Home Telecare System Integrated with Periodic Health Reminder and Medical Record & Multimedia Health Information

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Abstract

The necessity of home telecare system is growing due to increase in desire for health promotion owing to increase in chronic diseases, aged population and medical expenses.

Already, we computerized patient's data and offer periodic health reminder to patients for health promotion by using Lifetime Health Monitoring Program (LHMP). Our study connected LHMP to the Web on internet by CGI as an electronic medical record; enabling reference to patient's medical records anywhere. The study also made possible video teleconsultation and constructed multimedia database to provide health-related information to the patients. On these bases, a flow chart was developed using the home telecare to practice manage patients with chronic diseases, old patients, and the handicapped. Further standardization in data, establishment of law bases for home telecare system, development of rules for medical fees and active utilization of biomedical telemetry will be needed to extend home telecare system.

Keywords

Home Telecare, Video Teleconsultation, Electronic Medical Record

Introduction

The necessity of home telecare system called for due to the change in disease epidemiology, change in medical environments and development in information technology. Epidemiologically, acute infectious diseases have decreased dramatically and chronic degenerative diseases have taken over 70% [1,2]. The characteristics of chronic degenerative diseases are that it has long incubation periods, no symptoms could be found till the disease is much progressed and once the symptoms have shown, it is very difficult to cure. So, the existing medical caring systems are focused on the management of acute diseases but the requested medical system for chronic diseases are disease prevention and health promotion. According to the emphasis on individual roles and responsibilities in disease prevention and health promotion, Department of Family Medicine, SNUH is carrying out LHMP which provides integrate examinations for early diagnosis and health risk assessment lifelong.

The characteristics of this program are essential scientific early diagnosis examinations which are done regularly considering patient's sex, age and health risk factors and efficient management of patients' medical records through introduction of computerized patient management system [3].

The purpose of our study is to connect this LHMP to home telecare system enabling decrease in patient's doctor visits, offering medical information and strengthening of patient education, so that efficient and continuous management of chronic diseases is possible.

Increase in old population and increase of medical fees could characterize change in medical environments. The proportion of old population is dramatically increasing, now being 6% and estimated to be 14% in 2020 [4]. The following increase in medical expenses and chronic diseases is also huge. The present medical caring environments can not adequately support old people who are apt to be debilitated, chronically ill and poor. So the home telecare system which enables less clinic visits and lower costs is requested.

Now the medical expenses, being 5.5% of GDP, is in increasing trend and doctor visits (7.6 times/year) & hospital admission days (0.67) per person are higher than advanced countries, still increasing [4]. Visiting doctors on trivial problems and insufficient medical information take a great proportion of these increases.

Thus, a system, which makes possible the management of common diseases with only consultation with, not visiting, the attending physician and appropriate provision of medical information is essential.

Next, Another characteristics of our medical care environments is that, despite the busy life of modern people, there is a great limitation to the time of actually interviewing the doctor compared to the long waiting time. The need of effective method of providing appropriate health education and medical information in such limited times are requested. And also, medical services through emergent counseling and care of the disabled chronic degenerative patients are very weak.

The most prominent change in environments, which made this study possible, was rapid development in information technology. Nowadays, the computers are being supplied to most homes in great speed, introducing the term 'era of computers. Our government is planning a construction of nationwide super speed communication network till the year of 2010 on addition to the existing public communication network.

The ultimate purpose of our study is to improve medical services and bring efficiency to medical caring system by constructing LHMP through home telecare system by super speed information network system.



Figure 1 - A configuration of network

Result

Our research was carried out in 3 categories: Video Tele-consultation Kit module, Electronic Medical Records Module, Multimedia Database Module (MMDM)



Figure 2 - Web based Electronic Medical Record

Database server has individual medical records, which are connected to the LHMP and MMDB data saved and connected to the internet. Doctor's personal computer is connected to patient's personal computer through T1, so that video tele-consultation is done, medical records in the server checked and MMDB data provided.

Home Telecare System requirement

- Video Tele-consultation kit: Intel procure 200 v2.0
- N-ISDN/T1

- · Web database: Electronic Medical Record, MMDB
- Windows NT based PC server

Video Tele-consultation kit module

The module enables the doctor to check patient's health status by utilizing the Video Tele-consultation kit (Intel Proshare program) through the use of private T1 connection line between the multimedia PC at patient's home and that at Home Telecare Center. And also, the doctor can use the module to transfer multimedia information including motion pictures, sounds etc. when needed. The doctor can prescribe medication through prescription transfer system by the White Board function of Intel Proshere.

TITLE		HTML		Image& Motion picture	
		No.	Size(byte	No.	Size(byte)
)		
Health Promotion		12	143434		
Lifetime Health	Lifetime Health Maintenance Symptom-oriented Information		42258		
Symptom-oriented Information		113	216802	10	35706152
Emergency Management		53	181499	54	672967
Medication		331	512476		
Child Rearing and Prenatal Care		89	423845	7	28234126
Medical Examination and Devices		27	70335	97	18896552 6
First-aid Kit at Home		3	18199	1	37692
Medical Insurance		26	147158		
Mistaken Health Common Senses		71	129496		
Disease	Infectious	83	165230	31	1691313
	Musculoskele- tal	16	23658	4	87605
	Reproductive	11	12724		
	Endocrine	20	27182		
	Congenital	64	103478	46	1584427
	Gastrointesti- nal	48	69117	10	17387653
	Neurologic	35	57138		
	Nephrologic	10	15440		
	Cardiovascular	27	51787	11	17256327
	OB & GY	58	100565	30	941968
	ENT	31	40871	24	15449056
	Tumor	49	81500		
	Skin	41	69485	34	706048
	Blood	7	8479		
	Pulmonologic	24	39615	6	1311445
	Psychiatric	32	52496		
	Ophmologic	64	88235	18	470378

Table 1 - Contents of Multimedia Health Information & MMDB data size

Electronic Medical Record module

The module enables the doctor to input patient's various examination results to the database of the Lifetime Health Management Program, so that they could be referred at the time of medical consultation due to the possibility that the patient's medical records can be referred to, input or revised at home telecare center or at home on the internet utilizing CGI (Common Gateway Interface) Program [6]. Multimedia Database module

Multimedia Database Module

The module provides the functions of making out various medical information in many data types (texts, images, sounds, motion pictures etc.). The contents provide pertinent information that the patient himself is looking for could be offered. Also, for the patients who are not familiar with these systems, search function is included enabling them to easily obtain the information needed.

Home Telecare flow chart



Figure 3 - Home Telecare logic flow chart using video tele-consultation and MMDB & Electronic Medical Record

- 1. Video tele-consultation system of PC at home telecare Center awaits with ON status
- 2. Patient uses Video tele-consultation system at home to call the PC at home telecare center
- 3. The content of patient's call is transmitted to the PC at
- 4. home telecare center (Buzzer rings)
- 5. Specialist replies to patient's call
- 6. Video tele-consultation system normally activates so that patient and doctor can see each other through their own PC
- 7. Specialist inputs patient's ID number on individual medical record initial screen
- 8. Pertinent patient's medical data are output
- 9. Specialist starts history taking
- 10. Specialist inputs any new information necessary
- 11. Specialist sends MMDB dates patient should refer to through Video tele-consultation system
- 12. MMDB data sent by the specialist is revealed on patient's PC through Video tele- consultation system
- 13. Specialist acknowledges the location of MMDB Web Page to the patient if needed
- 14. Patient starts Netscape and search for needed information on the pertinent Web Page. (Patient could use Search function provided by MMDB for easy search of needed data)

Screen Design

Medical Record

First, get into the 'my medical record' part through main screen where there are places to input doctor's ID and password. Next, through patient's name or social ID number, the patient's medical records could be referred and changed by laboratory examination result and final diagnosis. Patient's medical records are connected to the LHMP through CGI (Common Gate Interface). Patients can refer to their own medical records through main exam results and final diagnosis so that they can see their health problems, diagnosis or education materials. And through search function, information on specific diseases or symptoms could be searched. [5]

Health information

Health information is displayed through multimedia enabling maximum visual effect.

- Transfer of Information on Single Screen Unit
- Characters, Sounds or Voices, Still Images and Motion
- Pictures Provided Simultaneously on Single Screen
- Deepening and Linking of Information by Hypertext

Medical care utilizing Intel ProShare

Through screen of Intel Proshare doctor replies to patient's call and they can have conversation while watching each other's face. If prescription is needed, the doctor could use white board function to prescribe and patient could output the prescription slip by his printer. If there are materials in MMDB for patient's education, then through share function, the same data screen that doctor sees can be displayed on patient's PC.



Figure 4 - Video tele-consultation spot using Intel Proshare



Figure 5 - Doctor's prescription using Intel Proshare

Discussion

Development and Operation Plans

Doctor should set up computer clinic and arrange time for home telecare just like ordinary clinic. Patient can schedule consultation with attending physician through computerized medical reservation system. Doctors can reply to the patient's emergent questions at hospital or home 24 hours a day in turns. Patient could refer to patient's medical record and doctor through Web based medical record connected to the internet anywhere in the world enabling home telecare. And simple examination results could be inquired right at patient's home, no need for hospital to send the results by mail or for patient to visit hospital. And also, MMDB is continuously revised by the attending physician to make the information actually usable. For the last, the group health education now carried out at the department of Family Medicine could be done by motion pictures to enable integration with other hospitals' management systems.

Utilization and Anticipated Effects

Specialists could utilize DR COM in medical care of chronic and emergent situations at home, care of the aged and disabled and professional consultation. Also, exhibition of home telecare as an example could offer a model for home telecare center. Not only Home telecare is possible but also Worksite telecare which provides and evaluates hospital-worksite health promotion service, mobile telecare by the development of motion archieving system through the use of Notebook computers and hospice telecare are offered [6,7].

Problems and complementary plans

Programs strengthened in the area of medical record security should be developed. The data should be standardized to be intercommuncable between hospitals. Law based medical fee systems should be established, so that doctors, programmers and patients can have more positive attitudes to home telecare system [8]. And development and utilization of biomedical telemetry is essential for the doctor to get more of patient's clinical information. In countries like Japan and USA, remote biomechanical devices which could monitor blood pressure, pulse rate, body temperature, EKG and devices which has the function of stethoscope sufficient for basic management of chronic patients are already developed [9].

Practically the most important problem is that even though the home telecare system has a lot of advantages, if the cost of utilizing the system is too high, then it could be useless. At the initial phase, government assistance is needed for the development of these systems and medical devices and the developer has to make devices profitable in aspect of cost-effectiveness.

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