Fujitsu's Approach to Healthcare Information Systems

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The institutionalization of health promotion issues is proceeding in Japan, as can be seen from Industrial Safety and Health Law revisions in 2006 that lay out the obligations of entrepreneurs towards employees and the enforcement in April 2008 of systems for specific medical examinations and specific health guidance resulting from regulations ensuring medical care for the elderly. With these developments, the public's awareness of health issues is also changing. Fujitsu has been providing health checkup assistance systems to hospitals and health centers with the aim of enabling early detection of diseases. However, to cope with the developments in the market and the heightening of public awareness of health issues, Fujitsu has developed HOPE/webH@ins-GX, a healthcare information system. It also strengthens features such as providing medical advice seekers with the ability to promote their own health, as exemplified by the health guidance feature, and allowing entrepreneurs to manage and direct the health of their employees more effectively. In this paper, we describe this new system's development background and its characteristics from the various viewpoints of system users and describe prospects for the human-centric health information business, which will support health promotion for everyone.

1. Introduction

In the field of healthcare, Fujitsu started offering "HELSY," a health checkup assistance system intended for hospitals and health centers that functions on mainframe computers, in 1985 and has since been continuously providing systems incorporating current information technology. As a system for employees' health management in companies, Fujitsu itself has been introducing a health management assistance system since the 1990s to manage employees' health utilizing IT.

To support the two fields, namely systems intended for hospitals and health centers and for companies, Fujitsu has developed a new healthcare information system "HOPE/webH@ins-GX."

The social background that calls for a new system intended for companies includes the revision of the Industrial Safety and Health Law and institutionalization of specific medical examinations and specific health guidance, which has led to an increased need for health management and health promotion of employees, insured people and their dependents implemented by companies and medical insurers.

The diffusion of information systems such as medical insurance administration and medical record systems has increased demand for the ability to link with health checkup assistance systems to make use of information in the areas of health and medicine.

This paper first outlines the relevant laws and regulations and describes the trends of standardization in the industry, Fujitsu's approach and the features of HOPE/webH@ins-GX. Subsequently, it presents activities for supporting health promotion for everyone and

the future outlook opened up by this framework.

2. Outline of relevant laws and regulations and Fujitsu's approach taken so far

This section outlines the relevant legislation for medical insurers and entrepreneurs and the system support for it.

2.1 Revised Industrial Safety and Health Law[1)]

To further promote the safety and health of workers in the workplace, the Industrial Safety and Health Law was revised in April 2006, increasing entrepreneurs' obligation to implement the measures described below.

1) Provision of doctor's interview guidance to long-hour workers

Any business establishment with workers whose working hours in excess of 40 a week exceed 100 a month and that are showing fatigue is required to have them interviewed by a doctor if so requested by the workers.

To meet the requirement of this stipulation, it has become necessary to acquire information about workers' overtime work conditions and manage interview guidance based on the information acquired.

2) Notification of results of special health checkup to workers

Any business establishment obliged to conduct special health checkups is required to notify the workers themselves of the results in addition to the results of general health checkups.

Up till now, companies have individually systematized the management of the results of employees' health checkups, data on whether or not they have undergone checkups and the implementation of industrial health guidance. In the future, support for the following functions in addition to the existing system functions will be necessary to comply with the revisions to the law described above.

- Function linked with labor information to better understand the health conditions of long-hour workers
- Management function to maintain the results of special health checkups and have entrepreneurs notify employees who have undergone special health checkups of the results in an appropriate manner

2.2 Specific medical examinations and specific health guidance[2), 3)]

Of the rising national healthcare expenditure totaling 33.1 trillion yen in FY 2005, 10.7 trillion yen, accounting for 30%, is expenditure relevant to diseases linked with lifestyle-related illnesses, and the rate of death resulting from lifestyle-related illnesses is as high as 60%.

Against this background, specific medical examinations and specific health guidance have been made obligatory by the Act on Assurance of Medical Care for Elderly People as a function shared by medical insurers in the healthcare system reform.

Based on this Act, medical insurers conduct specific medical examinations on insured people and their dependents between the ages of 40 and 64, and the results are used as the basis for specific health guidance given in the procedure shown by the following steps 1) to 4) (**Figure 1**).

1) Classification judgment

People who have undergone specific medical examinations are classified into the following three categories based on their results.

- People to receive active support
- People to receive motivational support
- People to receive information provision

2) Issuance of specific health guidance vouchers (except for people to receive information provision)

Those subject to specific health guidance are identified and vouchers are issued to them.

3) Provision of specific health guidance (except for people to receive information provision)

4) Output and dispatch of notifications of the

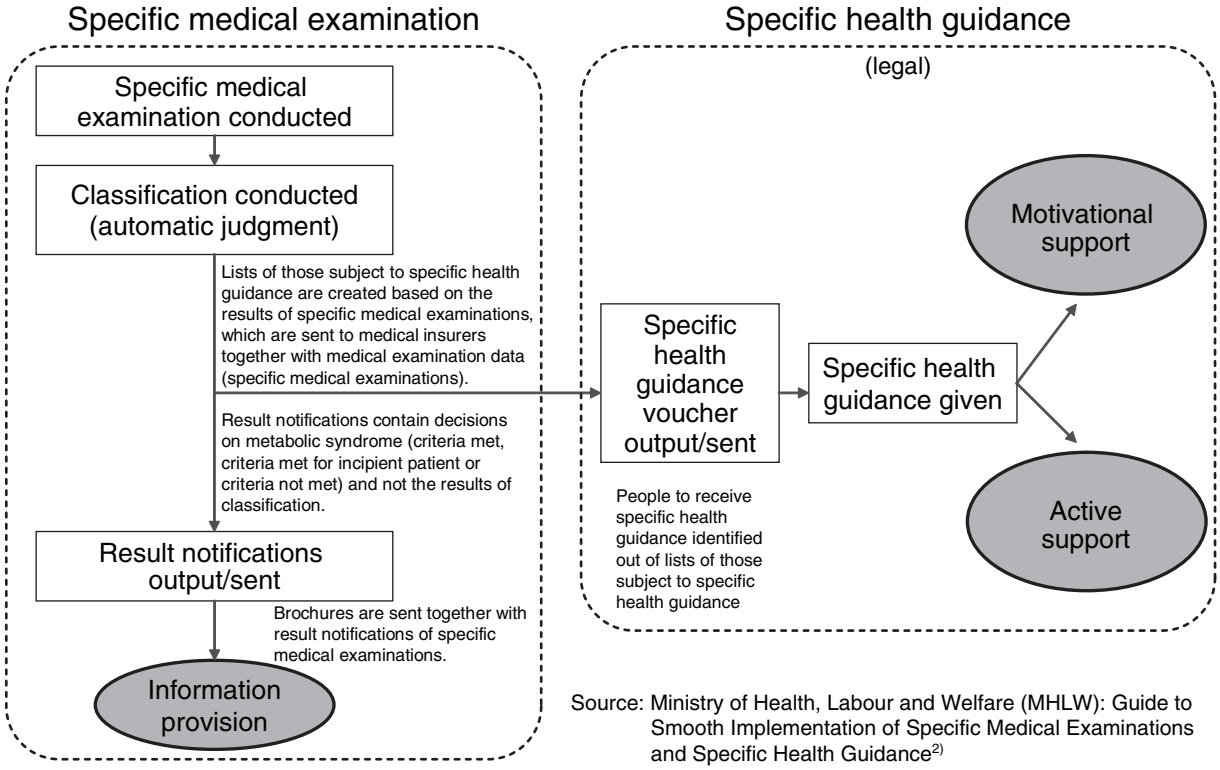


Figure 1
Flow of specific medical examination and specific health guidance.

results of specific medical examinations

- Result notifications contain the results of the decisions on metabolic syndrome and not the results of classification.
- Brochures are enclosed for people to receive information.

2.3 Fujitsu's approach taken so far

To meet the needs of the systems for specific medical examinations and specific health guidance, Fujitsu mainly offers the following functions. They are specific medical examination and specific health guidance options intended for the existing health checkup assistance systems such as HOPE/webH@ins and HAINS-L according to the roles of customers who use the systems.

1) Support for hospitals and health centers

- Support for different courses of specific medical examinations
- Making decisions on metabolic syndrome
- XML output of specific medical examination result data
- Contract and payment processing
- Assistance with the vicarious provision of specific health guidance

2) Support for medical insurers

Totally new operations have been added for medical insurers. New functions as shown below are required including encouraging companies to provide specific medical examinations and encouraging workers to receive specific health guidance if they have been diagnosed as having metabolic syndrome based on the results.

- Issuance of medical examination vouchers
- Recommendation of undergoing specific medical examinations
- Recommendation of receiving specific health guidance
- Billing and payment processing with paying agencies

3. Data standardization and Fujitsu's approach

This section describes the state of standardization in relation to healthcare information and Fujitsu's approach.

3.1 Standardization by the Ministry of Health, Labour and Welfare (MHLW) and other organizations

1) Standardization of examination codes

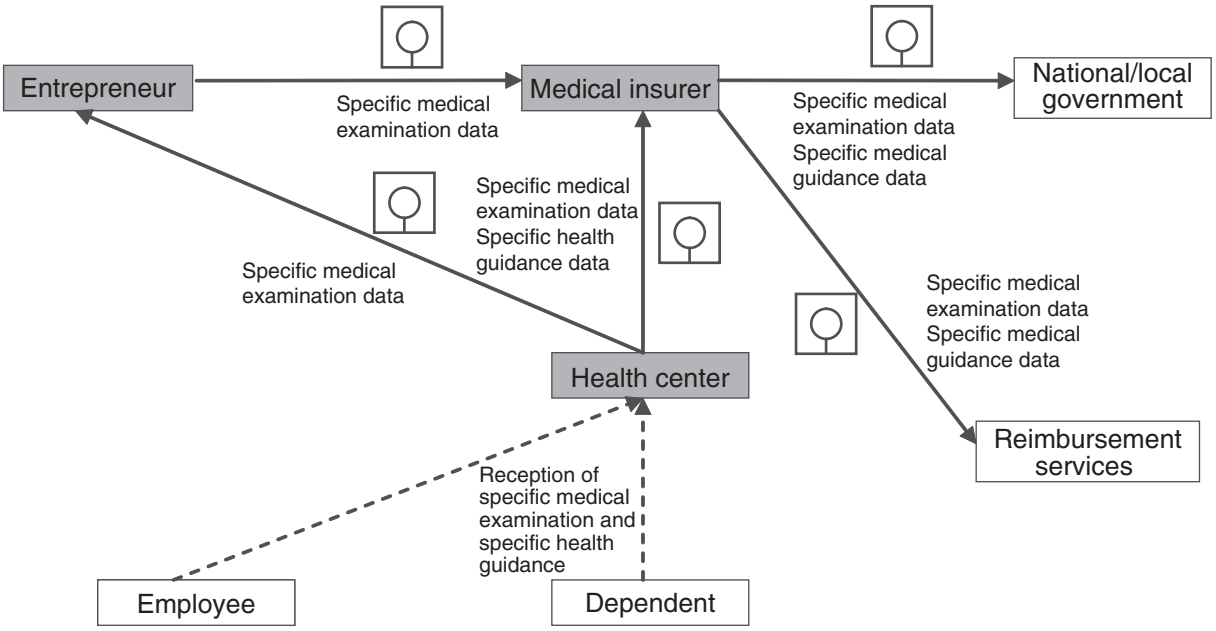
In the 1960s, when computers were beginning to be introduced, processing was mainly for stand-alone medical examination systems. Subsequently, connections with other systems within hospitals started, and this created a demand for connections between various systems, and the need for the standardization of interfaces increased. Efforts for standardization were made in the field of laboratory examinations before others and the Japanese Society of Laboratory Medicine (formerly the Japan Society of Clinical Pathology) announced laboratory examination codes. In 1990, a major revision premised on the use on computers was made and the tenth revision in 1997 resulted in the announcement of the JLAC10.[4)]

The JLAC10 is used for the Laboratory Examination Master that assumes use by systems of various departments in hospitals and is standardized to allow accurate information exchange in cooperation with other hospitals.[5)] The JLAC10 is also used to deliver specific medical examination data, starting in April 2008, and used as standard codes for sharing medical examination data as well.

2) Standardization of data formats

Data in relation to specific medical examinations and specific health guidance are sent from medical examination and health guidance institutions, medical insurers and entrepreneurs and complicated information exchanges via multiple paths take place (**Figure 2**).

If data are sent from the institutions, medical insurers or entrepreneurs individually in



Created based on MHLW Guide to Smooth Implementation of Specific Medical Examinations and Specific Health Guidance[2)]

Figure 2
Data flow of specific medical examination and specific health guidance.

their own data or file formats, those receiving the data must create conversion programs compatible with the respective institutions or process the data by exporting or otherwise handling them before they can be used.

Accordingly, to ensure compatibility of these data for continued accumulation and use, the government has laid down specifications that must be observed by the parties concerned as the minimum requirements, and they serve as standard formats to be used for specific medical examinations and specific health guidance.[6),7)]

In addition, the MHLW study group in charge published the File Specifications for Electronic Exchange of Specific Medical Examinations/ Specific Health Guidance Data and a framework has been put in place so that data in relation to specific medical examinations and specific health guidance are delivered in a format compatible with XML (compliant to HL7CDA Release 2). Immediately after the start of operation, however, creators and receivers of data applied their own interpretations and problems occurred such as a failure to receive data. To address this issue, the Japanese Association of Healthcare Information Systems Industry (JAHIS) launched a working group to create technical materials that allow interpretations to be compared in terms of creators and receivers of data.

The progress of standardizing data format specifications has made smooth data delivery possible to medical examination and health guidance institutions, medical insurers and entrepreneurs, and there are hopes that the system will make it possible to analyze changes over time and make forecasts.

3.2 Fujitsu's efforts for standardization

Fujitsu has taken part in the Standard Laboratory Examination Codes WG Activities (JAHIS Laboratory Examination System Committee) with the theme of promoting the diffusion of Laboratory Examination Master. This was created by the Medical Information System Development Center (MEDIS) based on the JLAC10, and is the standard system of codes for laboratory examinations mentioned earlier. In this way, Fujitsu is reviewing the problems with MEDIS Laboratory Examination Master and having discussions on the proposed measures to address them and to work on collating new requests from the sites of clinical care, vendors and examination centers.

In addition, to tackle challenges with the XML format (compliant to HL7CDA Release 2) used for exchanging specific medical examination and specific health guidance data, Fujitsu has participated in the working group established by the JAHIS and been working toward standardization.

4. Outline of HOPE/webH@ins-GX

The major functions offered by HOPE/ webH@ins-GX, which was developed for supporting the two fields, namely systems intended for hospitals and health centers and for companies, are described below.

4.1 Major functions of HOPE/webH@ins-GX

1) Functions for hospitals and health centers

The following functions are provided to allow hospitals and health centers to efficiently conduct health checkup operations.

- Contract, health checkup appointment and preparation for health checkup
- Reception, acquisition of examination results and result input
- Judgment and interview assistance
- Form output and form creation tools
- Billing and payment management
- Statistics and data output

2) Functions for companies and medical insurers

For companies and medical insurers, the following functions are provided to help increase the rate at which people undergo health checkups and enhance health.

- Linking with personnel information

- Identification of those subject to health checkups
- Acquisition of the health checkup results
- Interview assistance, viewing of health checkup history and disease management
- Work restriction management
- Creation of reports to the Labor Standards Office

In this way, HOPE/webH@ins-GX has strengthened the functions for efficiently conducting health checkup operations and provides new functions for companies and medical insurers to promote health enhancement.

4.2 Support for standardization by means of HOPE/webH@ins-GX

1) Adoption of standard examination codes

With HOPE/webH@ins-GX, the JLAC10, which is the standard system of codes for laboratory examinations described above, can be adopted to link with examination systems as the standard function. In addition, using the JLAC10 codes is expected to allow specific medical examination and specific health guidance functions to be applied to services such as mutual reference of medical examination results between multiple hospitals and health centers.

2) Support for standard file format of specific medical examination and specific health guidance data

One feature of HOPE/webH@ins-GX is the enhanced inter-system linking function. To allow hospitals and health centers to exchange data including corporate health checkup, specific medical examination and specific health guidance results with companies and medical insurers, a linking interface in an XML format (compliant to HL7CDA Release 2) is provided as a standard function.

5. Approach to data linking and application in HOPE/webH@ins-GX

We provide a framework that allows hospitals and health centers to make use of healthcare information. They do this by taking advantage of the intersystem linking function described above to link data, including the medical treatment information gathered and accumulated by hospitals, with the content of medical examination results and health guidance. For medical insurers and entrepreneurs that conduct health guidance mainly including specific health guidance and companies obliged to implement employees' health management, we provide a framework to make it easier to collect medical examination results and support activities toward health promotion.

5.1 Efforts for system linking with hospital information system

The health checkup operations and medical treatment operations are completely separated from each other at hospitals, which has caused problems such as an inability to use health checkup results as reference information when a patent is given treatment.

To solve these problems, we use HOPE/webH@ins-GX to offer the following functions linked with the medical insurance administration, examination and electronic medical record systems.

1) Centralized management of receivers of health checkups and patient numbers

Sharing patient numbers among medical insurance administration systems provided by Fujitsu, namely HOPE/SX-J, HOPE/X-W and HOPE/webH@ins-GX, allows the number of patients receiving medical care and the number of those undergoing health checkups to be unified.

2) Centralized issuance of examination orders for health checkups

Linking HOPE/webH@ins-GX with HOPE/Lains-GX and HOPE/Dr-ABLE-EX, examination and imaging systems provided by Fujitsu, allows the health checkup management to collectively issue examination request orders, which traditionally needed to be input for each system.

When decisions are made on health checkup results, image information can be viewed via a Web viewer from HOPE/webH@ins-GX, which allows the decisions and comments on the health checkup results to be input by viewing the examination images.

3) Viewing health checkup results from electronic medical record system

At hospitals where Fujitsu's medical electronic record system HOPE/EGMAIN-GX is introduced, the examination request orders to the examination system mentioned above can be issued collectively via medical records. The results of health checkups also become available for viewing via medical records for the purpose of medical treatment.

In this way, Fujitsu helps to improve the health of those who undergo checkups by providing systems to facilitate smooth data linkage in hospitals.

5.2 Efforts for making use of data for entrepreneurs

To assist entrepreneurs with employees' health management, Fujitsu has long been engaged in developing systems for the health management of its own employees and the health promotion activities that make use of those systems.

HOPE/webH@ins-GX takes advantage of Fujitsu's experience to offer the following mechanisms.

1) Enhanced function to link health checkup result data

Entrepreneurs often receive the results of their employees' health checkups as electronic data in various formats from hospitals and health centers.

To deal with the variation, we offer a function to link health checkup result data by using XML standard formats specified by the MHLW, which are established to implement specific medical examinations, and a mechanism to retrieve CSV data.

2) Enhanced function to link personnel information and labor information

The revision to the Industrial Safety and Health Law increased organizations' obligation to manage long-hour workers. To cope with this, we offer a function to link with labor information to support the provision of industrial health guidance for long-hour workers.

We have also enhanced the function to identify people subject to health checkups and the contents of health checkups to be undergone through linking with personnel information such as employees' affiliation, dates of birth and special working conditions.

6. Approach to personal health promotion activities

As an approach to health promotion, we established Best Life Promotion Ltd.[8] in February 2007.

Best Life Promotion has strengthened the efforts to achieve a vigorous work environment that supports the health of Fujitsu Group employees and their families and the approach to the health promotion operations. It makes use of IT based on the health guidance knowhow cultivated up to now. It provides operations in relation to health information management and health promotion operations for employees and their families as the following new services intended for medical insurers, companies, hospitals and general individuals.

1) Consulting services
- Assistance with planning of health checkups
- Analysis of statements of medical expenses and health checkup data

2) Provision of Health up Web system
- Health guidance manager functions
- Functions for users

3) Specific health guidance assistance services
- Health guidance
- Vicarious execution of administrative work

Best Life Promotion has been entrusted

with FY 2007 projects to promote the advanced health guidance services (Regional Healthcare Advancement Promotion Program) of the Ministry of Economy, Trade and Industry.

This is a new approach that medical insurers, insured people and companies that insured people work for as well as health guidance businesses and health appliance manufacturers are taking. In it, individuals collect daily measurement data via networks to make use of them for health promotion.

7. Future outlook

Fujitsu has been providing organizations that conduct health checkups including hospitals and health centers with systems and support for linking with various other medical systems. In response to the revision of the relevant legislation, it has also been offering systems that assist entrepreneurs and medical insurers with activities for health management and promotion.

Up to now, information has been made use of within separate information systems such as those for individual hospitals and health centers and companies. In the future, it will be important to be able to use the various types of information generated in the course of individuals' lives in addition to health information by taking advantage of IT in a human-centric society.

On top of the functions intended for hospitals and health centers provided by HOPE/webH@ins-GX, we intend to work to achieve a human-centric society from the viewpoint of health. We will do this by promoting the application and linking of health checkup information, implementation of activities on the assumption of various entrepreneurial applications and provision of a framework that allows individuals to record and use daily activity and health condition data including the number of steps taken, weight and blood pressure.

8. Conclusion

This paper has described the social background including an outline of the legislation relevant to health and the status of data standardization, followed by Fujitsu's approach to standardization, features of the new HOPE/webH@ins-GX and future direction.

In the future, to achieve a human-centric society based on HOPE/webH@ins-GX, we intend to work on providing a framework that allows health information to be used with a focus on individuals.

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