

Development of Korean Emergency Medical Dispatch Priority Reference System (K-EMDPRS)

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• Abstract

Currently, the emergency cases is increasing in proportional to the growing complexity of our society, and the emergency diseases and hazards present another problem in health and welfare. And it is required to develop our emergency care system that is lagging behind the foreign countries both in quality and quantity. Since the most crucial part of the emergency system is the communication system, our own communication system of Korean Emergency Medical Dispatch Preference System (K-EMDPRS) has been developed. It consists of four protocols focusing on the easy use for the emergency communication. And it is expected that this K-EMDPRS contribute to the development of our emergency care system.

Keywords : emergency care, emergency communication, EMDPRS, user interface

1. Introduction

The emergency medical system is defined as a synthetical structural system that can provide a patient in emergency with a proper emergency care with a timely manner. The emergency medical system is composed of several sub-systems: the communication system for an emergency dispatch, transport system to provide the personnel for the care and hospitalization of the patient, and of the hospital system by which the patient is cared with full scale medical services. Among these sub-systems, the communication system is the most important since it determines the initial state of the emergency care, and have an important effect on the following stages of the care.

The emergency care communication system should be such that it can respond promptly to all the emergency calls, and can make the proper decision whether to dispatch the nearest response unit to the emergency site. Also it should provide all the necessary information to the responder. Currently, the information technology and computer technology have been introduced to the emergency care, and particularly have changed the existing communication system almost completely[1].

In USA, numerous computer systems and programs have been developed so far to aid the emergency care communication system. The position and phone number of a caller can be identified. And the computer-aided dispatch(CAD) is made by using the dispatch card and

database which includes all the addresses and locations of the service area. Further, the automated vehicle locator(AVL) which identifies the emergency vehicle by satellite communication is employed, and communicational interface between various facilities such as pager, intercom and facsimile is provided. These technologies play an important role in optimizing the tactics of resource distribution and surveying a series of emergency care activities. With the increase of the emergency cases as is now, the role of emergency vehicle equipped with CAD and AVL is more expected[2][3].

In parallel with the hardware technologies, many softwares on the communication technology which an emergency medical dispatcher(EMI) can use. For example, the Emergency Medical Dispatch Priority Reference System(EMDPRS) permits an efficient allocation of emergency resources. The EMDPRS is the systematic protocol of the emergency case communication management, and provides the connection with the callers, determination on the dispatch of the emergency teams depending on the emergency degree and pre-arrival treatment. In more detail, it consists of six constituents. They are: (1) case-entry interrogation, (2) chief-complaints selection, (3) key-questions interrogation, (4) determinant-code selection, (5) pre-arrival instruction, and (6) post-dispatch instruction. In brief, the development of software system such as EMDPRS has been indispensable in the emergency care communication in that it provides emergency personnel with a reliable knowledge and information for the decision making to control the emergency site and patient in advance. Also the management and evaluation of the quality of the emergency care become possible by employing the standardized systems[4][5].

On the other hand, the situations of our country are quite different from those of other countries. In our country, the fire-fighting offices are in charge of emergency care, but there are many offices that are lack of necessary facilities such as a dedicated computer system. Consequently, the consulting with patients and hospital is not achieved efficiently, and the patient transfer to hospital is made mainly by the subjective experience of the emergency rescuer, resulting in the transfer delay. The plan of the development on fire fighting communication established by MOGAHA (Ministry of Government Administration and Home

Affairs) says that after the broad area communication network in cities and provinces is constructed ('94-'95), the government fire fighting communication center is set up('95), and then the government administrative network is connected with the area network for the computerization of the fire fighting instructions('94-2000).

Also this government plan includes the computerization of fire fighting instructions and administrative works in metropolitan cities and nine provinces, as well as the construction of the disaster management systems by satellite communication system. However, the first aid works of the fire fighting office have not been involved in the systematic manner in these plans. And the present situation of the 119 emergency unit of the fire fighting organization is such that it functions only as a basic information center, but still can not handle the emergency care systems in case of large scale disaster.

The present functions of our fire fighting offices regarding the emergency care communication are the situation dispatch to the related units, a communication with hospitals, a receipt of emergency call, and giving emergency unit instructions, so on. The emergency information management of the fire fighting office includes informations on traffic situation, available hospitals, and state of patient[6][7].

It is required to develop our emergency care communication system that is lagging behind both in quality and quantity as the emergency cases increase dramatically in our society. For this, the emergency medical dispatch priority reference systems of foreign countries have been surveyed in detail. Referring to the results of this analysis, and considering the specific environments and situations, our own system named K-EMDPRS(Korean Emergency Medical Dispatch Priority Reference System) has been developed.

2. Goals and Scopes

The goal of this study is to develop the protocols and computer programs of the K-EMDPR. This goal includes the development of four module programs that are described below.

1) Case-entry interrogation

: the program that treats the general information on patient such as patient's position, address, phone number, age, sex, awareness, breathing

2) Chief complaints selection

: the program that identifies the critical items to eliminate the life threatening factors and to find treatment methods for the pre-determined procedural flow.

3) Key questions interrogation

: the program that maintains the procedural flow of care. A protocol is provided to handle the necessary information on dispatch allocation and dispatch plan, patient's state for pre-arrival instruction, dangers of site, so on.

4) Pre-arrival instructions

: the program that instructs the emergency caller to deal with the patient for resuscitation by remote communication

3. Methods

As a preliminary stage, the emergency medical communication systems of foreign countries have been surveyed. The survey includes not only the emergency protocols but also the infrastructure of communication, traffic and transportation as well as the related laws and regulations. A particular stress has been given to the 32 chief complains employed in the USA EMDPRS.

Together with the surveying foreign countries, the various situations and constraints of our country have been analyzed with respect to emergency care. Detail information on the procedure from the emergency call to the response have been collected. Also the problems and their solutions have been identified along with the surveying the hardware infrastructures. With these data and information, expert meetings were held to derive the unique protocols that reflect our own situations and environments.

Further, wide documents were referred and site investigations were made to develop the more efficient standardized protocols. By use of these protocols, questions for the analysis of emergency situation and expected instructions for the response of questions have been made to incorporate with the K-EMDPRS.

4. Tools and Environments

The tools that were used for the protocol development, and execution environments and related database are as follow.

1) Development tool

To save the resources for the development, the existing utility program were adopted. However, the utility should be reliable and user friend. Further it should be linked with the database in a reliable and efficient manner. Considering these criteria, the proved utility program of Visual Basic (ver 6.0) were used as a development tool.

2) Execution environment

Considering that almost all of the currently running operating system is Window, although some use Linux, the programs have been developed under the assumption of running under the Window Systems(Windows 98, Windows 2000, Windows XP) with the optimal resolution of 1024 by 768.

3) Related database

The database should be efficient in memory resource and easy with the data management such as addition and deletion. And the field structures should be systematic and linked with the driving utility in a reliable manner. Also it should have the security. Since the main utility

was VC, the MS Access was adopted as a database. The Access has been proved to be efficient and reliable under the MS environment.

4) Other criteria in developing programs.

The concept of user friend has been emphasized. Although this user friendliness is quite common in all programs, it should be implemented to the utmost since the program is used in harsh conditions. In this study, various GUI (graphic user interface) techniques have been employed. In addition, the programs have been developed for a prompt and reliable access to the data and information, and the statistic function has been added to understand the long term trend in emergency care.

5. Results

Figures 1 and 2 show the case-entry interrogation and the chief complaints selection, respectively. The case-entry interrogation window permits the input and retrieval the general information on patient such as patient's position, address, phone number, age, sex, awareness and breathing. The input items are kind of disaster(fire, first-aid, emergency), name of reporter, and other general information. The chief complaints selection permits the identification of the critical items to eliminate the life threatening factors and to find treatment methods in line with the pre-determined procedural flow.

Figure 1. Window of Case-Entry Interrogation

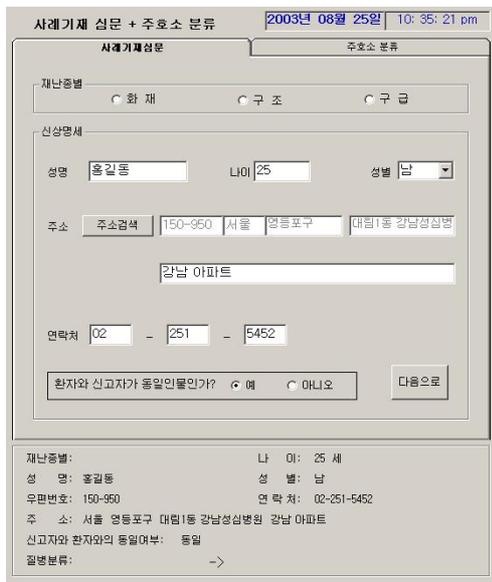
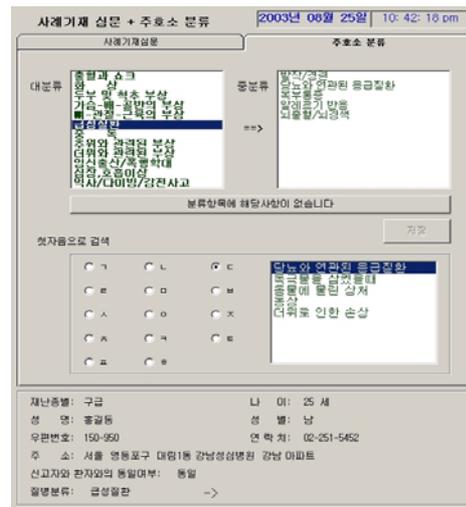


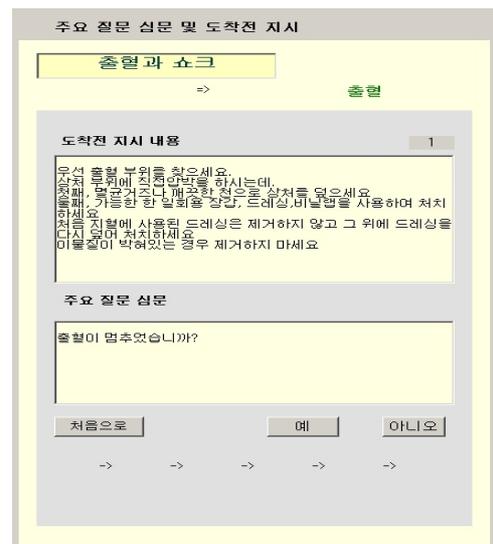
Figure 2. Window of Chief Complaints Selection



The windows for the key questions interrogation and pre-arrival instructions are shown in Figs. 3. The key questions interrogation deals with the care in compliance with the established procedure. The necessary informations for this section are dispatching programs, site environment for the rescuer, patient condition, so on.

These information will be referred for the pre-arrival instructions. The section of pre-arrival instructions is for the instructing the emergency caller at the site to cope with the emergency condition of the patient. The instruction is given by the communication facilities. The instructions are described in a everyday language and in a step by step simple sentence. And even the words that have several meanings are avoided for the clear communications.

Figure 3. Key Questions Interrogation and Pre-arrival Instruction



Figures 4-1 through 4-3 show the data retrieval and elementary statistical functions. All the input data is accumulated in the database, and a specific data retrieval is possible by various fields(Fig. 4-2). Also the basic statistical functions of MS database are easily used to grasp the overall long term trends(Fig. 4-3).



Figure 4-1. Data Retrieval Window



Figure 4-2. Data Retrieval by Various Fields



Figure 4-3. Statistical Function

6. Discussions

Our situation of the emergency care is lagging behind the foreign developed countries that use the up to date emergency communication facilities with the well established emergency care system. To decrease this gap, it is required to modernize the emergency facilities. Since the emergency care communication is the most important part of the emergency system, an emphasis should be given to the establishment of communication system.

The K-EMDPRS developed so far aims the improvement of the emergency care communication system. And this approach is directly related to (1) the construction of systematic access to the site through efficient emergency communication, (2) prompt handling of the nationwide disaster, (3) supply of emergency care of high quality, (4) development of knowledge management system(KMS) for the emergency care, (5) quality management(QA) and quality assurance(QA) of emergency care data, and (6) enhancement of national welfare by betterment of the emergency care system in our country.

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