MOBILE SOLUTION FOR DIABETES PATIENTS IN DEVELOPING COUNTRIES

Tharshini Partheepan, Sumathy Kumarasamy
tharshi_it@yahoo.com, sumathy2005@gmail.com

ABSTRACT

In this modern world when we think about efficiency and productivity we think about Information Technology, which increase the mentioned factors concerning in every sectors. This paper describes about a computerized system which deploy Information Technology into health sectors to serve general public in efficient and productive way. This system specially concerns only about diabetes patients. In most of the hospitals and health related organizations all the administrative related process carried out by manually. So the time consumption is high and also there aren't be speedy responses to emergency situations. The proposed system consists of a mobile application which has facilities for monitoring diabetes patients' conditions according to their sugar level, providing first aid instructions and drugs dosage information and channeling. And also it has a special feature called Short Message Service (SMS) that enables communication between patients and doctors. Administrator, doctors and patients are the users of this proposed system. After the evaluation of this system it shows a success rate and it is hoped that the implementation of this computerized system will lead to increase in the efficiency of the health sector.

Key words: Health, Mobile Communication, Diabetes

1.0 INTRODUCTION

Diabetes is one of most popular chronic disease often requires extensive care by a healthcare provider with the cooperation of the patient in learning and practicing methods of rehabilitation. Chronic illnesses can be genetic, meaning that parents can pass the tendency to get them on to their children before they are born through genes. This system specially concerns only about diabetes patients.

These days, people like a system which can be operated at any convenience place such as home, work place and hotel to carry out their work in minimum time. The World Health Organization recent estimates indicate there were 171 million people in the world with diabetes in the year 2000 [1] and this is projected to increase to 366 million by 2030. Despite greater knowledge of the disease, one-third of people with the disease are undiagnosed. This indicates most of the people are affected by this illness. Therefore all need a system to provide instant notifications to patient and doctor. Also this system will provide an instruction delivered by doctor as first aid treatment to patient. The whole objective is to enable a patient to instant advice/ instruction/ communication with doctor much easier and faster. While many chronic diseases may never be healed completely, the patient, with the help of new and creative treatment options, can enjoy a full and rewarding life.

In this recent year the researchers have explored various approaches for health-care system in developing countries [4, 5, 6]. The use of Information and Communication Technology in general practice is increasing. A number of international organizations have initiated various pilot projects, including disaster relief efforts, education initiatives and telemedicine [2, 3]. In addition, several institutions and organizations are dedicated to the promotion of e-health and a range of web-based health consultancy services have begun. Although e-health seems to have a limited role in Sri Lanka at present, there is growing interest in the opportunities it may offer in terms of improving the delivery and access to services, especially in remote locations. E-Channeling is also available to mobile subscribers. Existing system has not been able to fulfill lots of requirements that are needed by the health sectors and installation of this system has not improved the productivity or the efficiency of the hospitals.

The proposed system concerns the use of the glucometer, a medical device for determining the approximate concentration of glucose in the blood, and allows patients to monitor their

conditions and ask suggestions from doctors through mobile phone. And also patients can get first aid instructions and drugs dosage information in first and fast manner. This computerized system has facilities for monitoring diabetes patients' conditions according to their sugar levels, providing first aid instructions and drugs dosage information and channeling. The users of this system are administrator, doctors and patients.

This paper starts off with the general introduction of the background and the proposed solution. Next section outlines the proposed methodology and then analyses about results and discussion. Finally the paper winds up with conclusion.

2.0 PROPOSED METHODOLOGY

The proposed system consists of subsystems such as Sugar level monitoring, First aid, Drugs dosage, Channeling and SMS. Figure 1 shows the flow diagram of the system.

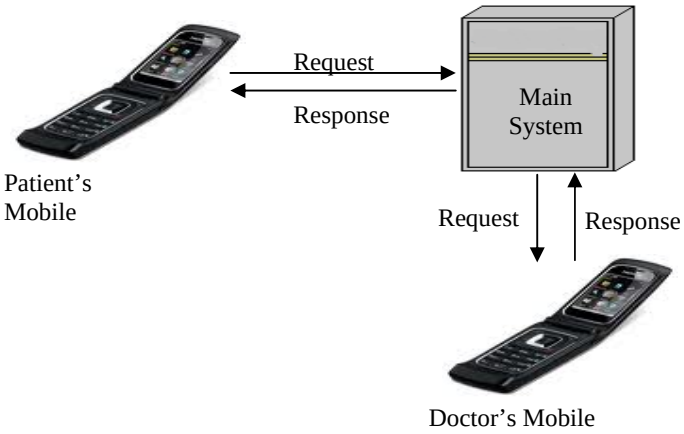

Figure 1: High level model of the system

The flow of the systems starts when a patient sends a SMS to the given number. The system then uses the content of the SMS to process the patient's request.

a) Sugar level monitoring sub-system: By using this sub-system each patient is provided with facility to enter the sugar level and get the details of the current status.

b) First aid sub-system: This sub-system has been implemented to provide the basic first aid information for the patients.

c) Drugs dosage sub-system: This sub system provides a facility to the patients to get the information regarding to the drugs dosage according to their age and the name of the drug.

d) Channeling sub-system: This sub-system delivers basic information about the doctors' consultation date and time. Two more options available related to following situations. This facility helps to find out the channeling details about,
   1. Particular patient's family doctor wether the doctor is available anywhere on that particular day.
   2. All other available doctors on that day. Here it doesn't consider only about that particular patient's family doctor.

e) SMS sub-system: This sub-system provides a facility to patients to communicate with the doctors through the system.

3.0 Results and Discussion

The data which is needed to trigger the modem should provide through this interface. By click the start button the server will start to execute. The figure 2 shows the interface of the system.

Figure 2: Interface of the system

The mobile application consists of an interface which has labels named as "Registration" uses to register with this system, and then "Sugar Level", "Drugs Dosage", "First aid", "SMS", and "Channeling" represents the each sub-systems like sugar level monitoring sub-system, drugs dosage sub-system, first aid sub-system, sms sub-system, and channeling sub-system respectively.

The user can able to click on any label to get the facilities. When the patient click on to the label called "Registration" there will be a form available for the patient. This form consists of the required fields such as name, age, address, phone number, family doctor's name, and date. After the patients details have been entered successfully in the database then the patient will get a message says that you have been registered with the system successfully. Figure 3 illustrates about the interfaces of the subsystems.

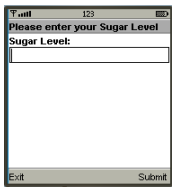

Figure 3.1: Sugar level monitoring sub-system

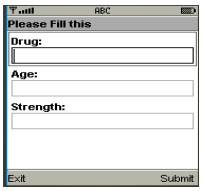

Figure 3.2: Drugs dosage sub-system

Figure 3.3: First aid sub-system

Figure 3: Interfaces of the sub-systems

a) Sugar level Monitoring Sub-system

Here patient asked to enter the sugar level as shown in figure 3.1. There are four ranges of sugar levels which have been used to verify the patient current status. The patient considered to be critical if he in the sugar level of greater than 200 mg/dl and less than 50 mg/dl. If the sugar level is in between 50 mg/dl to 65 mg/dl then it is considered as low. If the sugar level is in between 65 mg/dl to 110 mg/dl it is considered as normal. If the sugar level is in between 110 mg/dl to 200 mg/dl it is considered as high.

When the patient is in the normal range and he will get the message saying "you are fine and don't need to worry". If the patient is in the low or high level then the message will send to the patient with the first aid information. If the patient is in the critical level then the message says "you are in critical position and should consult the doctor immediately". Also the system adds the possible time to consult the patient's family doctor and if the family doctor is not available at that time it adds another available doctor's consultation time with the message. At the same time when the system sends this message to the patient it also send the message to the patient's family doctor with the patient name, age and the sugar level. If the patient is not registered in the system the system doesn't send the message to the doctor. After it sends the message saying "critical consult the doctor" it will send an another message to the patient and tells that you should register for the system to get more facilities.

b) First aid Sub-system

Figure 3.3 shows the first aid sub-system interface. This first aid information mostly will be provide by considering all the factors such as symptoms, age, and drugs details. When the patient is in critical level which is identified using the symptoms then the system doesn't consider about the other factors and it will ask the patient to consult the doctor immediately. But if the patient is in the level which is able to provide the first aid information then the system will see the appropriate first aid information in the database for the given combination of the details which is entered by the patient.

c) Drugs Dosage Sub-system

This sub system provides a facility to the patients to get the information regarding drugs dosage according to their age and the name of the drug. The interface for drugs dosage sub-system shows in figure 3.2. The dosage which includes the quantity of the drug and the duration to take the drugs like one per day, after or before meals will be sent to the patient.

d) Channeling Sub-system

Two options available related to channeling. Suppose the patient wants to get the details about his family doctor wether the doctor is available anywhere on that particular day, when the patient click on that option he will get a new interface where he asked to enter the doctor's

name and the date which is prefered to get the doctor's availability information. This will provide the hospital names and the consultation time for the appropriate doctor's name and the date.

If the patient wants to get the details about the all available doctors then he click on that option, he will get an new interface which asked to enter the hospital name and the specialist. This will provide the doctors' names and consultation time for the appropriate hospital's name and specialist.

e) SMS Sub-system

The sub-system provides a text area where patient can able to type any queries which he wants to clarify with the doctor. The system will extract the typed information and the phone number from where the sms has been sent. By using the patient's phone number the system first gets that patient's family doctor's name, then using that name the program will get the doctor's phone number which is appropriate to that doctor's name from the database. And this information will directly send to that family doctor without any modification.

4.0 Evaluation

The evaluation process was mainly focused in assessing the achievements of the system objectives. System evaluation was helped to identify the correctness, completeness, and quality of the developed software system. The system was evaluated by asked some novice people to use the system, based on their feedback the system was corrected.

5.0 Conclusion

The ultimate product of this mobile application is to improve the efficiency and the productivity in health sectors. Proposed system mainly concerns about diabetes patients. There is an exceptionally important role for patient education, diet, exercise, self glucose monitoring, with the goal of keeping both short-term blood glucose levels, and long term levels as well, within acceptable bounds.

One of the major goals of implementing this system is to monitor diabetes patients' sugar level and provide speedy responses in emergency situations. This has been achieved by using mobile technologies which are able to provide information according to the provided input within very few seconds. If a diabetes patient tests his blood sugar level by an electronic diabetes testing machine, normally he will get to know about sugar level in blood. But he will not inform this day to day testing to his consultant. But this proposed system will be read all these kind of results from home testing machines and will keep the histories. If there will be a critical situation for the patient it will send an alert to both doctor and patient. So both parties will notify about the critical situations. And also this proposed system will give first aid for those kinds of critical situations. With the help of this mobile solution, patients can get all type of services like monitoring diabetes patients' sugar levels, providing first aid information and drugs dosage instructions through mobile phone.

References

[1] Green A, King H, Roglic G, Sicree R, Wild S. Global Prevalence of Diabetes: Estimates for the year 2000 and projections for 2030, Diabetes Care, 27: 1047-1053 (2004).

[2] John B. Oladosu, Sunday. O. Ojo, Matthew O. Adigun. Framework for a Context-Aware Mobile Ehealth Service Discovery Infrastructure for Rural/Suburban Healthcare, Journal of Theoretical and Applied Information Technology.

[3] Niki Panteli, Barbara Pitsillides, Andreas Pitsillides, George Samaras. An E-healthcare Mobile Application: A Stakeholders' Analysis.

[4] Ikhu-Omoregbe, Nicholas. Designing E-Education Supports In E-Health Based Systems, Turkish Online Journal of Distance Education-TOJDE (2008) .

[5] Saroj Mishra, K. Ganapathy, Fams, Baljit Singh Bedi. The Current Status of eHealth Initiatives in India (2008).

[6] K. Ganapathy, FAMS, Aditi Ravindra. mHealth: A Potential Tool for Health Care Delivery in India (2008).