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A Successful Model of Regional Healthcare Information Exchange In Japan
- Case Study in Kagawa Prefecture -

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ABSTRACT

In this study, we focused on analysis of healthcare data exchange over the network. For the advance of broadband capability development, many governments expect online medical information exchange between medical institutions. Japanese government also has tried to deploy ICT in the healthcare field. In Japan, many healthcare ICT projects started, but almost of all the projects face many issues and failed to continue. This situation caused us to clarify the success factor of healthcare information exchange network.

For inspecting the success factors, we analyzed information access of healthcare systems in Kagawa prefecture of Japan. Kagawa prefecture is one of the most advance areas for healthcare information technology. We analyzed four medical ICT projects in Kagawa prefecture: K-MIX, Critical Pathway for Diabetes, E-prescription, and PHR. In addition, we inspected characteristics of exchanged data in the network, and stakeholder involved in these projects.

This analysis lets us find various types of healthcare ICT projects. Characteristic of data processed in the projects caused differences of characteristic of the projects. On the other hand, multiple systems process same data, though the project does not share the data itself. Considering various types of medical information exchanges projects, we propose classification and standard format of exchanged data according to their characteristic are critical for efficient business deployment.

Keywords: e-Health, regional healthcare information exchange, EHR.

1. INTRODUCTION

For the advance of broadband capability development, online medical information exchange between medical institutions is strongly expected. Main expectations for ICT deployment in medical field are i) Improving the quality of medical practice, ii) Decreasing medical expenditure, iii) Promotion of new industry that

uses healthcare information.

Japanese government has tried to deploy ICT in healthcare field. Many healthcare ICT projects started, but almost of all the projects face many issues and failed to continue [1] [2]. Hence, many researchers look for success factor of healthcare information exchange network.

Healthcare information network system in Kagawa prefecture is one of the successful healthcare information exchange system in Japan. In addition, in Kagawa prefecture, many other healthcare information and communication technology project is driven.

In this paper, we research and analyze healthcare ICT system and project in Kagawa prefecture. In addition, we discuss success factor of healthcare information network. This paper consists of the following three sections. In section 2, we explain outline of our research. In section 3, we show the situation of Kagawa prefecture and healthcare ICT systems (a. K-MIX, b. Critical Pathway for Diabetes, c. E-prescription, d. PHR). In section 4, we discuss a successful model of regional healthcare information exchange network.

2. Outline of our research

Our research is composed of two phases: interview and analysis. At first, we interview management organizations of this system, and then we analyze this system in view of both information this system handles and relevant stakeholders.

3. Situation in Kagawa Prefecture

In this section, we show analysis of the four medical ICT projects progressing in Kagawa prefecture (a. K-MIX, b. Critical Pathway for Diabetes, c. E-prescription, d. PHR). Before explaining results, we introduce the situation of Kagawa prefecture as follows.

Kagawa prefecture in Japan is 1-hour flight away from Tokyo, and one of the smallest prefectures in Japan. About 1 million people live in Kagawa, where 94 hospitals and 822 clinics are running [3]. In Kagawa prefecture, the following three organizations promote four kinds of healthcare ICT network; the three organizations are Kagawa medical association, prefectural government in Kagawa, and Kagawa University. In following sections, we analyze the contents and project of healthcare information network in Kagawa prefecture.

3.1. K-MIX

K-MIX (Kagawa Medical Information eXchange) provides ASP (Application Service Provider) service to regional medical alliance, and has been running for last ten years. K-MIX stores and shares the following five kinds of information: 1) patient basic information (name, sex, age, etc), 2) medical image (computed tomography image, magnetic resonance images), 3) doctor's comment, 4) laboratory data, 5) files that doctors append. Only registered doctors can access K-MIX, and additional access control protects this system [4] [5] [6]. This system allows information sharing from the sender doctor to the designated doctor only, and the information is not accessible to doctors who are not designated. Fig.1 shows information sharing scheme of K-MIX.

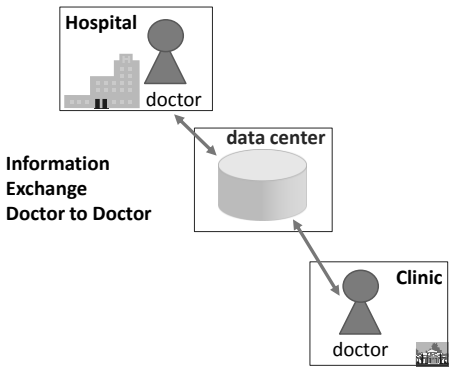

Fig 1. K-MIX

K-MIX is an ASP type of medical information exchange system. Patient's medical information is exchanged between one doctor to one doctor.

3.2. Critical path in medical field

Critical path in medical field means an integrated plan of diagnosis and treatment. For example, diabetic patients have to take long-term care done in various medical institutions. When medical providers want to provide medical treatment of high quality, medical providers have to collect continuous patient information and long-term care plan. Therefore, continuous patient information sharing is important for medical providers. In addition, medical providers expect ICT as an economical tool for patient information sharing. Kagawa University Hospital established "Team Kagawa", a project team to diabetes. The purpose of "Team Kagawa" is i) to decrease the number of diabetics in Kagawa prefecture, ii) to improve the patient's prognosis [7]. To accomplish to this project, "Team Kagawa" is going to make Regional Cooperative Critical Pathway for Diabetes. The purpose of Critical pathway in Medical field is improvement of medical treatment for diabetics. This system stores and shares the following four types of information: 1) patient basic information, 2) diagnosis, 3) treatment plan, 4) laboratory data. The shared data is accessible to medical staffs (nurse, nutritionist, e.t.c.) who were allowed to use this system, as well as doctors. Fig.2 displays information sharing scheme of this critical path system.

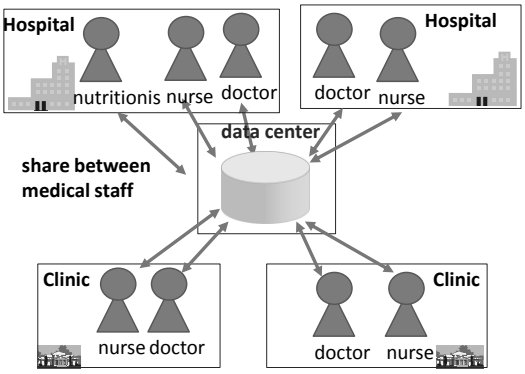

Fig 2. Critical path in medical field

The system for critical path in the medical field is medical information sharing system between medical staffs. Critical path information is accumulated in the data center, and designated medical staff s is permitted to share patient information.

3.3. e-prescription.

E-prescription system is an electronic prescription data sharing system between hospital and pharmacy. E-prescription system in Kagawa prefecture is demonstration experiment. In usual medical consultation, patients receive medicine in pharmacies after they consult doctors in hospitals. Patient receives prescription from doctor in hospital, and the patient goes to the pharmacy with this prescription. E-prescription system makes this process electronic, and transmits information via network. This system shares seven type of information: four types are from

doctors to pharmacists, and the remaining three types are from pharmacists to doctors. The four types of information from doctors to pharmacists are 1) patient basic information, 2) prescription data, 3) disease name (not diagnosis), 4) laboratory data. The three types of information from pharmacists to doctors are 5) Medicine change information, 6) Doubt inquiry information, 7) pharmacist comment. Information sharing is done between one doctor and one pharmacy (not pharmacist), and other doctors and other pharmacies are not allowed to access this data. Fig.3 depicts information sharing of this e-prescription.

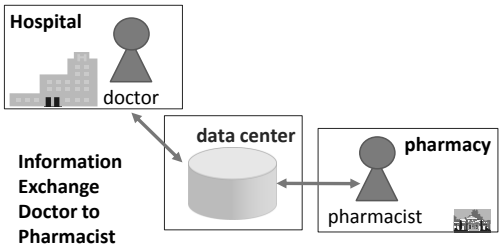

Fig 3. E-prescription

E-prescription system is a data sharing system between doctors and pharmacists. Doctors send electronic prescription to pharmacists. Pharmacists receive prescription and is able to send comment to doctor.

3.4. PHR

PHR (Personal Health Records) is a service for patients to manage his medical information by themselves. This system in Kagawa prefecture is demonstration experiment. Healthy people use this PHR system as well as patients. This system stores and shares the following two kinds of data: 1) basic data. 2) healthcare data (blood pressure weight, height, etc). Users are able to allow access to this information to persons whom they trust, for example, public health nurses. Fig.4 reveals information sharing scheme of PHR.

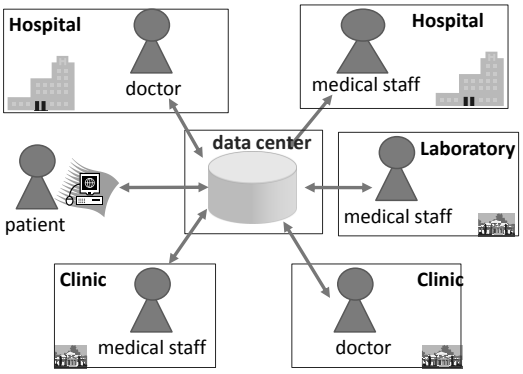

Fig 4. PHR

PHR (Personal Health Record) is a system for patients to manage own medical information. This system gathers medical information from any medical institutions, and patient is able to see this information.

Here, we summarize structure of healthcare information exchange system in Kagawa prefecture. In table. 1, we show medical data which each healthcare system uses. These data are the main item that the doctor uses for the diagnosis and treatment.

Table 1. Summary of healthcare systems and medical data used

	K-MIX	Critical path	e-prescription	PHR
patient basic information	○	○	○	○
medical image	○	×	×	△
Laboratory data	○	△ (limited)	○	○
drug information	○	○	○	○
prescription	×	×	○	×
comment	○	△	○	○
care plan	×	○	×	×
other files	○	×	×	×
Sharing Scheme	one doctor to one doctor	between staffs	one doctor to one pharmacist	medical institutions to patient

Table. 1 shows the relationship of medical data and medical information exchange system. These data are the main item that the doctor uses for the diagnosis and treatment. All systems use patient basic information as surrounded by solid black lines. Though each system uses common data, each system is not able to exchange them. The difference of medical data these system use relates the characteristic of medical information exchange system.

5. DISCUSSION

In this study, we research four types of healthcare ICT system and demonstration experiments in Kagawa prefecture. All the systems are ASP type, and all information these systems use is stored in data center. Characteristic of data processed in the projects cause differences of characteristic of the projects. K-MIX is a system for sending patient information from doctor to doctor. The critical pathway is a system for supplying care plans on specific diseases. E-prescription is a system for sharing drug information between doctors and pharmacists. PHR is s system for patients to receive their own medical information.

On the other hand, multiple systems process same kind of data, though these systems do not share data itself between the systems.

We believe the above situation forms a critical issue. Though primary data source of these data is electronic medical records used in each hospital and medical information exchange system uses these data, medical information systems are unable to share the data so that many medical data exchange systems experience difficulty in managing medical information.

Considering various types of medical information exchanges projects, we propose classification and standard format of exchanged data according to the characteristic of them are critical for efficient business deployment.

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