Millennial Medical Record Project

Toward establishment of authentic Japanese version EHR and secondary use of medical data

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The beginning of EHR (Electronic Health Record) can be traced back to the start of MML (Medical Markup Language) studies in 1995. In 2001, EHR which structured MML as a database were developed, and expanded to Kumamoto, Miyazaki, Tokyo, and Kyoto (Dolphin Project). Subsequently the need for medical data management on the national level was recognized. For this reason and due to the needs for secondary use of medical data, the Millennial Medical Record Project was started in 2015 as a national version of the Dolphin Project. During the 4 years up through FY 2018, the number of connected hospitals increased sufficiently and the stage was set for the secondary use of medical data beginning from FY 2019. The objective is to achieve independent profitability for the EHR divisions based on income from secondary use and without depending on subsidies.

EHR, Electronic Health Record, Millennial Medical Record Project, regional cooperative medicine, medical record disclosure, medical data, secondary use, data use

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1. Introduction

The Next Generation Medical ICT Task Force (Cabinet Secretariat)*[1] was established in March 2014, and began studies related primarily to the secondary use of medical data. The first Next Generation Medical ICT Infrastructure Conference*[2] (hereafter referred to as “the Conference”) was held on April 2, 2015. This is one organization under the Headquarters for Healthcare and Medical Strategy Promotion, which is led by the Prime Minister. One of the projects launched by the Conference was the Millennial Medical Record Project, which was based on the theme of “large-scale collection and use of health and medical data”*[3].

In September 2015, this project was officially adopted as a research announcement of the Japan Agency for Medical Research and Development (AMED) (research subject: national collaborative research related to collection and use of internationally standardized health and medical data). This research aims for commercialization beginning from FY 2019. Starting from 2002, it has collected the separately operating EHR (Electronic Health Record)*[4] websites in Kyushu, Tokyo, Kyoto, and other regions (Dolphin Project) at a newly developed and established collaborative EHR Center. With participation by large numbers of medical institutions in other regions as well, the collaborative use of this data center aims to ensure data safety and reduce operating expenses. Although the data standards of the data output by the medical institutions vary widely, the data is finally collected at the data center using ISO13606*[5]. Secondary use of this data will be carried out fairly and safely in accordance with laws, and the income used to operate the EHR and ensure the sustainability of the project (ending the dependence on subsidies and research expenses) (**Figure 1**).

In accordance with the Next Generation Medical Infrastructure Act (Act Regarding Anonymized Medical Data Contributing to R&D in the Medical Field) that is scheduled to take effect in FY 2018, two business entities (operating agency for primary EHR use, and certified operators who create anonymized medical data) will be established and operated. This project will result in full-scale operation of a medical database that has been an outstanding issue since the 1990s, and in secondary use of the data. It is expected that the results will be applied to cooperative health care,

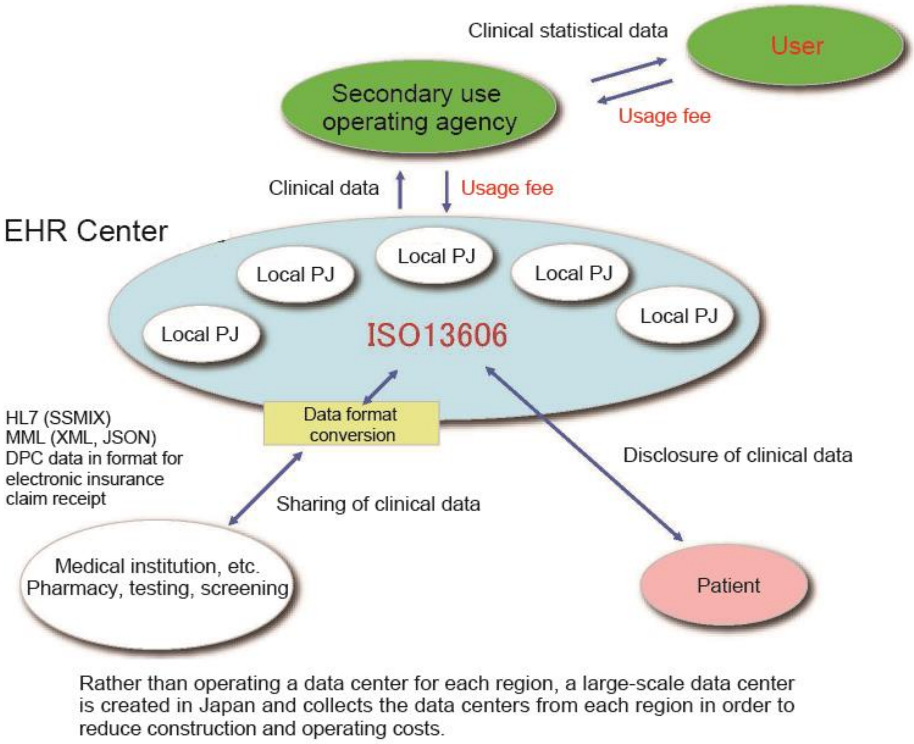


Figure 1: Overview of Millennial Medical Records

clinical research, drug development, public health, government, and other areas. This paper provides an overview of the future issues, including legal problems, facing the Millennial Medical Record Project system.

2. History of EHR in Japan

2.1 Dolphin Project

Private use of the Internet first became possible in 1993. At that time, young medical data researchers and business representatives came together to discuss the functions which should be included in future electronic health records. In 1995, the first gathering was held in Miyazaki, and was named the “Seagaia Meeting” for the venue where it was held. These meetings have been held each year up to the present*[6].

The objective of electronic health records is “connectivity”. When a patient is seen at a new hospital, the electronic health record should display all of that person’s past medical history. There are three issues to achieving this in an environment where electronic health records from multiple different vendors are used. These are *data location*, *data compatibility*, and *access control* (**Figure 2**).

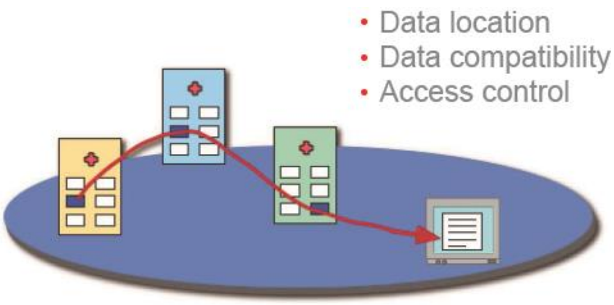


Figure 2: Technology elements required for EHR operation

The above issues were resolved in the 1990s, and the development and operation of EHR (here the medical data exchange infrastructure) which structured MML (Medical Markup Language)*[7, 1] into a database was started in 2001 with a research subsidy from the Ministry of Economy, Trade and Industry (Dolphin Project)[2 - 4]. Through the Dolphin Project, regional medical data centers (hereafter, “data centers”) to manage patient medical data were created in each region. The project serves as a mechanism which uses these data centers as hubs for cooperative medicine and disclosure of electrical medical records (**Figure 3**).

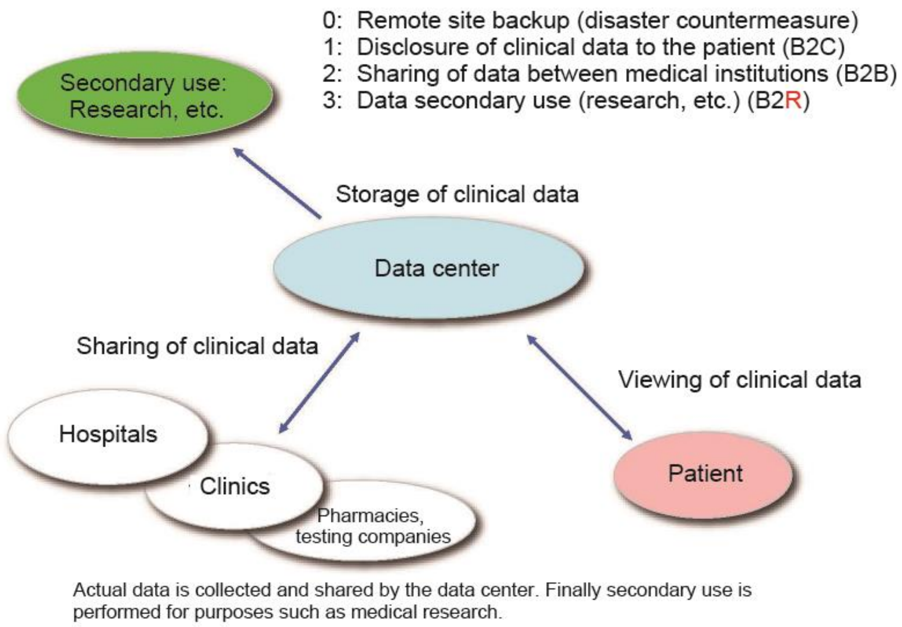


Figure 3: Basic concept of the Dolphin Project

The goal of the Dolphin Project was to provide an infrastructure that enabled efficient connections between hospital data systems in different regions. Medical data that is stored on a central server is stored under designated security conditions, and medical practitioners can centrally view the medical data of patients who have concluded a treatment agreement. This not only makes cooperative medicine possible, but also allows the patient to view his or her own medical data (electronic health record disclosure) and also to record symptoms or other information in the record.

In order to make this possible, it was necessary to establish data centers and connect them to clinics, hospitals, testing centers, pharmacies, and home nursing care stations. Progress records, test results, referrals, discharge summaries, and other data is sent and collected in an integrated manner for each patient. This data is used for medical data sharing within the region, and also as backup medical records for each medical institution.

2.2 Mechanism for linking data centers and electronic medical records

Data centers include an interface for receiving data, and can accept medical data that is recorded in formats such as MML or HL7 (Health Level 7). The medical data in the electronic medical records at each medical institution is converted to MML or other format before it is sent. It is then received by the data center and stored in the database. The data can be viewed by medical institutions, patients, and other parties.

Data centers for each region were established and began operating in sequence. Higo Med began operating in Kumamoto in 2001, Haniwa Net in Miyazaki in 2002, HOT Project in Tokyo in 2003, and Maiko Net in Kyoto in 2006. As of 2017, the centers in Miyazaki and Kyoto are still operating.

2.3 Opportunities for data center consolidation

Although operation of the regional data centers varied depending on the regional project, a very large human and financial burden is involved with matters such as installation at a university hospital or other site, posting to major data centers, and server purchase, management, and replacement every 5 - 6 years. For this reason, the idea was born of reducing installation and operating costs as much as possible by creating large data centers in Japan to contain the regional servers, and by operating EHR services as SaaS (Software as a Service)*[8]. This was started from around 2014, and under the government’s next generation medical ICT infrastructure construction plan, this led to construction of an EHR infrastructure on the national level.

3. Millennial Medical Record Project

As described in the previous section, in order to reduce the heavy burdens involved in operating data centers for each region in the Dolphin Project, the Millennial Medical Record Project designed a single EHR Center to concentrate the data centers and allow distributed use of the functions in each region via the Internet (**Figure 1**).

In the first year (FY 2015), the EHR Center infrastructure (databases, etc.) was constructed. At the same time, the hospitals (11 facilities) which had been connected to the old EHR in Kyoto and Miyazaki were connected to the EHR Center.

Continuing coordination resulted in the addition of 23 connected hospitals in FY 2016, with 40 or more new connections expected in FY 2017. The plan is to also connect 40 or more hospitals, pharmacies, and other facilities during FY 2018, the final year of the AMED research period. The final objective calls for around 150 facilities in the large hospital class (**Figure 4**).

As shown in **Figure 5**, the Millennial Medical Record Project is first prioritizing construction of the EHR system shown in the center of the figure (through FY 2018) and providing EHR services. It is expected that newly certified operators who create anonymized medical data will begin operating after the Next Generation Medical Infrastructure Act takes effect in 2018. The operating agency for primary EHR use will continue to be the existing NPO Japan Medical Network Association.

3.1 Databases

3.1.1 Databases (engine)

The database engine for Millennial Medical Records will be based on the Hadoop Eco System which is an open source large-scale distributed file system. Of the technological elements which compose the Hadoop Eco System, the primary technological elements that are used here (**Figure 6**) are explained below.

(1) Hadoop

The Millennial Medical Records contain electronic medical record data that is sent from participating medical institutions across Japan. Because the data which should be stored increases according to the number of participating institutions, a flexible approach to data processing capacity and storage capacity is needed. Generally there are two approaches to increasing processing and storage capacity. These are known as “scale up” and “scale out”*[9]. Apache Hadoop can be expanded by scaling out, and it is possible to expand while continuing to provide services. Because data is replicated and stored on multiple servers*[10], this ensures a high level of failure resistance.

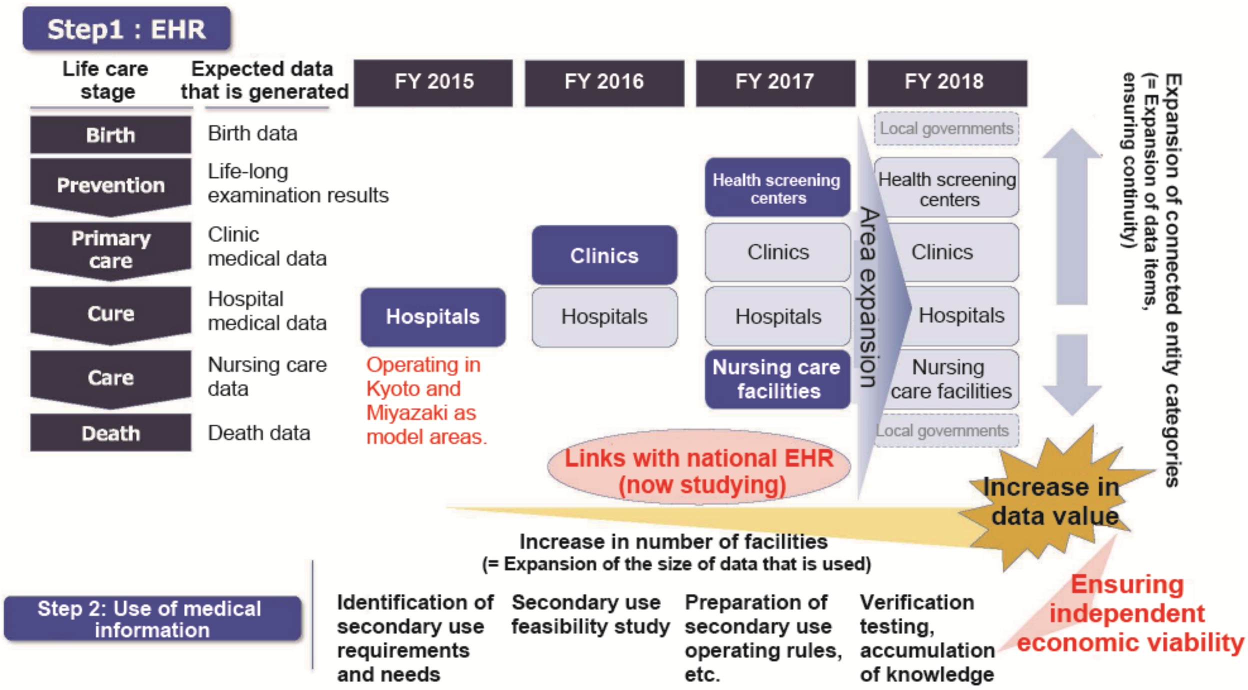
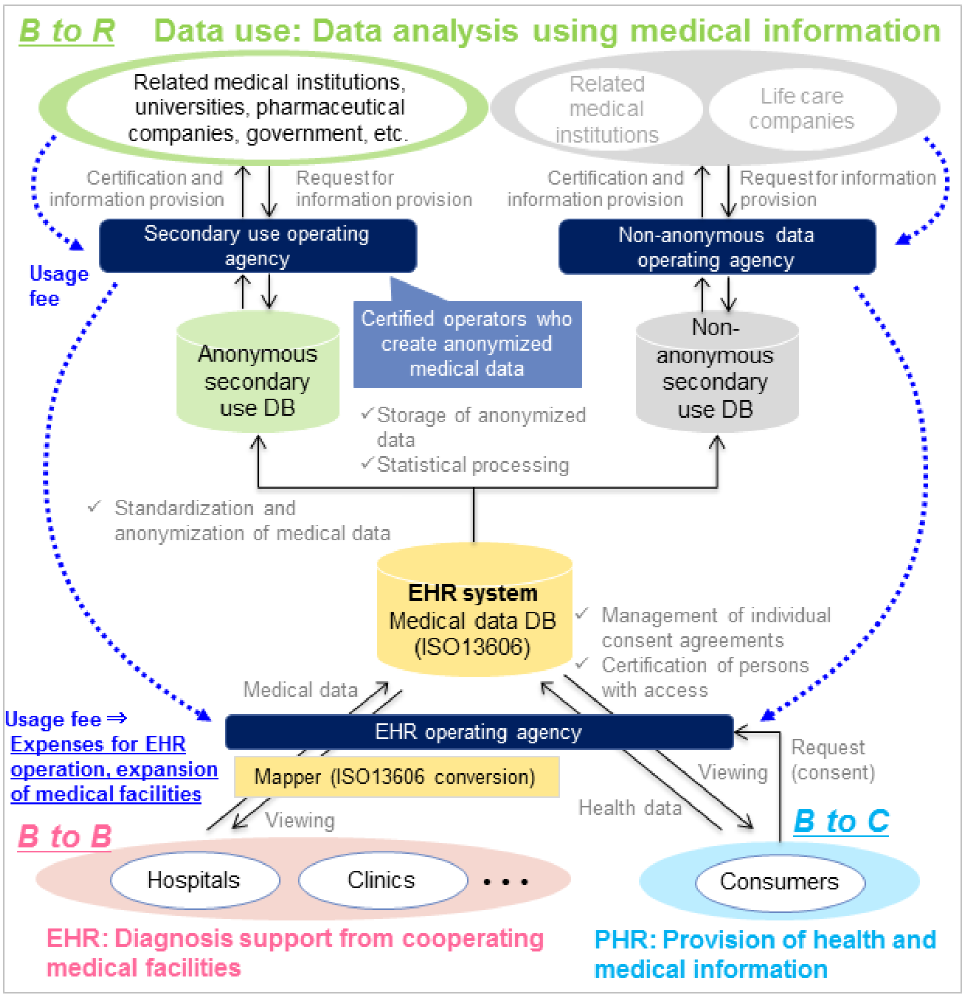


Figure 4: Millennial Medical Records implementation plan



Data is collected from medical institutions and other entities in the EHR system that is operated by the NPO Japan Medical Network Association (lower half of figure), and a secondary use operating agency that is certified under the new law anonymizes the identifying data that was provided from the EHR Center, and provides the data to researchers for a fee (upper left half of figure). The hospitals or life care industry conclude individual agreements with patients, and the non-anonymous data operating agency provides services which add value to medical information.

Figure 5: Overview of the Millennial Medical Record Project

(2) Hive

The medical record data that is sent from each medical institution is sent in the MML format that is prescribed by the MedXML Consortium. After it is converted to a format known as JSON, it is stored in the Millennial Medical Records. Because the data may be sent from the medical institutions at any time, a mechanism which can process a vast number of data items is necessary.

Apache Hive is a DWH (Data WareHouse) product that supports large-size data which is difficult to handle with a RDB (Relational Data Base). The processing that is executed through Hive is converted according to a distributed processing framework known as YARN for distributed execution.

(3) HBase

In addition to the above MML format data, Millennial Medical Records also contain ISO13606 format data. ISO13606 features a flexible data model structure using archetypes, and a storage method that is highly compatible with this feature is necessary. HBase is an open source large-scale distributed storage system. A KVS (Key-Value-Store) system is used for the data structure. An ordinary RDB requires highly precise definitions (schema) related to the data structure, however HBase does not require schema (schema-less) and is capable of flexible data management.

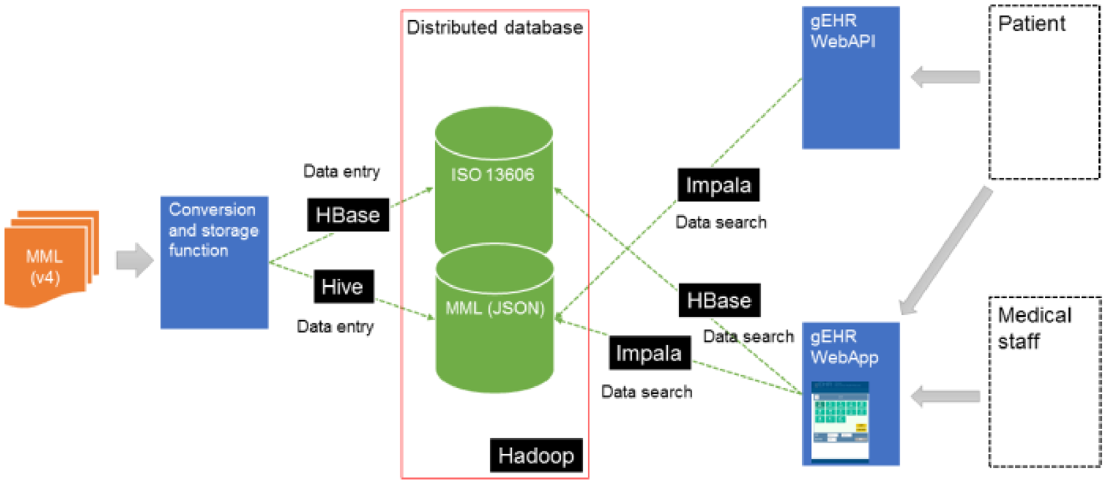


Figure 6: Millennial Medical Record data flow and relationship of technological elements

(4) Impala

An ordinary EHR is used only by the medical institution that creates it, and even a regional EHR is used only by medical institutions within the designated region. However Millennial Medical Records contain data used by medical institutions across Japan, and the volume of data is vast. The Millennial Medical Records allow the medical record data to be viewed by the patient and medical staff on a web screen, and special consideration must be given to online search performance.

Impala is an open source distributed SQL query engine, and is capable of high-speed searches of data stored on an HDFS. Because the data can be shared with the Hive described above, Millennial Medical Records utilize Hive for batch processing and Impala for online processing in order to make best use of the characteristics of each technology.

3.1.2 Databases (logical structure)

Based on the above decisions, the initial data sources for the Millennial Medical Record Project were the MML Version 2 and 3 data that was output to the old EHR. In order to increase the number of connected hospitals and increase the types of supported data, it became necessary to support not only MML but also HL7 or original hospital or vendor formats. Therefore the logical structure inside the database uses an archetype model based on ISO13606 openEHR*[11], which is flexible and provides excellent search performance. The use of the archetype model makes it possible to flexibly acquire data from multiple data sources and perform cross-sectional data searches.

In addition, MML Version 4 was released, which maintains backwards compatibility with existing MML while increasing development convenience and adding modules for vital signs, body temperature chart, prescriptions, and injection records. This was adopted as one of the interfaces for this project, and a supporting logical model was designed and mapping tables were created[5].

Because a data format[6] which conforms to HL7 CDA Rel2 defined by HL7 Japan is widely used for health screenings, in the same way an archetype based on this schema was used to design a logical model and make it possible to receive data from health screening facilities as well.

For HL7 and vendors that are not accustomed to MML development, uploaders that support JSON (a simplified version of MML) and original formats were also prepared. The data is acquired by logical models that also support these data formats.

3.2 Access control

Previously, access control was designed for strict 1-to-1 control that decides who the patient data can be shown to. However because this puts a large load on hospital operations, it was almost never used. This project defined the following three entities as stakeholders: the facility creating the data, cooperating hospitals, and the patient.

(1) Establishing a policy for disclosure by medical institutions

The medical data sharing range and access rights for medical institutions are set.

Ordinarily, the medical data that is subject to access controls is classified according to department, physician, document type, and item. In this project, it was assumed from the start that access rights would be set for each document type and department, without control for individual

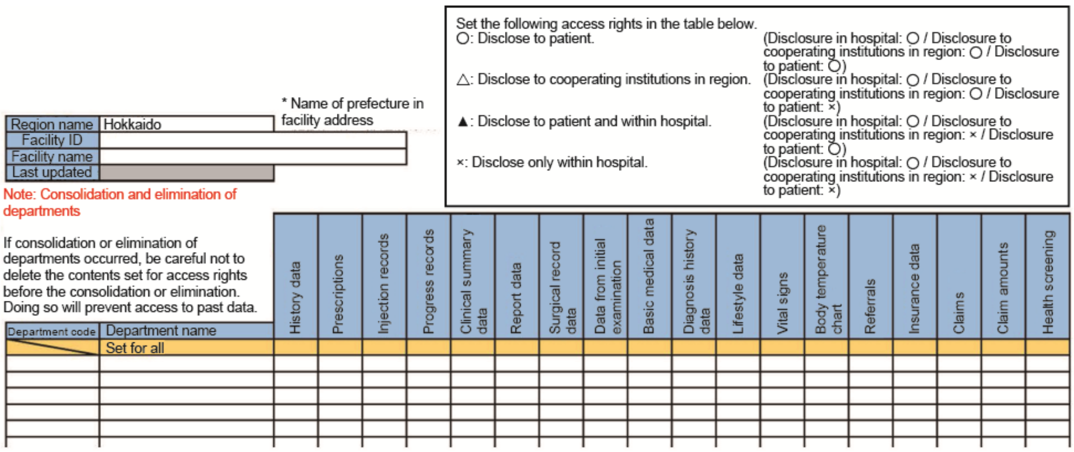


Figure 7: Access control for each medical document and department, set for each medical institution

physicians and items. Using the 18 documents that are defined by the MML standard convention as the units, access rights to each of them can be set for patients and cooperating facilities (**Figure 7**).

(2) Patient opt-out

The patient selects the medical institutions from the history of examining medical institutions which he or she does not want the medical information shared with.

The patient intentions are given priority, so information which a patient refuses to share with a medical institution is not shared even if the medical institution permits sharing with cooperating hospitals.

(3) Rules for joint care

Only medical information which was permitted by both the medical institution which created the medical information and the patient who was examined by that medical institution is shared, and is shared only with cooperating hospitals listed in the patient's examination history. For example, information is not shared with a hospital that has not examined the patient even if the hospital is participating in this project.

3.3 Service functions

The Millennial Medical Record Project classifies the services provided to medical institutions, patients, and others into the following categories: zero-order use (remote backup of diagnosis result data), primary use (sharing of information for joint care and disclosure to the patient), 1.5-order use (automatic discovery of medical risks in the EHR), and secondary use (use of anonymous or non-anonymous medical information for research).

3.3.1 Zero-order data use

Disaster countermeasures by medical institutions are generally carried out following the most recent earthquake. The ideal of this project is to permanently store the lifetime medical records of individuals as an asset for humanity, and medical institutions can be described of as a mechanism which allows the most recent medical information to be continually stored. EHR provides the most recent patient information during the period until the electronic medical records are restored following a disaster.

Restoring electronic medical record data from a backup (all data including diagnosis results data, and operational data such as orders and medical business data) requires power, communications, local hardware, and restart of operations. As a result, performing recovery immediately after a disaster occurs is difficult. However because the EHR Center is able to provide medical data as long as it has power and communications, it can therefore promptly provide the most recent test results, prescriptions, and other information that is needed immediately following a disaster. By providing this information to the patients via EHR in advance, an individual patient can refer to the information using the smartphone which the patient carries with him or her following a disaster, allowing medical treatment to continue.

Figure 8: Millennial Medical Record web interface

3.3.2 Primary data use

There are four primary uses of the data that is stored in EHR: data viewing, Electronic Data Capture (EDC), alert system, and business index analysis.

(1) Data viewing: Viewer for the patients and medical staff

PC (web browser) applications and smartphone applications (iOS, Android) have been created for the user viewers. **Figure 8** shows the PC application screen. After logging in with an ID and password, tests, prescriptions, reports, and other medical record items are displayed in time series lists in the left window (**bottom of Figure 8**), with the most recent data at the top. Clicking displays the details in the right window. For test results and other items, clicking multiple items will display them in a line graph. For details, see the YouTube video*[12].

Figure 9 shows the smartphone application screen. This is for patients only, and not for physicians. Applications have been created for iOS and for Android, and can be downloaded for free from the Apple Store or other site.

After logging in with an ID and password, at first the full patient medical history is downloaded. Although it depends on the size of the history, 4,000 records can be downloaded in around 25 minutes. In the case of a PC, the data is erased when the viewer is closed. However with a smartphone the data remains recorded. Only the new data is downloaded the next time that access occurs. This means that the patient's entire medical history is stored on the smartphone. Power outages and network interruptions are to be expected following a disaster. However when the patient has a smartphone, then it is possible to check the most recent prescriptions, tests, and other data.

Figure 9: "Millennial Medical Record" smartphone app (two on left = iOS, on right = Android)

(2) Electronic Data Capture (EDC)

Regarding use for EDC, some electronic medical records include a mechanism for sending data to the EHR Center when template data is input.

The objective is to allow data to be collected easily without introducing a whole new EDC system when it is necessary for a particular project to record more detailed data items than those listed in the electronic medical record. Because data is exchanged between medical institutions using routes that are equivalent to a dedicated line between the EHR Center and medical institution, it is not necessary to secure a safe route for each project.

(3) Alert system, business index analysis

Functions will be installed which will combine the data analysis results from 1.5-order use (described later) with the medical data display screen. They detect changes in particular test values of a particular patient, and display an alert when necessary. This will produce a significant improvement in clinical safety, particularly among patients who are examined regularly for chronic ailments, by analyzing sudden changes in irregular values and providing feedback to the physician. Previously there were cases where an alert system was installed on electronic medical records within a hospital, however this required a large burden on the electronic medical record vendor or hospital operations division. With this project, this data analysis and alert generation is performed centrally by the EHR Center, placing no burden on the individual medical institutions and allowing a reduction in overall medical costs.

In addition, information such as portfolios and benchmarks will be returned to the management of medical institutions which provide medical business data.

3.3.3 1.5-order data use

One of the objectives in constructing EHR is to provide diagnosis support based on the collected data*[13]. With this project, data use that is provided to the medical institutions and patients is considered primary use, and use of the data for diagnosis support is considered 1.5-order use.

Already there is a report of improved prognosis resulting from the application of AI to EHR data for early detection of acute renal insufficiency[7]. This project is also conducting a feasibility study for this purpose.

In Sweden, it was reported that when anticoagulant therapy conforming to guidelines was recommended to physicians treating patients with atrial fibrillation based on EHR data that utilizes archetypes as the internal logical model in the same way as this project, an improvement in compliance was seen[8]. The mechanism that was used in Sweden to provide greater diagnosis support from the EHR described in the paper has been made available as open source software and this project intends to make use of if.

3.3.4 Secondary data use

Data secondary use, which was difficult before, became possible with the enactment of the Next Generation Medical Infrastructure Act. Under this law, national certification will be carried out for the certified operators who create anonymized medical data. These agencies are permitted to receive data bearing patient names from EHR agencies, hospitals, and other entities. In general, the data is collected and is anonymized without the consent of individual patients (opt-out). This data can be provided (for a fee) to researchers for the purpose of medical research. Because the data is collected under the actual patient names before it is anonymized, it is possible to trace the individual with an anonymous ID. Use of the data for purposes such as clinical research and post-marketing surveys is expected.

4. Issues to be resolved

4.1 Data commonization and standardization

When data from different vendors is stored in the same database, data commonization is an essential requirement. Beginning from the 1990s, common standards for medical information in countries and regions around the world were developed, and each country adopted its own standard. Examples include HL7 (Health Level Seven International*[14]) in the United States, openEHR and openEHR foundation in Europe, and MML (MedXML Consortium*[15]) in Japan. In fact, both in Japan and overseas, a variety of different standards are in use and method of mapping is used to store them in the same database. Even now as specialist mapper companies (example: Orion Health, https://orionhealth.com/) have taken the world by storm, the achievement of a single global standard is clearly not practical.

In the 2010s, a standard derived from Europe openEHR was codified as ISO13606. An investigation of the present relationship with HL7 and MML confirmed that mapping to ISO13606 is possible. Therefore in the Millennial Medical Record Project, the various standards (MML, HL7, original industry standards, etc.) of data output by hospitals, pharmacies, health screening centers, sample testing companies, and others are mapped to ISO13606 before they are stored.

4.2 Insufficient structuring of electronic medical record data

Although the data output from electronic medical records is output using a variety of standards such as HL7, MML, or original industry standard CSV, mapping can be used to integrate this data. However in many cases the data remains on the subsystems and cannot be output in the first place. Even if the data is somehow sent to the electronic medical record, it is generally in PDF, JPEG, or other unstructured format. This data may be human readable, but it is not machine readable and therefore secondary use is not possible. There is no package that is equipped as standard with a function for data output in a common format, and in order to achieve the secondary use that is a primary objective of the government, it will be necessary to reconsider the handling of data in electronic medical records on an industry level.

4.3 Legal problems

Because the revised Act on the Protection of Personal Information that was enacted in May 2017 is a general statute, it does not give any consideration to the special case of medicine. As a result, extreme abnormal values and similar data is classified as sensitive information, and an exception must be created for it. This is a fatal obstacle to medical research. In addition, when medical data is collected in the course of joint research conducted by multiple facilities, it is necessary to perform the anonymization process for each hospital. As a result, the data for the same individual when examined by multiple medical institutions must be handled as data for different persons. In other words, it is not possible to trace the individual using the anonymized data. In many cases, ordinances established by local governments require that medical information be handled at a higher level of confidentiality that is required by the Act on the Protection of Personal Information, and this is also a large obstacle to EHR and secondary use (2000 Problems)*[16].

The Next Generation Medical Infrastructure Act that was enacted in May 2018 is positioned as a law which supersedes these problems. As shown in **Figure 10**, the newly certified agencies are permitted to receive data bearing patient names from EHR agencies, hospitals, and other entities. This make it possible to collect and anonymize data without the consent of individual patients (opt-out), and because the data is collected under the actual patient names before it is anonymized, it is possible to trace the individual with an anonymous ID. The establishment of this law is expected to produce dramatic advances in medical research.

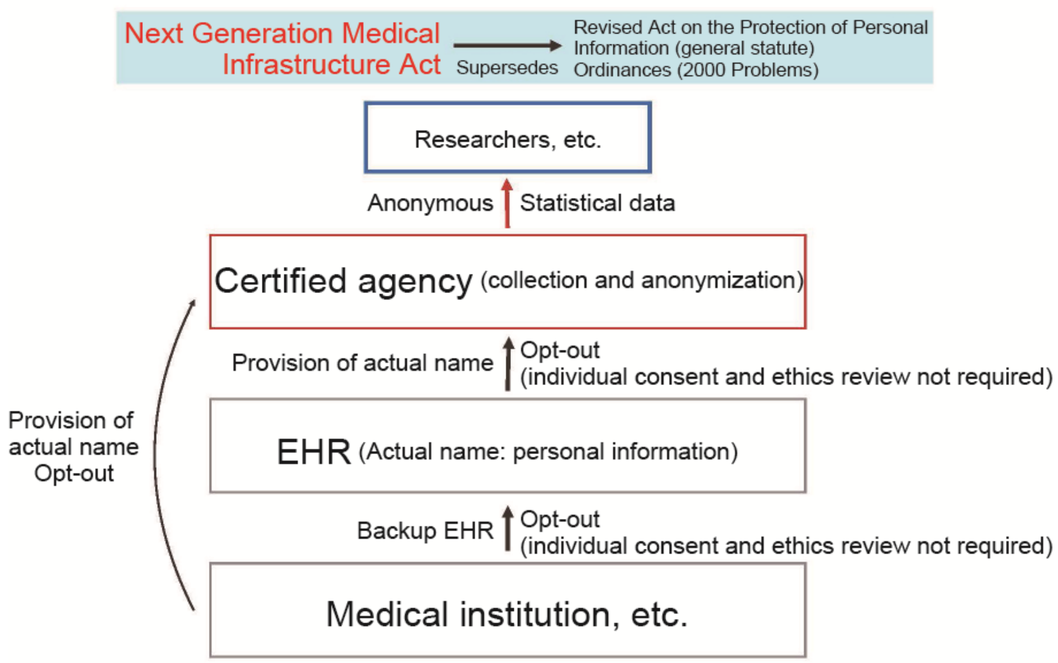


Figure 10: Handling of medical information under the Next Generation Medical Infrastructure Act

4.4 Japan EHR system in comparison with other countries

We began EHR research in 1995. Based on these results, EHR were implemented as a social system in 2001. Although Japan was leading the world at that time, over the last 15 years or so, Japan has fallen behind other countries. In several advanced countries (such as Europe, Canada, and Oceania), EHR are implemented under the direction of the national government without exception. The budget used for this purpose is in all cases approximately 50 dollars (approximately 5,000 yen) per citizen. Considering the population of Japan, that works out to 700 - 800 billion yen. Looking back, the amount that Japan has invested in EHR is much less than this, and the manner of use has been uncoordinated and inefficient. This project did not require such a large budget, and we felt clearly the need to formulate a full-scale plan that is focused on the future. It is expected that if EHR covered all medical institutions, the reduction in redundant tests, prescriptions, and other treatment would be approximately 5%. That represents savings of 2 trillion yen, and would allow more effective medical investment (such as investment in equipment). We are hopeful for a governmental and political decision.

5. Conclusions

This paper has provided an overview of the history and current state of EHR in Japan. The programs carried out in Japan over the past 3 years have been very ambitious and are expected to deliver results. Aiming to make up for the lost 15 years, Japan is putting every effort into constructing and operating a system for EHR and secondary use.

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Advanced to the Faculty of Medicine at Miyazaki University Hospital after graduating from the Department of Chemistry in the Osaka University Faculty of Engineering Science in 1973 and working at a private company. After graduating in 1995, he entered the fields of surgery and then medical informatics. He worked as a professor for a total of 18 years, employed at the Faculty of Medicine at Miyazaki University Hospital in 1995, Kumamoto University in 2000, and Kyoto University (Medical Informatics) in 2003 before retirement in March 2013. He launched the Kyoto University EHR Joint Research Project in April 2013. He served as reagent and hospital director at Miyazaki University from April 2014 to March 2016. From April 2016, he has served concurrently at Kyoto University and Miyazaki University (director of the Kyoto University EHR Joint Research Program / distinguished professor at The Center for EHR, Miyazaki University Hospital). He is professor emeritus at Kyoto University and Miyazaki University. EHR and medical DB are his life’s work.

Notes from text

*1 Next Generation Medical ICT Task Force: http://www.kantei.go.jp/jp/singi/kenkouiryou/jisedai/kaisai.html

*2 Next Generation Medical ICT Infrastructure Conference: https://www.kantei.go.jp/jp/singi/kenkouiryou/jisedai_kiban/kaisai.html

*3 Millennial Medical Record Project: www.gehr.jp

*4 EHR in Japan refers to the collection of data in EMR (Electronic Medical Record) on the regional, national, or other level. PHR (Personal Health Record) refers to an EHR composed of data from a hospital, to which data (such as body weight, blood pressure, walking distance, and workplace health examinations) that was generated from a non-hospital source (the individual, workplace, etc.) was added. The website of the Japan Medical Network Association (http://www.ehr.or.jp/) contains links to the Dolphin Project and Millennial Medical Record Project (http://www.gehr.jp/).

*5 ISO13606-1:2008 Health informatics -- Electronic health record communication -- Part 1: Reference model. https://www.iso.org/standard/40784.html

*6 Seagaia Meeting: http://www.seagaia.org/

*7 MML: Standard developed for correctly exchanging medical data between different medical institutions (electronic medical record systems). Description from the MedXML Consortium (http://medxml.net/?page_id=9).

*8 SaaS: Refers to software that allows the necessary functions to be used at the necessary times and in exactly the amount necessary as services provided over the Internet or other network, or to the provision of services in this form.

*9 Scale-up, scale-out: Scale-up is a method of increasing processing performance by increasing the capabilities of hardware such as servers and memory. Scale-out is a method of increasing processing performance by increasing the number of servers.

*10 Replication: Copying data on a server to a remote site in real time

*11 The openEHR Foundation: http://www.openehr.org. Japan openEHR Association: http://www.openehr.jp/

*12 Millennial Medical Record viewing service for patients: https://youtu.be/ShKchgsnD7Q

*13 Health informatics -- Requirements for an electronic health record architecture, ISO18308:2011. https://www.iso.org/standard/52823.html

*14 Health Level Seven International: http://www.hl7.org/

*15 MedXML Consortium: http://medxml.net/

*16 2000 Problems: Excessive personal information protection required by 2,000 ordinances from local governments across Japan. The new law is positioned to supersede the information protection provisions of these ordinances.

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Author Abstract

The beginning of EHR (Electronic Health Record) can be traced back to the examination of the medical information common standard in 1995 (MML: Medical Markup Language). In 2001, EHR with database structure of MML was developed and expanded to Miyazaki, Kumamoto, Tokyo, Kyoto (Dolphin Project). After that, the necessity of medical information management at national level and the importance of secondary use of medical information came to be recognized. In 2015 the country level version of the Dolphin Project "The Millennial Medical Record Project" began. We will increase the number of connected hospitals in 4 years until 2018 and prepare for secondary use of medical information starting from 2019. We are aiming for independent profit including EHR department by revenue of secondary use of data without relying on government subsidies.

Key words

EHR, Electronic Health Record, Millennial Medical Record Project, collaborative medicine in the community, disclosure medical records to patients, medical data, secondary use, data use