Medical Information network System to Kagoshima Prefecture

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by

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Abstract

Kagoshima Prefecture Medical Association (KMA) constructed Kagoshima prefecture medical information network system in 1989.

In this paper, I explain the general outline of this and the actual construction.

As for this result I presented in a commemorative lecture, in Asia Pacific Health executive conference (Oct. 1989 at BANGKOK) and the 100th anniversary of KMA.

1. Introduction

There are 2830 doctors in Kagoshima Prefecture and 87% of them belong to the Medical Assocition. This percentage is the highest in Japan. In Kagoshima there exist 290 member hospitals (at least 20 beds) 1150 clinics (less 19 beds).

In such an environmentv, the KMA tacled with the constuction of a medical information system which can be divided into 2 fields.

One is the office automation of executive office in this Association.

This other is the construction of a medical information network. I explain them as follows.

The other is the construction of a medical information network. It explains about each below.

2. Office Automation at the Executive Office of Medical Association

The executive office of Kagoshima Prefecture Medical Association consists of 3 independent organizations. They are the Medical Association, the Medical Credit Association and the Medical Cooperative Association.

The Medical Assocition offers management and health insurance service to its members and related people (such as their families, nurses and technical experts).

The Medical Credit Association offers banking service to its members.

The Medical Cooperative Association sells medical supplies (excluding

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pharmaceuticals) to its members.

One computer was installed for Medical Credit Association in 1979 and two more were installed for the other Sections in 1982 in order to increase the efficiency of the office work.

However, these computers became rather outdated and their capacity became insufficient for required services. Therefore, we renovated the computer system in 1987 and adopted the following policies for our office automation.

1. *All the sections offer services to the members and the related people. Therefore, there should be one host machine and one data base of members etc. Field operations should be executed by terminals in the distributed processing mode.* (Fig. 1)
2. *The Medical Cooperative Association should manage and operate the computer sysstem. The cost of operations should be paid by the expenses they receive for executing their processes.*
3. *They Medical Cooperative Association should employ 5 full-time computer staffs. They are to manage the system, the data and the application software.*
4. *A machine of the same model should be installed for the medical information network system. The two systems should be connected functioonally, including the data bases.*

BASIC CONCEPT OF KMA OFFICE AUTOMATION SYSTEM

Fig. 1
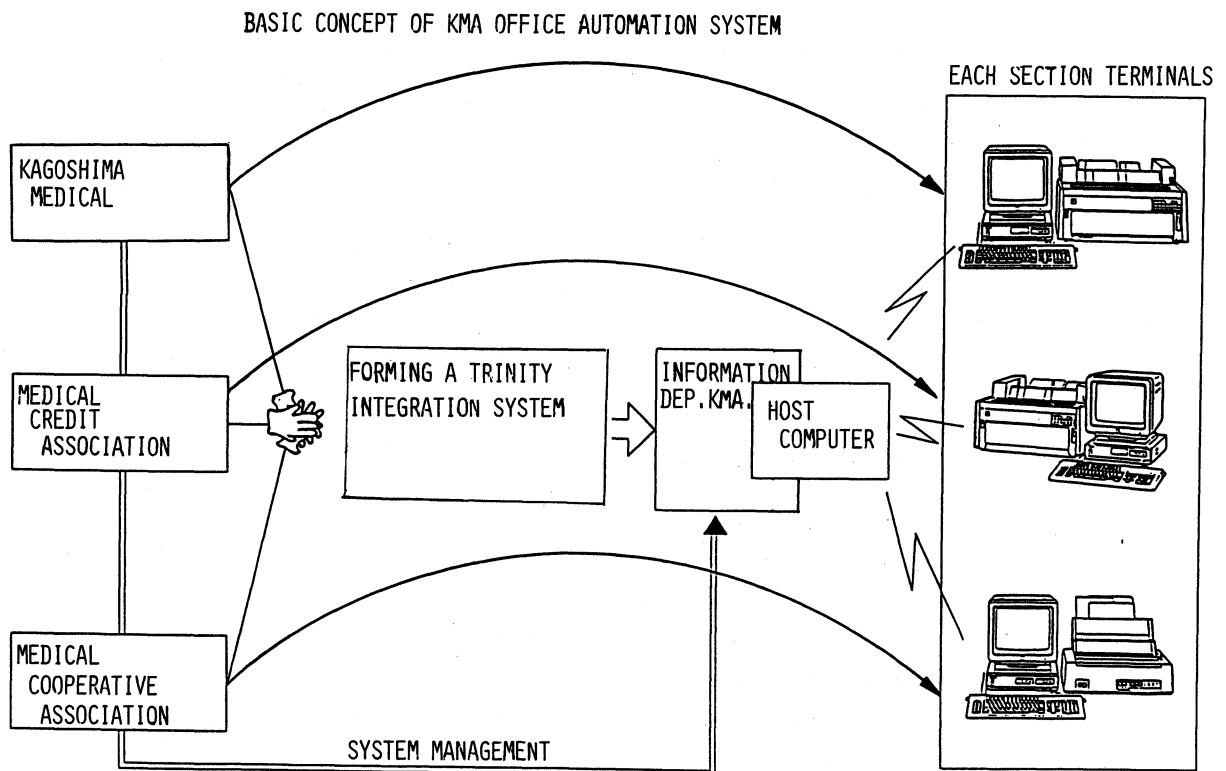
Such a system has never been employed by any another medical association in the country.

The machines were installed in October, 1987. Full-scale operations of Medical Credit Association were started in April, 1988. Then, full-scale operations of both the Medical Association and the Medical Cooperative Association were started in April, 1989.

This system was found to have the following advantages.

1. *Since the data base of members is shared, it is easy to maintain and manage it.*
2. *Since the master file has a relational data base structure, data can be retrieved easily under various conditions.*
3. *Since most of the field processing are executed by workstations in the distributed processing mode, the load of the host machine is small. As a result, a small economic host machine is sufficient for all the operations.*
4. *Since full-time staffs were employeed, the system can be managed and operated smoothly.*
5. *There are two functionally connected host machines, namely, one for office automation and the other for the medical information system . Therefore, resources can be used effectively and back-up measures are easy to be taken.* (Fig. 2)

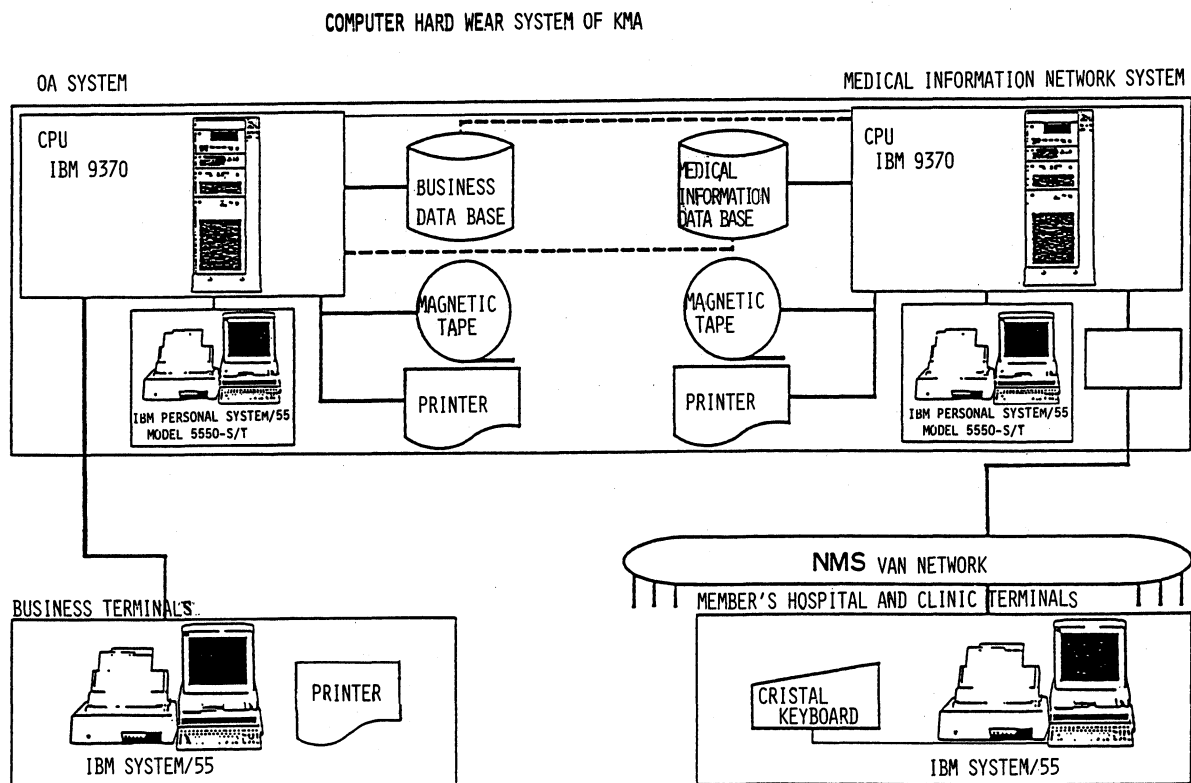COMPUTER HARD WEAR SYSTEM OF KMA

Fig. 2

In this way, Kagoshima Prefecture Medical Association is able to process all the operations smoothly.

3. Medical Information Network System

A medical information network system can be constructed with many of the latest technologies, such as a remote medical care system, a medical diagnosis is support system, an IC card system and digital image processings, etc.

However, many of these advanced teshnologies still seen to have low cost performances even if adopted by Kagoshima Prefecture Medical Association.

Therefore, we decided to start with practical technologies.

First, a medical information network can comprise the following.

1. Electronic Mail
2. Pharmaceutical Information Retrieval
3. Examination Result Inquiry System
4. Vacant Bed Management system
5. Patient Accounting

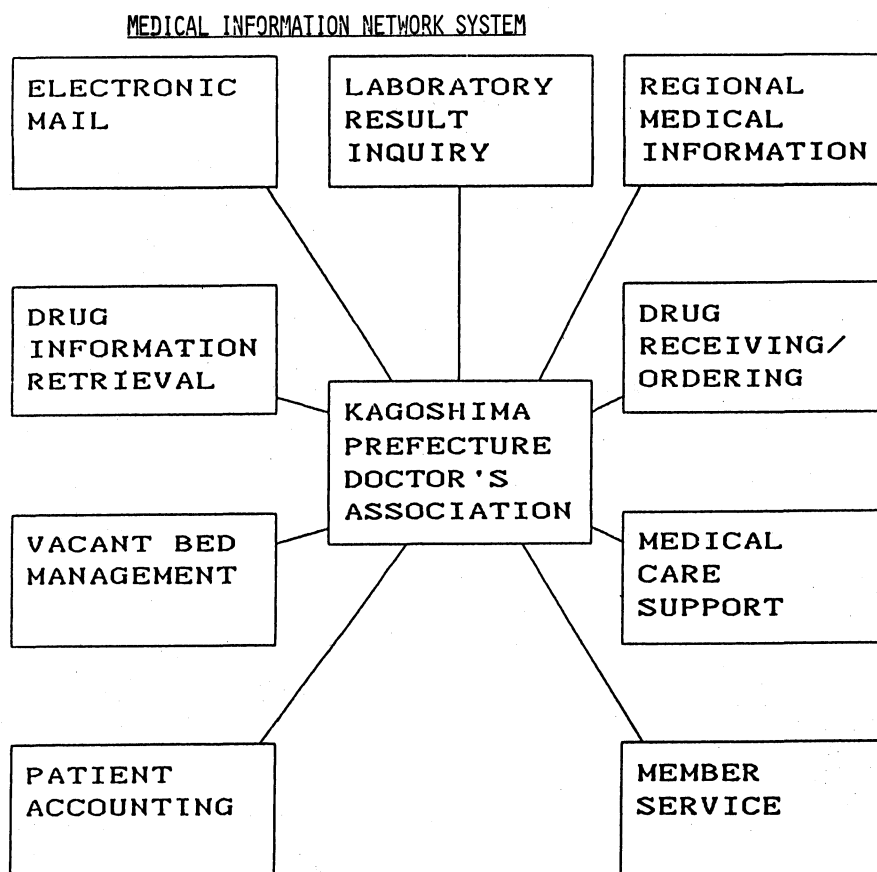MEDICAL INFORMATION NETWORK SYSTEM

Fig. 3

6. Regional Medical Information System
7. Drug Receiving/order System
8. Medical Care Support System
9. Service for the members
(Fig. 3)

So decided to take up 5 items No. 1～No. 5 for the lst stage of the development.
Let me explain each of them in some detail.

1. Electronic Mail

Electronic mail is a network system which is widely used in general.

A. The Electronic mail system has the following characteristics.
  (1) *Automatic dial connection function*
  (2) *Extended automatic printing function*
      This function automatically prints the results which we want.
  (3) *Easy operation*
      The menu system and function keys facilitate the operations.
  (4) *Supply of a large amount of information*
      Many types of information
      Graphic image processing
      Mail prearation function by word processor

Our electronic mail covers the following items.
  (1) Information and notices from the Medical Association
  (2) Information of doctors and clinics on duty on holidays and at night
  (3) Information of lifelong education and academic lectures
  (4) Information of public health centers (medical check-up, immunization)
  (5) Information on hospitals offering clinical survey service
  (6) Information on hospitals belonging to the Medical Association
  (7) Information from staffs at the Medical Association executive office
  (8) Information on infections diseases
  (9) Question corner (exchange of medical care information between doctors)
  (10) Circle corner (hobbies, sports, special skills, etc.)
  (11) Exchange of information with hospitals belonging to district and city medcal associations (in the future)
  (12) Exchange of information with the Affiliated Hospital of Kagoshima University (in the future)

Out network enables information on these items to be exchanged between the Medical Association and its members, between each members and between the all Medical

Association hospitals and the members.

2. Pharmaceutical Innformation Retrieval System

We constructed a data base of pharmaceuticals on the computer which is installed at the Medical Information Center of the Medical Association.   It contains all of 16,000 drugs which are now used in Japan.   The information in this data base can be retrieved from each terminal.   It supports mainly the following types of retrieval.

(1)   Retrieval of drugs by the name of a disease
(2)   Retrieval of the names of drugs by effect
(3)   Retrieval of the name of druge by its ID code
(4)   Retrieval of New drug information
(5)   Retrieval of Emergency drug information

It is also possible to combine these retrieving conditions.   In addition, it gives detained information about the drug which is retrieved, such as its application, dosage, frequency and prohibitions.

We plan to develop this systen into Patient Accounting System, and Drug Receiving /Ordering System.

3. Examination Result Inquiry System

This system sends the results of blood and other examination from the Examination Center of Kagoshima Prefecture Medical Association to each hospital.

This system has the following teo characteristics.

1. *Full automatic sample processing system*
2. *On-line result transmission system*

First, let me explain the full automatic sample processing system.   When samples with bar code labels sent from each hospital are put on racks, this system processes them completely and automatically.

(1)   Sample are put into a fully automatic centrifugal separator.
(2)   A bar code reader reads the samples and classifies them by the types of examinations.
(3)   An automatic cork extractor extracts the cork of each test tube.
(4)   Samples are decanted to new test tubes which have the same bar code labels stuck on by an automatic labeling machine.
(5)   Samples are decanted as much as necessary.
(6)   Samples are charged to biochemcal test equipment.
(7)   After being examined, samples are put into a stocker by a carrying robot.
(8)   The results of the examinations are sent from the test equipment to a computer

in on-line mode.

The processes from (1) to (8) are processed completely automatically by a sample transportation belt conveyor system, a full automatic centrifugal separator, an automatic cork extractor, a bar code reader, an automatic bar code labeling machine, a decanter, a carrier robot and a computer.

This system is currently being developed, but individual devices have already been developed. The entire system will be completed in about 1 year.

Now, let me explain the 2nd characteristic, namely, the on-line result transmission system. The results of the examinations which are collected in a computer by the process 1 are returned to eash hospital by this system. This system has the following advantages. It shortens the turnaround time from sending a sample to obtaining the result. Since it automatically accumulates each patient's results in a terminal, it facilities the time-sequential observation of the results. It sends results by FAX to those hospitals which have no terminal.

4. Vacant Bed Management and Inquiry System

This system enables a check to be made for vacant beds at each hospital from terminals. At present, it covers only the beds of pediatrics. We plan to extend it to the hospitals of the Medical Association and, then, to general hospitals.

5. Patient Accounting

Patient Accounting consists of the following two kinds of support.
1. Medical fee calculation support
2. Input device support

The medical fee calculation support system has the following functions.
(1) *It supports adequate drug administration and treatment by the use of the pharmaceutical information retrieval system.*
(2) *It gives advice on better medical practice with the cooperation of medical fee examiners between the members.*

The input device support system offers both a standard keyboard and a liquid crystal keyboard. The liquid crystal keyboard is convenient because an input item can be entered by a one-touch operation. Therefore, even beginners can input information easily. Of coursev, the standard keuboard can also be used at the sametime. These systems are not the same as the computer used for fee calcultion which are marketed by makers. This is because member doctors have integrated some unique medical fee calculation knowhow of Kagoshima prefecture.

We decided to use IBM's NMS VAN network if these systems need s network.

We selected PS-55s as terminals.

I have briefly explained the system of the 1st phase.

The following five systems have been developed and are being operated on monitor terminals.

1. Electronic Mail
2. Pharmaceutical Information Retrieval
3. Testing Result Inquiry System (excluding full automatic system)
4. Vacant Bed Management System
5. Patient Accounting System

Now, let me explain the system of the 2nd phase. We are considering the support of the office automation of the 1st phase. The Medical Association of Kagoshima Prefecture consists of nineteen county and city branches. Each of these brabches is being engaged in the operations and services of the Medical Association. We are thinking of processing them by connecting them to the machine at Medical Assocition Information Center by trminals.

The next component of the 2nd phase is a medical information network.

We are considering the following three systems.

1. Medical Care Support System

Kagoshima Prefecture is 600*Km* long in the north south direction and it has many solitary islands and remote places. Therefore, it is important to send medical care support information to doctors. For this reason, we will construct a medical information network which is connected to the school of Medicine at Kagoshima University. The School of Medicine at Kagoshima University is the only medical university in Kagoshima Prefecture. Most of the doctors are from this university. Therefore, this network will be very effective for supporting doctors. Especially, the doctors in solitary islands and isolated places will be helped enormously by a data base which supports the medical care outside their specialized fields.

We will also construct a data base of infections disease surveillance information, chronical disease guidance information and intoxication. We want develop it into a computerized medical care support expert system. We plan to support first aid medical care also.

2. Open Type Hospital Support System

Kagoshima Prefcture has 19 national or public hospitals, including 8 hospitals of the Medical Association and the Affiliated Hospital of Kagoshima University.

We will construct an information network which connects these hospitals. For example, it will support the following services.

1. Reservation of examination
2. Inquiry of doctor's schedule

3. Reservation of operation

4. Vacant bed information

We will construct an open type hospital support system for public hospitals.

3. Drug Inventory Management and Receiving/Ordering System

This system will be operated with the patient accounting system of each hospital and manage the inventiry of drugs. This will implement optimal inventory and avoid dead stock.

We will construct a drug receiveng and ordering system which is connected to wholesalers by VAN network.

We will also support the retrival of the makers' new drug information data base.

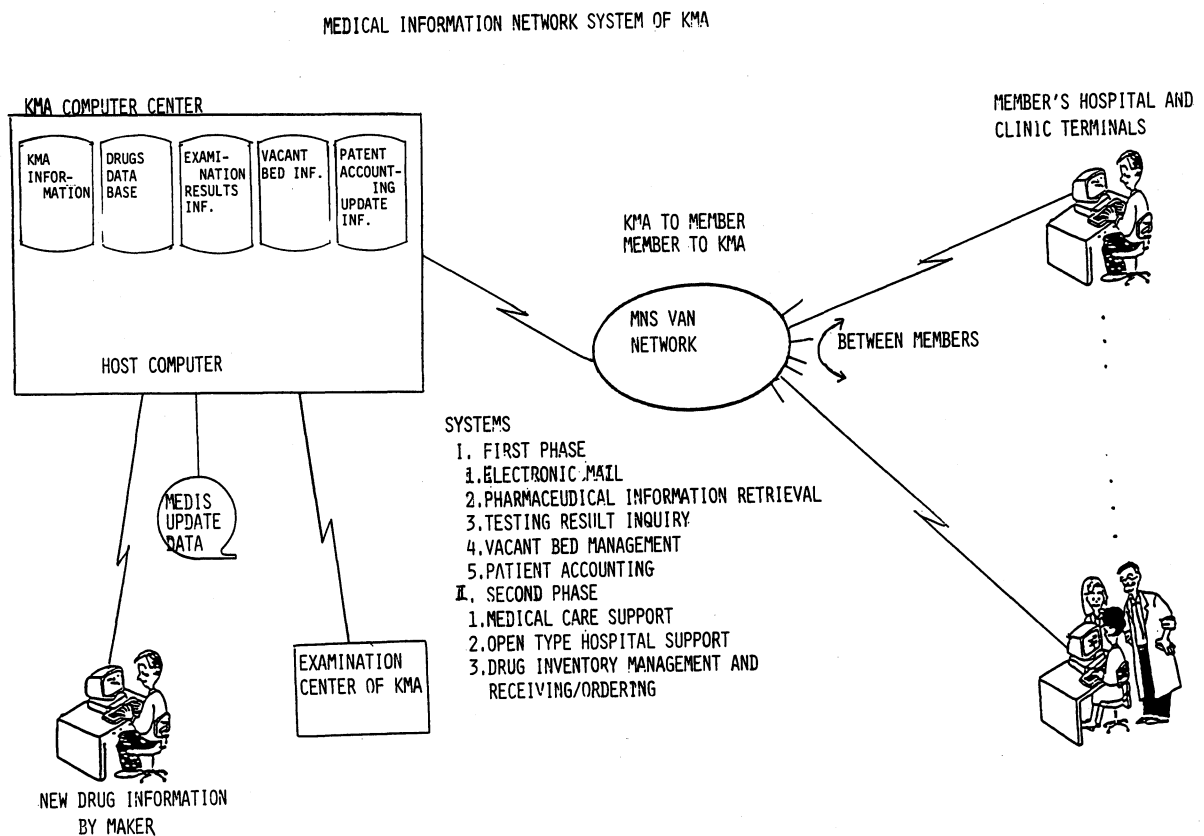These are the concepts of the 2nd phase system. We plan to start their development soon. (Fig. 4)

MEDICAL INFORMATION NETWORK SYSTEM OF KMA

KMA COMPUTER CENTER

| KMA INFOR-MATION | DRUGS DATA BASE | EXAMI-NATION RESULTS INF. | VACANT BED INF. | PATENT ACCOUNT-ING UPDATE INF. |

HOST COMPUTER

MEDIS UPDATE DATA

EXAMINATION CENTER OF KMA

NEW DRUG INFORMATION BY MAKER

KMA TO MEMBER
MEMBER TO KMA

MNS VAN NETWORK

MEMBER'S HOSPITAL AND CLINIC TERMINALS

BETWEEN MEMBERS

SYSTEMS
I. FIRST PHASE
  1.ELECTRONIC MAIL
  2.PHARMACEUDICAL INFORMATION RETRIEVAL
  3.TESTING RESULT INQUIRY
  4.VACANT BED MANAGEMENT
  5.PATIENT ACCOUNTING
II. SECOND PHASE
  1.MEDICAL CARE SUPPORT
  2.OPEN TYPE HOSPITAL SUPPORT
  3.DRUG INVENTORY MANAGEMENT AND RECEIVING/ORDERING

Fig. 4

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[2] A. Togashi: Regional health network system at Kagoshima Prefecture, Proceedings of 1989 IBM Asis Pacific Health executive confernce pp. 241.