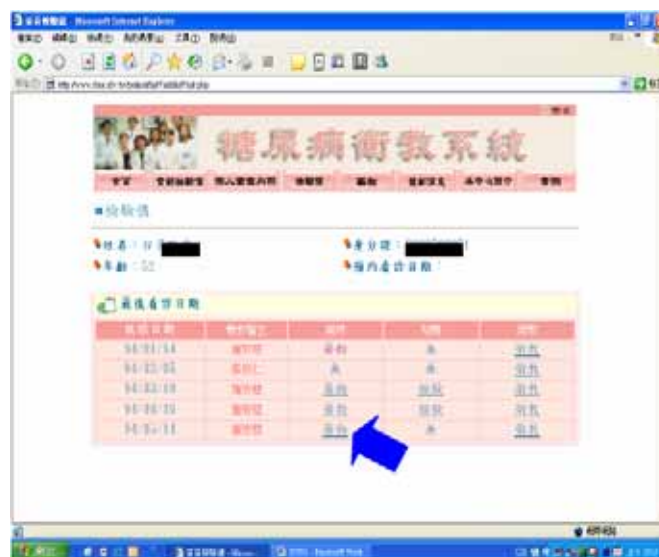


Figure 2 – Diabetic patients search on-line for pharmaceutical information using visiting dates as guide

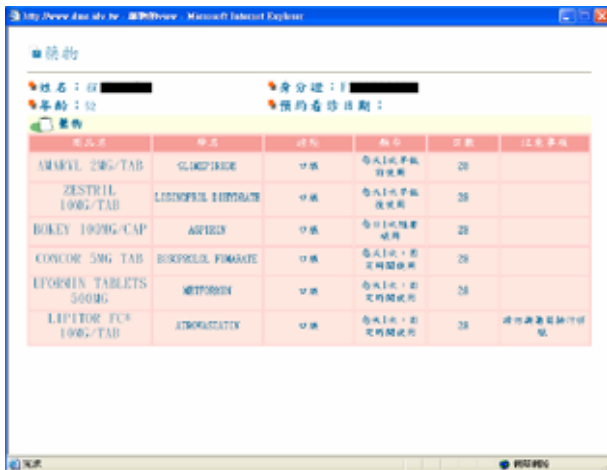


Figure 3 – Diabetic patients’ prescriptions after the medical visits

3 Personalized on-line pharmaceutical education

After patients enter the system, they encounter personalized pharmaceutical education main page (shown in figure 2). Patients can search information by clicking on either visiting dates or pharmaceuticals. If a visiting date is chosen, patients can check on the prescription drugs prescribed on that particular date (shown in figure 3). If they want to learn more about the medication, they can click on specific medicine then a pharmaceutical education window will appear (see figure 4). The contents include manufacturer, Chinese drug name, drug photo, dosage, intake instructions, preservations, suitability, functions, side-effects, attentions... etc. The purpose of this is to help patients have a better understanding of the medicines they are taking and further enhance their self-care ability. In addition, patients can enter their own pharmaceutical education webpage and click on the prescription drug button, and a comprehensive list of previously prescribed medicines will emerge (see figure 5). Then they can click on certain drug name and its pharmaceutical education window will pop up.

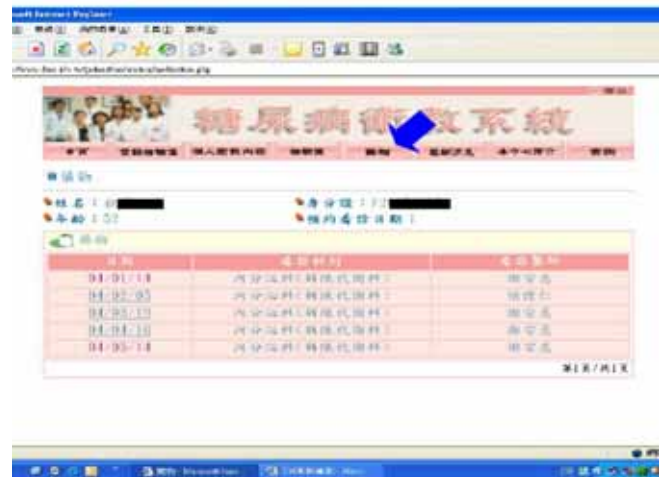


Figure 5 – Diabetic patients search on-line for pharmaceutical information using Drug fold as guide

Discussion

It’s been demonstrated that Internet application can promote abundant health education. And patients, through the help of internet access, can increase their self-care abilities [15]. According to Cochrane Database literature[16], better treatment results can be achieved if patients’ knowledge about pharmaceuticals is advanced. Therefore, it is critical to enhance patients’ self-care abilities and their understanding of prescription drugs they’re taking. With the popularity of internet access, more and more people are searching on-line for medical resources and medication knowledge. Although people can search the medicine information on certain websites for example, www.druginfo.tmu.edu.tw, www.usp.org, http://druginfo.icareasia.com.tw/medcon_hol.asp, www.rxlist.com, and www.webhospital.org.tw or look it up in books such as The Manual of 2004 Medicine Use, most diabetic patients find it too complicated and troublesome to do since they may need to buy books or get on-line and type in certain drug names, shapes and even colors of the drugs in order to realize the uses of the medicines they are taking. Besides, that does not answer to the needs of individual patient. According to Liu [17] the pharmaceutical knowledge information website designer- and others, patients can inquire about their prescriptions through on-line service afterwards. This provides them with an easy and effective means to be aware of the relevant pharmaceuticals information of which they need to know.

The new system supplies patients with a comprehensive lists of individualized drug treatment introductions and personalized drug use pharmaceutical education. By accessing the system, patients know what the lab results are and can match prescribed drugs to the on-line pharmaceutical introduction webpage which contains information about drug names(both in Chinese and English), dosages, drug shapes, suitability, functions, methods of intake, and side-effects, thus considerably reducing the chances of receiving wrong prescription drugs. Furthermore, patients’ drug use safety awareness may be enhanced by



Figure 4 – Personalized on-line pharmaceutical education system

reviewing the archives of pharmaceutical information. The future study for this research team aims at evaluation of the new system effect. Evaluations on frequency of patient access on-line and on pharmaceuticals will be examined so as to construct survey questionnaires in relations to satisfaction of system use, accommodation of pharmaceutical information and further discussion on whether obedience to doctor's advice and pharmaceutical cognition are advanced.

Conclusion

The patient-oriented diabetes pharmaceutical education on-line service system developed by this research team, supplies diabetic patients with thorough education and treatment needs. On one hand, it fulfills the needs of diabetic patients or their family members by accessing on-line for medical records, prescriptions, lab results, and amount of pharmaceutical education received. On the other hand, it reinforces patients to accept pharmaceutical education on-line, rendering consolidated pharmaceutical education results. Through the assistance of the on-line diabetes patients' self-management and pharmaceutical education, not only the quality of treatment will be improved, but care as well. Patients' understanding towards drug use safety and self-care knowledge and skills will also be greatly advanced with the help of the on-line system.

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