Perspectives in the E-health Policies

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ICT Utilization Strategies in the Medical Field

Issues in the Medical Field

Taking advantage of ICT’s ability to transcend time and distance

World’s most advanced telecommunications infrastructure

New trends

- **Barrier-free “ubiquitous society”**
  (Connecting people to people, people to things, and things to things)

- **Development of easy-to-use ICT**
  (Dramatic improvements in user interfaces)
  - Cloud computing
  - SNS
  - Smartphones
  - Smart TVs

- **Development of new ICT**
  - Communication Robots
  - Sensor network
  - M2M
  - Big data
  - etc.

Medical Related Computerization

- Realization of the best practice in each area
  - Verification of qualitative and quantitative effectiveness
  - Identification of technical and practical issues

- Expansion of information-sharing systems and covered fields
  - Within medical facilities (hospitals, clinics)
  - Medical treatment, nursing care, pharmacies and home care
  - Medical and healthcare fields

- Expansion of shared information and its continual utilization

- Emergency and remote treatment, etc.

- International cooperation

Issues

- Information security
- Personal information/Privacy protection

Medical Related Computerization

- Administration of health-medical-welfare information platform development
  (Development and operating costs, etc.)
Changing trends in ICT are altering its applications

- Utilization of wireless broadband
- Cloud computing
- Big data, M2M, sensor network
- Improvements in user-interface
- Diffusion of SNS
- Diffusion of smartphones, smart TV’s, etc.

### Alterations in ICT Application

By New Generation M2M Consortium

<table>
<thead>
<tr>
<th>Sensor Type</th>
<th>Application Area</th>
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<tbody>
<tr>
<td>Acceleration/vibration sensor</td>
<td>Urban planning</td>
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<tr>
<td>Temperature/humidity sensor</td>
<td>Environment/energy</td>
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<tr>
<td>CO2/pollen sensor</td>
<td>Farming/dairy farming/forestry</td>
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<tr>
<td>Water/flow-rate sensor</td>
<td>Commercial distribution</td>
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<tr>
<td>Calorimetric sensor</td>
<td>Transportation</td>
</tr>
<tr>
<td>Densitometric/viscometric sensor</td>
<td>Machine maintenance</td>
</tr>
<tr>
<td>Pressure sensor</td>
<td>Structural monitoring</td>
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<tr>
<td>Strain sensor</td>
<td>Resource management</td>
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<tr>
<td>Light (infrared) sensor</td>
<td>Disaster-prevention/disaster</td>
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<tr>
<td>Magnetic sensor</td>
<td>Weather/atmospheric observation</td>
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<tr>
<td>Location sensor</td>
<td>Health care</td>
</tr>
<tr>
<td>Image/video sensor</td>
<td>Water quality/geological observation</td>
</tr>
<tr>
<td>Biosensor</td>
<td>National land preservation</td>
</tr>
<tr>
<td>Ripeness/sugar content sensor</td>
<td>Activity monitoring</td>
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ICT Application in the Field of Medical Care
Progress of ICT in the Medical Field

ICT has been progressing from the system coordination by each department or among departments in a medical facility to information sharing among medical facilities and with patients and fields other than the medical field.

- **1970’s**
  - Coordination among medical facilities
  - Information sharing with patients and fields other than the medical field

- **1980s**
  - On-line receipt
  - Coordination among medical facilities
  - Information sharing with patients and fields other than the medical field

- **2000’s**
  - Integration of intra-hospital systems
  - Coordination among departments
  - Systems by each department
  - Department system (inspection, goods management, etc.)
  - Medical accounting system
  - Electronic medical records
  - Image system (PACS)
  - Ordering system

- **2010’s**
  - Cloud-type electronic medical records
  - On-line receipt
  - EHR • PHR
  - Local medical coordination system
  - Telemedicine system

Fields taken in charge by MIC
Effects of ICT Utilization in the Medical Field

- The more aggressive the ICT utilization by the medical facility is, the greater the extent of information-sharing and the more efficient the routine office will be.
- The Electronic Health Record (EHR) (medical information link platform), especially, shows improvements in quality of medical treatments and office work.

### Relationship of ICT Utilization and Its Effects in Medical Facilities

#### Effects of ICT Utilization in the Medical Field

- **Active info-sharing among medical staff**
- **Active info-sharing among medical staff and clerical staff**
- **Inter-medical-facility cooperation in medical care**
- **Cooperation in medical care with care & welfare facilities**
- **Cooperation in medical care with testing centers and pharmacies**
- **Simplified receipt preparation process**
- **Efficiency raising of medical care fee claims’ bill preparation**
- **Reduced working time of medical staff**
- **Reduced working time of medical clerical staff**

#### Medical Facilities

- **Low utilization (n=151)**
- **High utilization (n=65)**

#### Effects of Programs Using the EHR

- **Improved quality in medical treatments**
- **Reduced time in examinations i.e., greater number of patients treated per a day**
- **Better inter-facility cooperation**
- **More efficient office work**
- **Others**

#### Pharmacies

- **Improved quality of medication advices**
- **Shortened time for input of prescription info i.e., reduced input errors**
- **Better inter-facility cooperation**
- **More efficient office work**
- **Others**

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**Effects of info-sharing & cooperative processing**

**Improvement in clerical process**

**Reduction in working time**
Over 550 projects have been completed, of which 111 are in the medical fields. The majority are in imaging telediagnosis, emergency medicine, health-care, etc.

### Examples

<table>
<thead>
<tr>
<th>Medical Activities</th>
<th>Non-medical Processes</th>
</tr>
</thead>
<tbody>
<tr>
<td>○ Imaging telediagnosis</td>
<td>□ Healthcare, assisting preventive medicine</td>
</tr>
<tr>
<td>● Telemedicine for patients staying home, support of visiting nursing</td>
<td>■ Medical health information management support</td>
</tr>
<tr>
<td>△ Medical info-sharing (Disease control, e-medical records)</td>
<td>◇ Care-welfare s service network</td>
</tr>
<tr>
<td>▲ Emergency support (Info-sharing of patients in transit, etc.)</td>
<td>◆ Others (dissemination of health information, medical education, etc.)</td>
</tr>
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Note: To prevent multiple entries, any regions that receive support over more than 1 fiscal year are only reported once in principle.
Formulate technological specifications for sharing information among various areas in regard to medical information cooperation infrastructure.

With regard to formulated specifications, develop dissemination in cooperation with bodies relevant to standardization related to medical information provision.

- Provide contiguous medical services by sharing medical information on patients among medical institutions and so forth.
- Cost saving due to elimination of multiple tests and multiple administrations.
- Refer to and share medical records of patients if necessary, not only in normal times, but also in the times of disasters.
The following environments are constructed to realize effective prescription and dosage by establishing infrastructures for wide-area circulation of information on medical treatment, dispensing and medical checkups in the entire area.

1) Information described in prescriptions issued at hospitals and clinics is digitalized and provided to pharmacies.
2) “Web Medicine Notebook” which allows patients to utilize their own medication history information where necessary is provided.
3) Patients can give feedbacks on their daily state of drug administration and medication to personal physicians and dispensers.

### Outline of project

- Medical institutions
  - Prescription information
  - Medical examination and treatment information

- Medical institutions
  - Medical check-up information

- EHR
  - Dispensing information
  - Drug administration information

- Local governments
  - Medical examination and treatment information

- Pharmaacies
  - Dispensing information
  - Prescription information

- Patients
  - Web Medicine Notebook

### Major matters to be verified

#### < Technical verification >
- Digitalization of prescription information and a system for its safe circulation
- A system for efficient sharing and coordination of prescription information and dispensing information
- A system that allows patients to access to their own dosage history through mobile phones, etc.

#### < Verification of effects >
- Appropriate medical examination based on past dosage history
- Appropriate instructions on drug administration based on past medical examination history (reduction in overlapping dosage, prevention of harmful effects when taken together)
- Reduction rate of errors of and time for input of information on prescription at pharmacies, etc.

### Cooperating organizations and associations

- Kagawa Prefecture, Takamatsu City, Miki-cho, Sanuki City
- Kagawa Medical Association, Kagawa Pharmaceutical Association
- Kagawa University, Tokushima Bunri University, etc.
An infrastructure for wide-area circulation of information on medical examination and treatment, dispensing and nursing care is constructed in the entire area and the following systems are established.

1) Establishment of a medical treatment-nursing care coordination model for efficiently referring to and sharing information of patients on medical examination, dispensing and nursing care among various categories of business (including deliberations on desirable information that should be shared by medical care and nursing care)

2) A system of safe registration of information on patients by visiting doctors and nurses, care helpers who are involved in home care and home nursing care.

[Outline of project]

[Major matters to be verified]

<Technical verification>

- A system for safe and efficient provision of information to medical institutions, nursing care facilities and parties concerned of home care and home nursing care
- A system for safe browsing of medical examination information at home and for registration of new information, etc.

<Verification of effects>

- Reduction rate of overlapping medical check-ups and dosage
- More efficient works of nursing care facilities, visiting doctors and nurses
- Reduction rate of the frequency of outpatient visits and outpatient costs
- Reduction rate of the average admission days of patients
- Reduction of mortality rate by regular home medical examination and care
- Reduction rate of medical expenses, etc.

Cooperating organizations and associations
- JA Onomichi Hospital
- Onomichi Medical Association
- Matsunaga Numakuma Medical Association
- Innoshima Medical Association
- Onomichi Pharmaceutical Association
- Fukuyama Pharmaceutical Association
- Mihara Pharmaceutical Association
- Onomichi Liaison Council for Care Facilities
- Onomichi City, Fukuyama City, Mihara City, etc.
The following environments are constructed to realize one-stop medical services through common hospital ID cards (provisional name) in the entire area.

1) Personal health information (information on specified medical checkups), medical examination information and dispensing information are registered and shared among parties concerned and local residents can make a reservation for medical examination.

2) Emergency care facilities can refer to information on vacant beds of local medical institutions and history of medical examination and drug administration of emergency patients.

[Reference3] Project for Medical Coordination Using Hospital ID Cards (Shimane Prefecture)

- Improvement of service levels of medical care, medical examination, dispensing and dosage
- Reduction rate of overlapping medical examinations and dosage
- Improvement rate of vital data (e.g. blood pressure, blood glucose level) of patients with chronic diseases, etc.

Cooperating organizations and associations
- Shimane Prefectural Central Hospital
- Shimane University Hospital
- Ohda Municipal Hospital
- Izumo Medical Association
- Ohda Medical Association
- Shimane Pharmaceutical Association
- Izumo Fire Department,
- Izumo City, Ohda City, Hikawa-cho, etc.
Assisting Healthcare through ICT Utilization (Smart Wellness City Project)
Mitsuke City, Niigata Prefecture and Environs (Comprehensive Project for special districts)

- Approach to visualizing residents’ health conditions by comprehensively gathering and analyzing their health information in the area such as data for the National Health Insurance and Social Insurances, health data, etc. so that municipalities can objectively draft and verify evidence-based measures.
- Seven cities including Mitsuke City in Niigata Prefecture share the platform.

### Three Pillars of Social Innovation

- Ordinance & Plan (Social innovation)
- Town Development
- Cloud Computing of Health Data

### Elements of Social Innovation

- Mitsuke
- Niigata
- Sanjo
- Gifu
- Date
- Toyooka
- Takaishi

**Seven Cities (Common platform + Localized municipal policies)**

### Responsible involvement of municipalities, residents

### Inter-municipal programs

### Administrative Action (Patterning of various municipal programs and results)

**Main points of Patterning (tentative)**
- Population covered
- Local characteristics (region, culture, etc.)
- Staff capability
- Target population
- Kinds of health data

**Pattern A**

**Pattern B**

**Pattern C**

Seven types of patterns possible

### Analysis and Evaluation based on Objective Indices

- Satisfaction Analysis
- Medical Economic Analysis

**Policy planning conforming to present and future realities**

**Simulation of policy effect**

**Optimization of implementation plan**

**Analysis Evaluation**

### Intellectual Support Platform

**Basic Data**

- National Health Insurance
- Social Insurance
- Nursing Insurance
- Association Health Insurance
- Vital data, food intake and exercise record
- Questionnaire Surveys, etc.

**Survey on life style and living habit**

**Data Collection**

**Cloud Computing of Health Data**

**Analysis, Evaluation, etc.**

Development of optimized and verified evaluation engine based on evidences of 7 cities

**SWC member municipalities**

**SWC Summit Study Group**

University of Tsukuba

### PDCA Cycle

- **PLAN**
- **DO**
- **CHECK**
- **ACTION**

Renders easy review of municipal programs

Provides program models for other municipalities
Objective
Nationwide installation of network robots (for nursing care, monitoring, etc.) by 2020

Expected capabilities (life-support activities to promote social participation for the aged and the challenged)

**Shopping assistance**, reducing burdens on care takers (*remote active listening service*, etc.), monitoring (gathering information on family members of the aged, etc.), **healthcare** (gathering and storing biological information, **healthcare advise**), guidance information: services mainly for communication
Mobile Health (mHealth) Trend

Change of The World Mobile-phone User Population

- Low-income nations
- Lower mid-income nations
- Upper mid-income nations
- High-income nations

2000: 1.1 million, 313, 37.1
2005: 208, 614, 37.2
2010: 79, 801

Change of The World Internet-user Population

- Low-income nations
- Lower mid-income nations
- Upper mid-income nations
- High-income nations

2000: 1.1 million, 313, 37.1
2005: 167, 614, 37.2
2010: 860, 1171

Miniaturization and Cost Reduction of Sensors

- Size (of chips)
- Price for sale (average)

About 85% reduced

Interest toward Mobile Health

- No. of Mobile Health Users
- No. of Smartphone Users

Source: “Active Japan ITC Strategy”, Ministry of Internal Affairs and Communications
Verify appropriate combinations of “terminal X Transmission Protocol X Measuring Instruments” according to users, communication environment and conditions of patients, and ideal situation of network security, transmission standards and user interface

Collecting and grasping daily information on home-staying patients accurately utilizing mobile terminals, sensors or the like, and register and accumulate it in EHR, and realize sharing of home medical care and the nursing ICT system

- **Utilization of individually collected vital data**
  Individuals upload daily vital data they measure to the medical cloud, which may be utilized by medical organizations, etc.

- **Utilization of mobile terminals, sensors, etc.**
  By use of mobile terminals and sensors, transmission among medical devices (M2M: machine to machine) based on the transmission standards such as NFC and Continua can be realized

- **A variety of uses**
  An individual may easily make measurements and upload the data. Because the circuit is wireless, the network can be used for home and remote medical care, and health management

- **Carry out proposals, standardizations of communications standards, best-practices, or the like through the venues of ITU (International Telecommunication Union).**
Mobile Health (mHealth) – Examples of Use of Home Medical Treatment/Nursing Care ICT System

- Use of mobile terminals and sensors renders the system user-friendly, thereby allowing anyone to upload and record information.
- Sharing uploaded medical information of patients, a variety of professionals such as physicians, nurses and care managers are able to provide timely medical care services.

**Home-Visit**

- Medical Information Collaboration Infrastructure (EHR)
- Simple measurement and uploading of a patient’s vital data reduces physicians’ work burden at the patient’s home.

**Chronic Disease Management**

- The reference by physicians to daily uploaded patients’ vital data and directions to health care may prevent the advance of chronic diseases.

**Home Medical Care Model**

- Vital Data Reference
- The physician at the clinic monitors the vital data of a patient collected by a nurse using electronic stethoscope and supports the nurse as the latter works at the patient’s residence.

**Home Nursing Care Model**

- Vital Data Reference
- The helper measures and uploads vital data and other patient conditions, and the physician returns appropriate directions if required.
Coping with Large-scale Disasters
Because medical information recorded on paper, basic data of patients, was largely lost in the disaster, provision of appropriate medical treatment was difficult, which caused great communications difficulties among the medical staff and placed a large burden upon them.

Due to the lack of information on prescription and dispensation of the medicine to the patients, physicians could not decide which drugs to prescribe for fear of double prescription. This placed a large burden on the them.

For physicians, the prescription details are important as they must repeat determinations of patients’ blood glucose level, ECG, blood pressure level, etc. at each examination.

All of the medical records were carried off by the tsunami. Physicians examined patients twice as many as patients as normal without any records.

Accordingly, it would be mandatory to strengthen the medical systems against damage from natural disasters, i.e., aim at computerization of medical records so that physicians and other medical workers may access cloud computing systems through the use of note book computers and satellite communications system.

In short, there should be a system in which medical records may easily be compiled, stored, and shared through a personal computer and appropriate communications environment.

Storage, handing over and coordination of patient data is necessary. To prevent confusion, such as lack of prescription details and other problems, detailed medical records require a centralized storage system.

On the whole, necessitate EHR, which electronically records and stores patients’ medical treatment and prescription information recorded in medical facilities, and permits physicians and other medical staff to refer to and share the information as required.
Tohoku Medical Megabank

For reconstruction in response to the Great East Japan Earthquake, MIC aids financially local governments (Iwate Prefecture, Miyagi Prefecture and Fukushima Prefecture) affected by the tsunami to construct EHR (Electronic Health Records)

To be more specific, MIC helps them to construct the following systems

1) Store and share a variety of information, including medical charts, drug dispensing and nursing care data
2) Telemedicine with video phone
3) Implement health guidances

Outline of project

- Supporting Miyagi Prefecture
  - Ishinomaki/Kesen-numa Medical Districts
  - Sendai Medical District, etc.

EHR (Electronic Health Record)

Log, Store and View Various Types of Information

Broadband network

- Securely access information anytime, anywhere

Regional healthcare and medical collaboration zone

- Core medical institution
- Clinic
- University hospitals, etc./Emergency care
- Telehealth Consultation
- Biobank
- Coordination

Other regions within prefecture (backup support)

Health exam information

Medical care information, etc.

Nursing care related information

Log, Store and View Various Types of Information

- Store and share a variety of information, including medical charts, drug dispensing and nursing care data

Telemedicine Consultation

- Specialist doctor
- University hospitals, etc./Emergency care
- Clinics/specialist doctors

Telehealth Consultation

- Municipalities
- Public health nurses/Health advisors
- Evacuation centers and assembly halls
- Other regions within prefecture (backup support)

Implement health guidance

- Patients/Residents
- Pharmacy
- Nursing home
- In-home medical care
- Temporary clinic
- Temporary housing
- Regional healthcare and medical collaboration zone

Core medical institution

Pharmacy

Nursing home

Patients/Residents

Temporary housing

Public health nurses/Health advisors

Evacuation centers and assembly halls

Telehealth Consultation

Clinics/specialist doctors

Biobank

Coordination

Other regions within prefecture (backup support)
Programs for the Future
ICT Utilization Strategies in the Medical Field

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- **Expansion of shared information and its continual utilization**
- **Emergency and remote treatment, etc.**
- **International cooperation**

### Issues

- **Information security**
- **Personal information/Privacy protection**

- **Administration of health-medical-welfare information platform development**
  (Development and operating costs, etc.)
Programs for the Near Future

Assumptions
- Coping with large-scale natural disasters
- Responding to problems of the super aging society

- From fragmented information to a holistic view...
  - Development of a system that is possible to be deployed on a nation-wide basis by combination of the best practices
  - Evidence-based quantitative approach

- Computerization of medical records by maximum utilization of newest technical renovation
  1) Expansion of continuous, sharable range
     - Facility, Information, System, Equipment, etc.
     - Medical Treatment, Nursing Care, Social Welfare, etc.
  2) To connect them, standardization of a variety of healthcare fields must be implemented
  3) Review of the rules on the protection of information security, personal Information, etc. to meet the requirements of ICT technology
  4) Desirable administration of health-medical-welfare information platform development (development and operating costs)

- Importance of International Cooperation