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# IT in Home Healthcare News

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# Förord

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Lena Moritz

Enhetschef

# Innehåll

# 1 Introduction

Japan has had a problem with the lack of medical doctors and hospitals in backcountry and isolated islands for long time. Furthermore, in such areas, it takes long to bring a patient to the nearest medical care center. Japan is about 38 million hectares in land area; Sweden is about 1.3 times larger than Japan. There are 127 million inhabitants in Japan, which is about 14 times more than Sweden, and the population density in Japan was 336 persons per square kilometer as of 2000. However, the breakdown of its land utilization tells more about Japanese situation. *Land for building* is just 5 %, and the rest is *Forest* 66 %, *Farm* 13 %, *Waters* 4 %, *Roads* 3%, and others 9 %. Therefore, most people in Japan live densely in plains formed by rivers and coastlines, such as Tokyo and Osaka, where a lot of hospitals are located. Whereas, there are still some people living sparsely in forests, mountains, and small islands, they are far from cities and medical care centers.

Other problems of Japan are rapid increase of aged people, population shift from country to urban areas especially young people, and spread of the nuclear family, which increases elderly people who are living alone in backcountry. Such problems affect each other, and it makes us difficult to take measures; for example, in mountain villages there is a tendency that elderly people living alone who has difficulty in getting medical care.

This newsletter is the first trial of collecting information related to IT used for home healthcare in Japan. Therefore, this is not all the activities happened and happening here.

1. INTERNATIONAL COMPARISON: RATIO OF 65 YEARS OLD AND OVER AMONG TOTAL POPULATION (1990-2050)

(percent)

| | Japan | USA | Germany | France | Italy | UK |
|---|---|---|---|---|---|---|
| **1990** | 12.05 | 12.39 | 14.96 | 13.99 | 15.32 | 15.72 |
| **1995** | 14.54 | 12.47 | 15.47 | 15.09 | 16.62 | 15.74 |
| **2000** | 17.37 | 12.30 | 16.40 | 15.97 | 18.07 | 15.75 |
| **2010** | 22.54 | 12.89 | 20.19 | 16.62 | 20.63 | 16.95 |
| **2020** | 27.85 | 16.29 | 22.51 | 20.45 | 23.85 | 20.21 |
| **2030** | 29.57 | 20.17 | 27.70 | 23.85 | 28.58 | 24.34 |
| **2040** | 33.23 | 21.00 | 30.92 | 26.16 | 34.53 | 27.24 |
| **2050** | 35.65 | 21.09 | 30.97 | 26.73 | 35.87 | 27.31 |

*(Source: http://jin.jcic.or.jp/stat/index.html)*

# 2 Home healthcare

Regarding IT in home healthcare in Japan, there were three mainstreams: 1) telemedicine (real-time) with a TV-phone set at home and a medical care staff, 2) a home healthcare management system (batch process) consists of a home terminal with vital sensors, an operation center with vital information storage, and a terminal for a medical staff, and 3) an emergency call system (real-time). However, the emergency call system merged with the home healthcare management system, so, at the moment, there are two mainstreams remained. Telemedicine has been promoted mainly by the Ministry of Health, Labour and Welfare (MHLW). The home healthcare management system in Japan, was originally developed by a private joint venture, and has been gradually disseminated nationwide mainly under initiatives of local governments with back of national grant money.

## 2.1 Telemedicine Project by MHLW

Ministry of Health, Labour and Welfare (MHLW) has tackled the issue of the lack of medical staffs in backcountry since 1956. Measures were, for instance, providing with physicians and dentists where there is no physicians or dentists, building central hospitals in such areas, and also, building/assigning supporting hospitals for such areas. Those measures did not show adequate results. Therefore, in 1997, MHLW started to try out ICT solution as one of the measures in backcountry. It was a trial telemedicine with TV Phone sets and other necessary equipment at a patient home and at a hospital, connected with an *Intranet*. Since then, MHLW has focused on telemedicine with image data transmission between a patient and a doctor. MHLW has applied such systems mainly between isolated islands and hospitals in main lands so far, and has a plan to apply also between a local hospital and a hospital with an expert in a special medical field.

## 2.2 Home healthcare management system

There are some home healthcare management systems available on the market. Major suppliers are Sanyo, NEC, Matsushita and Hitachi (Nasa Corporation), and the systems are similar to each other. A system consists of a home terminal for its user (patient), a terminal for a medical staff, an operational center system, and communication media to connect those terminals and center. Home terminal has vital sensors, sensor adaptors, (video) telephone function, and communication adaptor; also some system has a portable emergency switch to send an emergency call for help. Doctor terminal has (video) telephone function, data processing function, printer, and communication adaptor. Center system has data server, printer, operation terminal, (video) phone function, communication adaptor. Communication media to connect all three different sites could be fixed telephone line, leased circuit line, cable TV network, and the Internet.

The system works as follows. Firstly, at a user home, user responds to doctor's routine questions, for example, whether or not have an appetite, by yes or no with pressing a button or touch panel on the home terminal. Then, measure and record

vital data, such as, an electrocardiographic wave, blood pressure, heart race, body temperature, body weight, blood sugar, and so on. Such items are different among systems, and some system changes the items depending on the users health conditions. Secondly, all the collected data in the home terminal is transferred to the operation center via communication line, and stored in the database. That is actually triggered by the data center so that the users do not need any operation. Also, the data are sent to a terminal for a medical staff (nurse or doctor), together with the user's past records as a reference. Finally, a medical staff returns the diagnosis of the user to his or her home terminal on the following day, or a monthly report is sent to the users by post.

There are different features among such systems supplied by different makers and system integrators. For example, one has TV phone function, and a patient can talk to a doctor in real-time if necessary. Other one has a pendant style emergency button, which is connected with a home terminal via radio. It sends a signal to a medical center in real-time when the user needs immediate help. However, there is no compatibilities among the different systems, therefore, the players in the field have tried to standardize and to develop a connectivity at the industrial association, JAHIS (Japanese Association of Healthcare Information Systems Industry).

The first test system of a home healthcare management system with ten home terminals was launched in a private hospital in Iwate Prefecture in 1990. It was a joint venture between the hospital and a cable TV company. The home terminal "Urara" was originally developed by the joint venture, and manufactured by Nasa Corporation. At the beginning, the aim of the project was to watch conditions of patients at home discharged from the hospital. Also, from business point of view, it was a value added service of the hospital, to differentiate from other hospitals, and it was a sales promotion of the cable TV network company to increase subscribers. The number of terminal users has been increasing through several milestones; for example, to expand its users to outpatients, formation of users community, and reception of grant money from local city government. The system has expanded from ten to 605 home terminals connected to the hospital via the cable TV network and fixed telephone network as of 2002. The Urara system does not have TV Phone or emergency call function, so it works as batch process.

Similar home terminals and systems have been developed by other companies, but they (including the first system written above) were (are) too expensive for private hospitals and their patients to use at their expenses. In late 90s, some ministries started to offer grant money especially for towns and villages in backcountries, and it has made some local governments think about introducing home healthcare management system by utilizing such grant money. One of the objectives of such projects at ministries was to decrease the gap of information access opportunity (or digital divide) among urban areas and backcountries. For example, Ministry of Agriculture, Forestry and Fisheries (MAFF) offered grant money for local governments to develop intranet and related equipment, useful for the elderly people in agricultural, fishing, and mountain villages. Ministry of Economy, Trade and Industry (METI) had grant money for promoting electric power resource site and Informatization towards ideal aging society project.

Ministry of Public Management, Home Affairs, Posts and Telecommunications (MPHPT) had Regional Intranet Project and Advanced Information Communication Systems Model Town Project.

As of October 2002, there are 125 systems in operation nationwide according to Japanese Association of Healthcare Information Systems Industry (JAHIS). Their operation bodies are local governments (town or village), hospitals, health care/day-care/elderly-care centers. Most of the systems, for example, run by local governments, were introduced and are operated by public funding, and very few systems by private expenses. Scales of those 125 systems are very much different; for example, a system with one home terminal for multiple users placed in e.g., day-care center, and another system with 1300 home terminals at individual homes. Small-scale system, something like up to 30 home terminals, dominates 125 systems.

*(Source: http://www.jahis.jp/,* http://www3.famille.ne.jp/~smhb-ura/uraraf.html*)*

## 2.3 Research and Development Project (example)

### 2.3.1 a) METI offered public subscription of Home Healthcare Model Proof Project

METI offered public subscription of a contractor for a three-year project, Vital Sign Measurement Proof Project (Home Healthcare Model Proof Project), aiming at establishing a business model to create and nurture "a cross-sectional and total healthcare service industry" in June 2003. The project is to improve and test a basis of an information system, which supports spontaneous total healthcare management and health enhancement for elongation of longevity with fine health. The budget for the project is within 80 million yen for FY 2003.

(Background and purpose)

Recently, it has been recognized important to do self-active healthcare management and to ensure better health, through utilizing vital signs collected from the self-active healthcare management; because, in the aging society, that materializes peace and safe quality of life, and also it shortens the period of care of patients and elderly. To attain such healthcare management and health enhancement, such an environment is needed that each individual is able to collect and manage total health information without burden, for example, own vital signs and diagnosis information (including counselling). Also, it should be necessary to do the followings by receiving supports from experts if necessary. To diagnose one's health by oneself, to make effectively one's own plan for enhancing health, and to feed results back to the plan.

(Project description)

The major system requirements are as follows.

Firstly, regarding collection and management of vital signs, a system is able to collect one's vital signs and medical care information under a non-stress condition to the person in a variety of scenes. The system is well coordinated between health

monitor terminal and diagnosis system that handles receipts and electronic medical charts. Vital signs and health information must be systematized and standardized. Communication protocols must be unified, and information platform must be standardized. From over a couple of thousands sample bodies, vital signs and information must be collected and managed at a variety of places, such as, home, hospital, in-house healthcare center at company, and fitness facility.

Secondly, as for supporting diagnosis, one can diagnose own health based on the collected vital signs by receiving support from experts if necessary. Evaluation and analysis methods of vital signs & health information must be developed.

Thirdly, about making a plan, execution, and record for health enhancement, one can makes a plan for own health enhancement by oneself based on diagnosis, and record without burden.

Fourthly, system must have secure communication over the network.

Lastly, all those requirements should be coordinated with the NEDO (New Energy and Industrial Technology Development) project "Development of high-performance health check equipment for home healthcare" mention below.

*(Source: http://www.meti.go.jp/information/data/c30609aj.html)*

### 2.3.2 b) NEDO Project of Development of high-performance health check equipment for home healthcare

NEDO announced that it would accept candidates from the general public of a private company who would develop high-performance health check equipment for home healthcare. NEDO will offer grant money to the selected company, which will be half of the total cost for the project within 279 million yen for FY 2003, planned as three-year. NEDO is a semi-governmental organization under METI, and receives budget from METI and re-distributes according to its mission. The project aim is to carry out R&D on health check equipment and system, mainly three requirements as follows.

Firstly, develop vital sign monitor terminals, which can measure and record a variety of vital signs in different situations, such as, at home and outdoors. Also, it is important for terminal users to measure and record the data continuously and on a day-to-day basis; therefore it is preferable that the data is measured and stored for the users not to recognize that, in unconscious and no restraint way. The recorded data should be transferred in an easy way to data center. There is a need of display to show the analysis results of one's vital signs.

Secondly, develop methods for evaluation and analysis of one's health. The system is able to analyze huge data stored in the data center, and acquires and displays indicators that are used to diagnose one's health. Furthermore, the system infers one's possible risk to be lifestyle related diseases, and supports one's health management. Also, develop a database that associates signs of disease with its attack, and develop diagnosis support system.

Thirdly, standardize data protocols among equipment. The data protocols must be unified, and they must keep secure data transmission over networks, which

connect data center, homes, and other institutes. Also, develop interface equipment, which assures smooth data transmission among other equipment. The following issues must be kept: compliance, integrity, security, and authenticity of vital (health) information.

Lastly, all those requirements should be coordinated with the METI "Home Healthcare Model Proof Project" mention above.

*(Source: http://www.nedo.go.jp/informations/koubo/150609_1/150609_1.html)*

# 3 Other examples

## 3.1 Watch system for elderly people living alone

Hitachi provides a system to watch an elderly person living alone at home or people living at home for elderly people. The system uses a network of sheet type pressure sensors under carpets, placed the doorway of some rooms, for example, toilet, bathroom, bedroom, kitchen, and living room. Whenever a sensor detects a person passing through a doorway, a central unit at the home records the place and time, and sends the information to the operation center. The system at the operation center analyzes the person's daily behaviour pattern. Then, if the system infers an occurrence of an abnormal situation, for example, to fall unconscious by an unusual long stay in a bathroom, the system alerts staffs at the operation center so that they will do some actions. For example, call to the person, or call a staff at home for elderly people.

*(Source: http://www.hesco.co.jp/JPN/products/welfare/caremat.html)*

## 3.2 Fetus and newborn health care system

Research Institute of National Cardiovascular Center has developed and operated a system for monitoring the condition of a baby from its fetal to newborn period. A pregnant woman measures fetal heart rate and uterine contraction at home, and send the record to a medical staff to diagnose the condition of fetus through a telecommunication line.

*(Source: http://www.ncvc.go.jp/english/res/Epi.html)*

# 4 Links

Ministry of Health, Labour and Welfare (MHLW)
(http://www.mhlw.go.jp/english/index.html)
The Medical Information System Development Center (Foundation under Ministry of Health, Labour and Welfare and Ministry of Economics, Trade and Industry)
(http://www.medis.or.jp/) (in Japanese)

Ministry of Economy, Trade and Industry (METI)
(http://www.meti.go.jp/english/index.html)
NEDO (New Energy and Industrial Technology Development)
(http://www.nedo.go.jp/english/index.html)

Ministry of Public Management, Home Affairs, Posts and Telecommunications (METI)
(http://www.soumu.go.jp/english/index.html)

Ministry of Agriculture, Forestry and Fisheries (MAFF)
(http://www.maff.go.jp/eindex.html)

Japanese Association of Healthcare Information Systems Industry, JAHIS (Industrial Association)
(http://www.jahis.jp/english/english.html)

Japanese Association of Medical Informatics (JAMI)
(http://jami.umin.ac.jp/) (in Japanese)
Telemedicine System Study Group, JAMI
(http://square.umin.ac.jp/jami-telemed/) (in Japanese)

Finished project report “Telemedicine study group”
(http://square.umin.ac.jp/~enkaku/Welcome.html) (in Japanese)
TELEMEDICINE REPORT -- Revised in March,1997
(http://square.umin.ac.jp/~enkaku/96/Enkaku-RepSoukatu-nof-eng.html)

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