i-Japan戦略2015　　IT戦略本部（2009年7月6日）

三大重点分野

【電子政府・電子自治体分野】

【教育・人材分野】

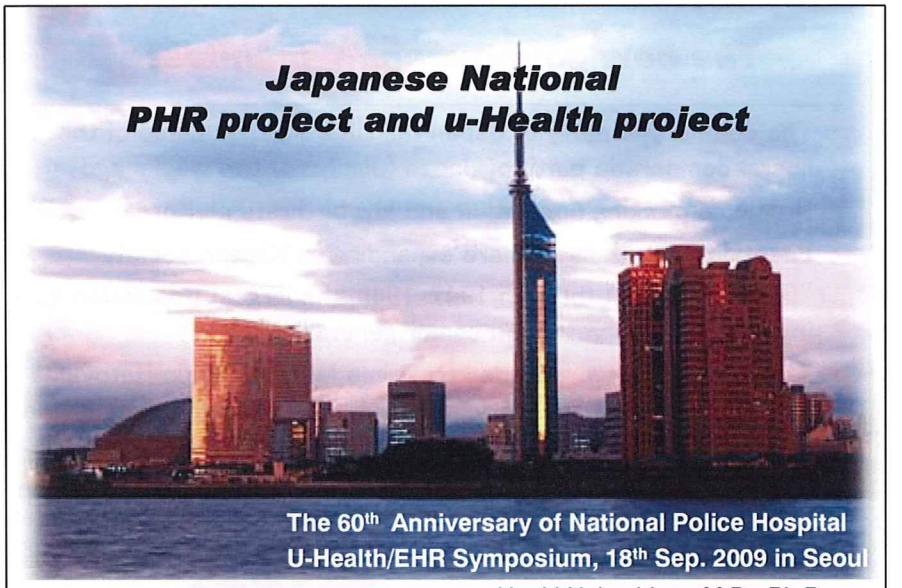
【医療・健康分野】
遠隔医療技術
・遠隔教育
・地域医療連携
・健康管理のための医療機関間の情報連携
日本版EHRの実現
・医療過誤が減少
・生涯を通じた継続的な医療が受けられる
・処方せんの電子交付および調剤情報の電子化
・匿名化された健康情報を全国規模で集積し、疫学的に活用

疾病管理手法をどうやって普及？

- 我々は方法論の確立を目指している
- 糖尿病をはじめとする慢性疾患診療のアルゴリズム化
- アルゴリズムが確立されると、誰がやってもまあまあ同じことができる（質保証）
- 小さなサイズで運用可能なものが出来上がれば、必要数のコピーを作れば良い
- 福岡市で、都市モデルを積極的に展開中
  - 福岡市130万人、九州1300万人、日本1億3000万人
  - コールセンターはIP電話が使える。インターネットに距離は関係ない
  - ソフトウェアは簡単にコピー、翻訳も容易。
- アジア人は「倹約遺伝子」のために生活習慣病になりやすい
  - 食のグローバル化により、アジアは糖尿病が爆発的に増加
  - 欧米に比したアジアの沈下を防ぐ。中国13億人

まとめ

- 連携すべきは医療のみならず
- 疾病管理手法は、糖尿病の1－3次予防に応用できる可能性がある
- 将来的には、構築されつつあるPHR（電子的個人健康情報活用基盤）上のアプリケーションの一つと捉え、医療分野を超えた個人に紐づいた情報連携を効率よく、かつ安全に行うべき
- 超少子高齢社会において、日本はこのような情報連携を効率よく行わなければ国力低下は防げない



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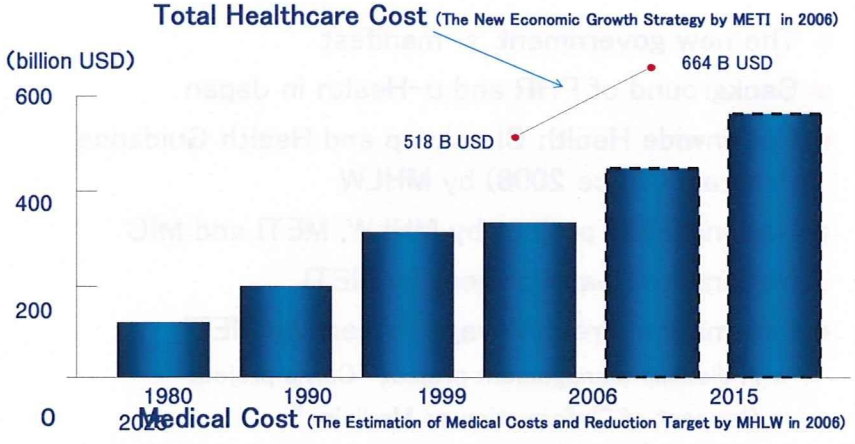
Today's Menu

- The new government's manifest
- Background of PHR and u-Health in Japan
- Nationwide Health Check-up and Health Guidance Program (Since 2008) by MHLW
- National PHR project by MHLW, METI and MIC
- National u-Health project by METI
- Information Great Voyage Project by METI
  - A disease management project "Carna project"
  - Concept of "Information as Medicine"
  - Not only for information collection, for decision support

The new government's manifest

- The democratic party of Japan (Minshu-to) took place of the liberal democratic party of Japan (Jimin-to) two weeks ago
- Problems of aging population and low birthrate as Korean society
- Lifestyle related disease are expanding as Korean society
- "Baby Boomers" (born in 1947-1949, the largest population ever in Japan) will be getting in senior generation
- The new government leaded by Prime Minister Yukio Hatoyama also promotes medical services, healthcare IT, and telemedicine in the manifest.
- This means there will be no big change in healthcare IT in Japan by the government change

Prediction of Japanese Medical Cost, and Total Healthcare Cost

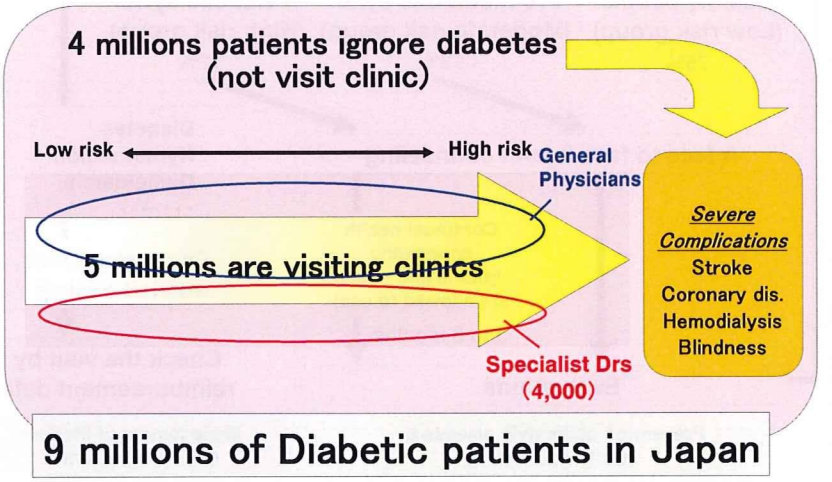


Prevention of the complications of
lifestyle-related diseases is the most important issue

Increase of Severe Diabetic Complications

Strokes, Myocardial Infarction, Hemodialysis, etc

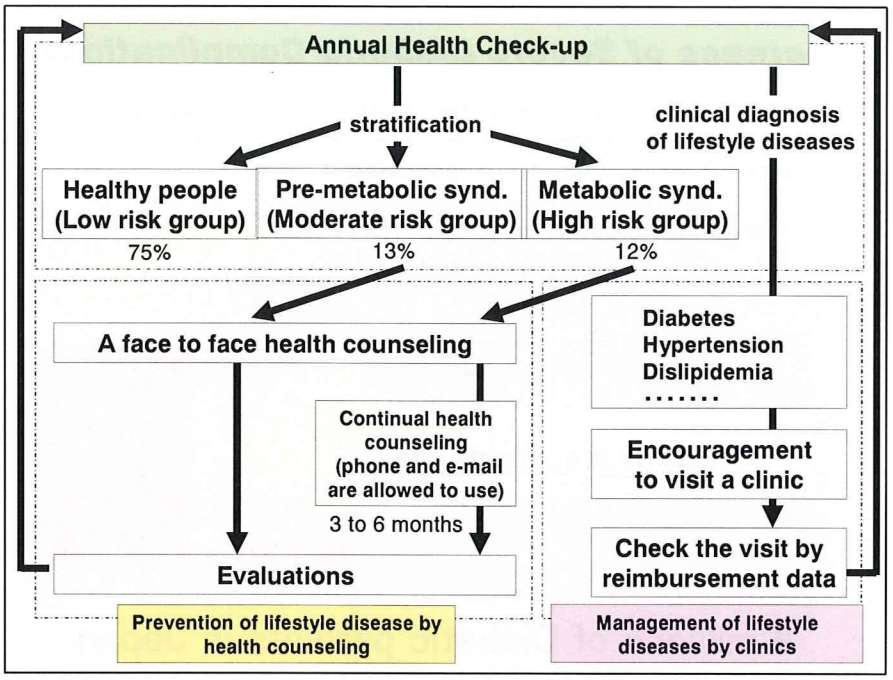
Out of 130 millions Japanese population・・・・・

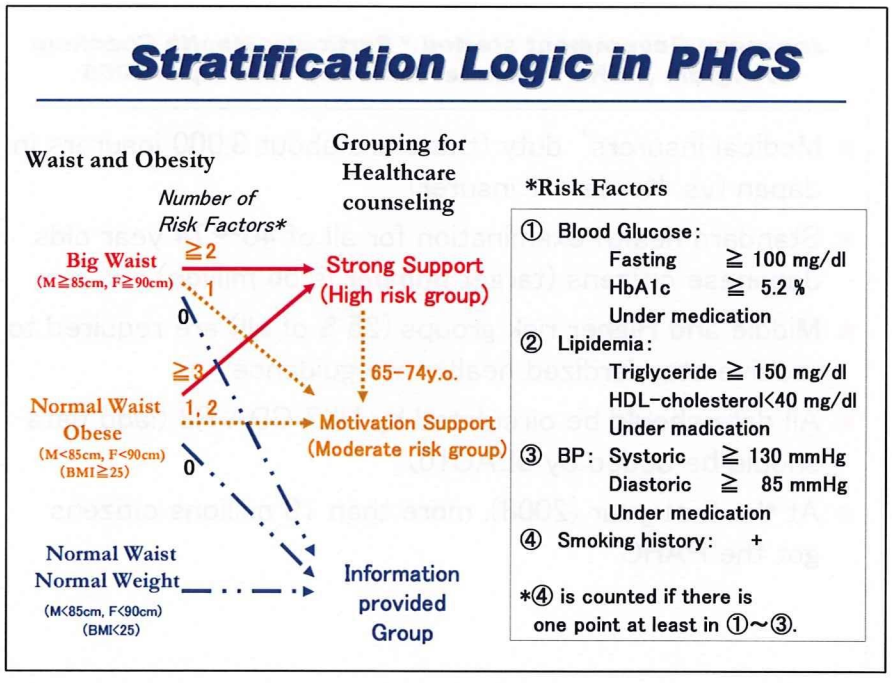


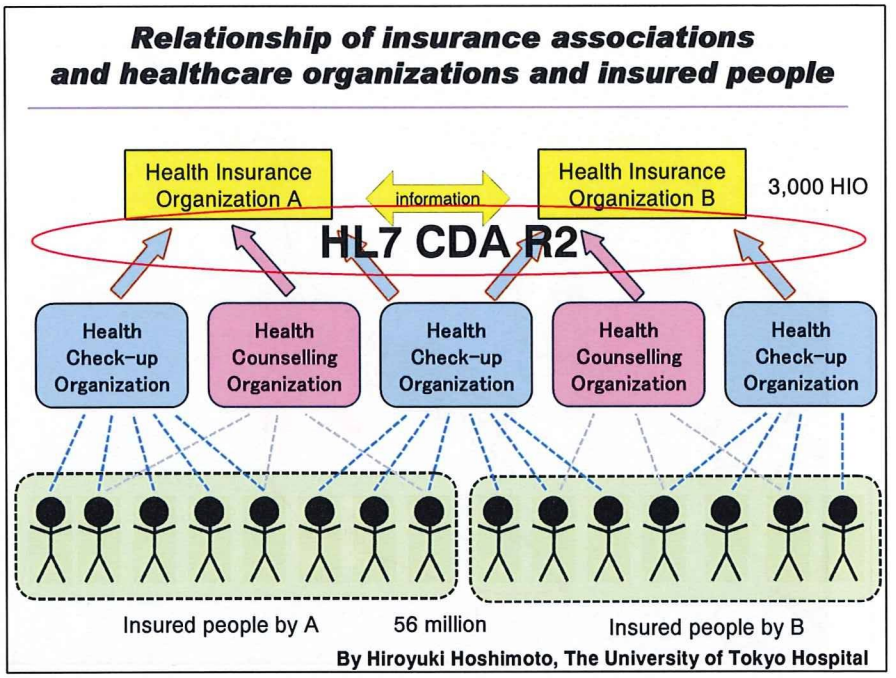
9 millions of Diabetic patients in Japan

Japanese Government started " Particular Health Check-up Program (PAHC = Tokutei Kenshin)" from April 2008

- Medical insurers' duty (there are about 3,000 insurers in Japan (vs. Korea = 1 insurer)
- Standard health examination for all of 40～74 year olds Japanese citizens (target number is 56 million)
- Middle and Higher risk groups (25 % of all) are required to receive standardized healthcare guidance
- All data should be circulated by HL7 CDA R2 (labo data should be coded by JLAC10)
- At the first year (2008), more than 10 millions citizens got the PAHC


Annual Health Check-up
stratification
clinical diagnosis of lifestyle diseases
Healthy people (Low risk group)
Pre-metabolic synd. (Moderate risk group)
Metabolic synd. (High risk group)
75%
13%
12%
A face to face health counseling
Continual health counseling (phone and e-mail are allowed to use)
3 to 6 months
Evaluations
Diabetes
Hypertension
Dislipidemia
.....
Encouragement to visit a clinic
Check the visit by reimbursement data
Prevention of lifestyle disease by health counseling
Management of lifestyle diseases by clinics

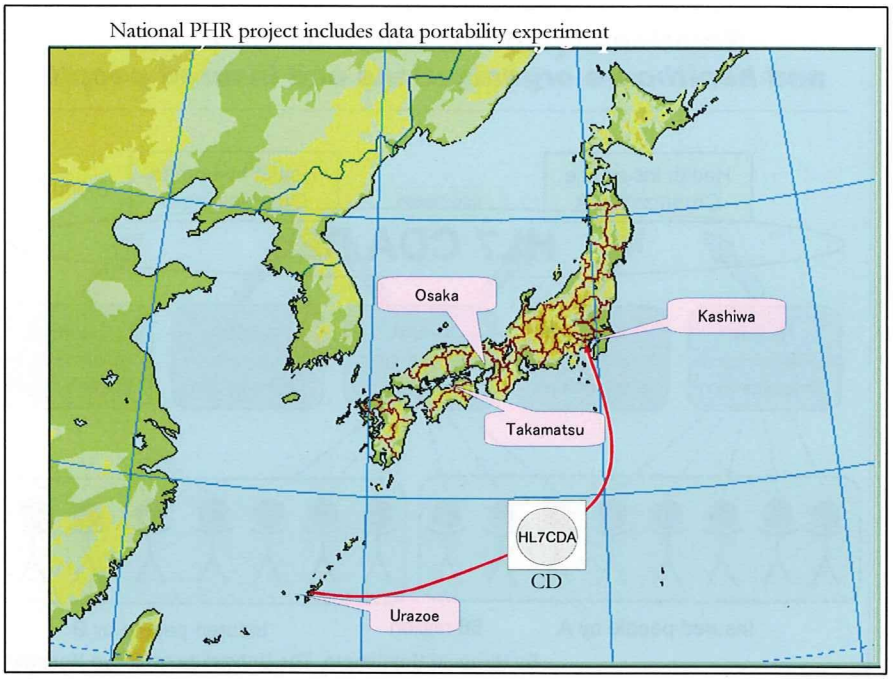

Stratification Logic in PHCS
Waist and Obesity
Number of Risk Factors*
Grouping for Healthcare counseling
Big Waist
(M≧85cm, F≧90cm)
≧2
Strong Support
(High risk group)
1
0
≧3
65-74y.o.
Normal Waist
Obese
(M<85cm, F<90cm)
(BMI≧25)
1, 2
Motivation Support
(Moderate risk group)
0
Normal Waist
Normal Weight
(M<85cm, F<90cm)
(BMI<25)
Information provided Group
*Risk Factors
① Blood Glucose:
Fasting ≧ 100 mg/dl
HbA1c ≧ 5.2 %
Under medication
② Lipidemia:
Triglyceride ≧ 150 mg/dl
HDL-cholesterol<40 mg/dl
Under madication
③ BP: Systoric ≧ 130 mmHg
Diastoric ≧ 85 mmHg
Under medication
④ Smoking history: +
*④ is counted if there is one point at least in ①~③.

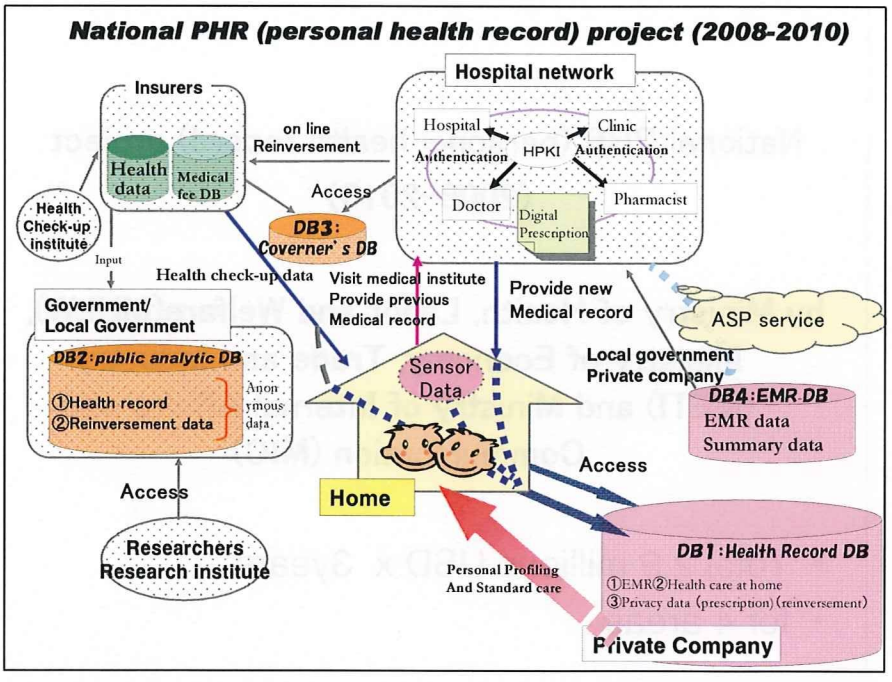


National PHR (personal health record) project (2008–2010)

by Ministry of Health, Labor and Welfare(MHLW), Ministry of Economy, Trade and Industry (METI) and Ministry of Internal Affairs and Communication (MIC)

- Total 2.9 millions USD x 3years
- for 4 areas


National PHR project includes data portability experiment
Osaka
Kashiwa
Takamatsu
HL7CDA
CD
Urazoe

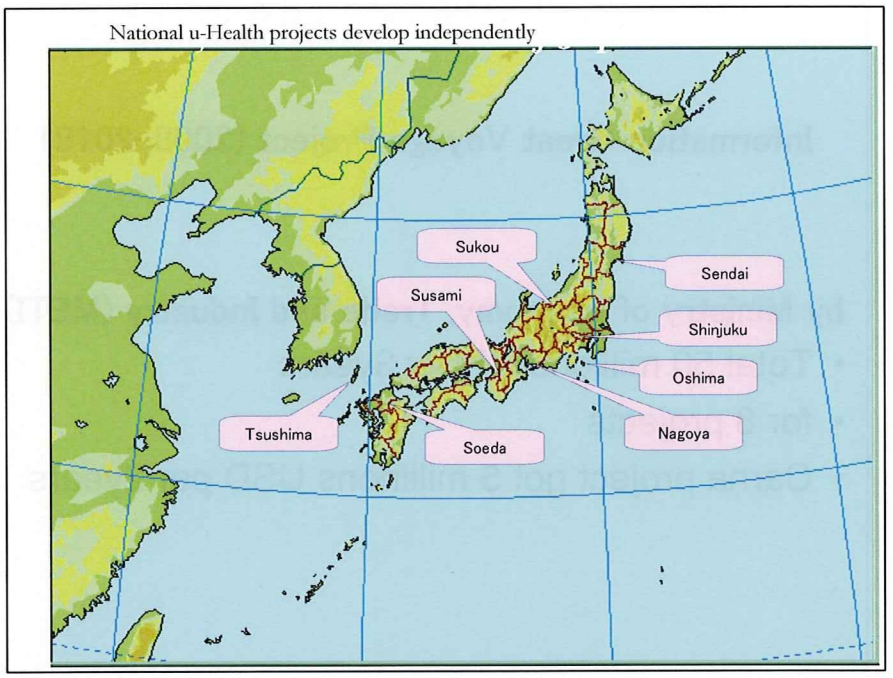

National PHR (personal health record) project (2008-2010)
Insurers
Health data
Medical fee DB
on line Reinversement
Access
DB3: Coverner's DB
Health Check-up institute
Input
Health check-up data
Hospital network
Hospital
Clinic
Authentication
HPKI
Authentication
Doctor
Digital Prescription
Pharmacist
Visit medical institute
Provide previous Medical record
Provide new Medical record
ASP service
Government/ Local Government
DB2: public analytic DB
①Health record
②Reinversement data
Anonymous data
Sensor Data
Local government
Private company
DB4: EMR DB
EMR data
Summary data
Access
Access
Home
Researchers
Research institute
Personal Profiling
And Standard care
DB1: Health Record DB
①EMR②Health care at home
③Privacy data (prescription) (reinversement)
Private Company

National u-Health project (2009-2011)

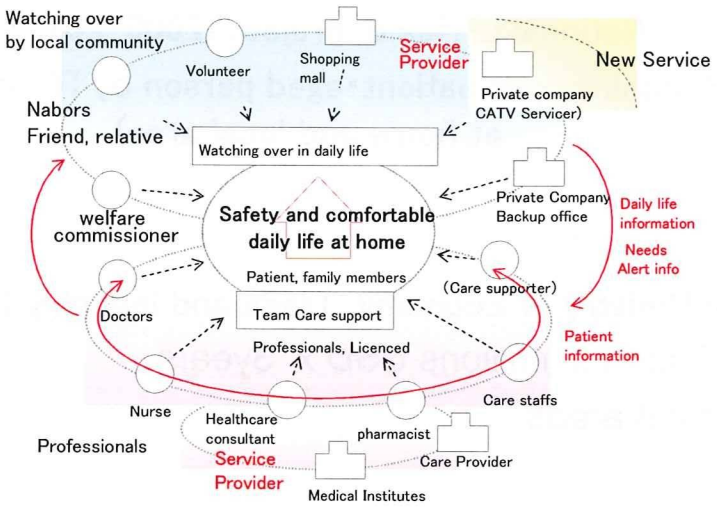
(Watching over patient・aged person by IT system at home and local area)

by Ministry of Economy, Trade and Industry (METI)

- Total 7.7 millions USD x 3years
- for 8 areas



Concept of "Watching over patient·aged person by IT system at home and local area"



Project is just beginning in 8 area.

15

Information Great Voyage Project (2008-2010)

by Ministry of Economy, Trade and Industry (METI)

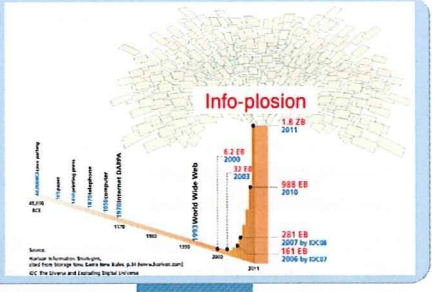
- Total 50 millions USD x 3years
- for 8 projects
- Carna project got 5 millinons USD per 2years

The Information Grand Voyage Project by the Ministry of Economy, Trade and Industry (METI)

The Information Grand Voyage (IGV) Project is three years (2007-2009) natio research project to build the infrastructure for sailing the "Information Ocean", in other words, to convert the "info-plosion" to the value.

Background

- Prevailing sensor technology
- Rich Information
- Growth of Web



Next generation information retrieval / analysis technology

Objectives :

Info-plosion driven Valuation

Creation of innovations and Establishment of an affluent society

We, Carna, are using two methods

- Disease Management
  - The third party to medical institute and patient
  - Call center office
  - Critical pathway
- Information as medicine "Info-medicine"
  - (Wearing) Sensor network
  - Automatic care planning by critical pathway on Web service

Consortium of Carna Project

Members

Kyushu University
- Diabetes Specialist Doctors
- Saiseikai Kumamoto Hospital
- Kyushu Electronic Power Co. and group(QIC, QBS)
- Tokio Marine & Nichido Fire Insurance Co.

Assented by

Fukuoka Prefecture Medical Association

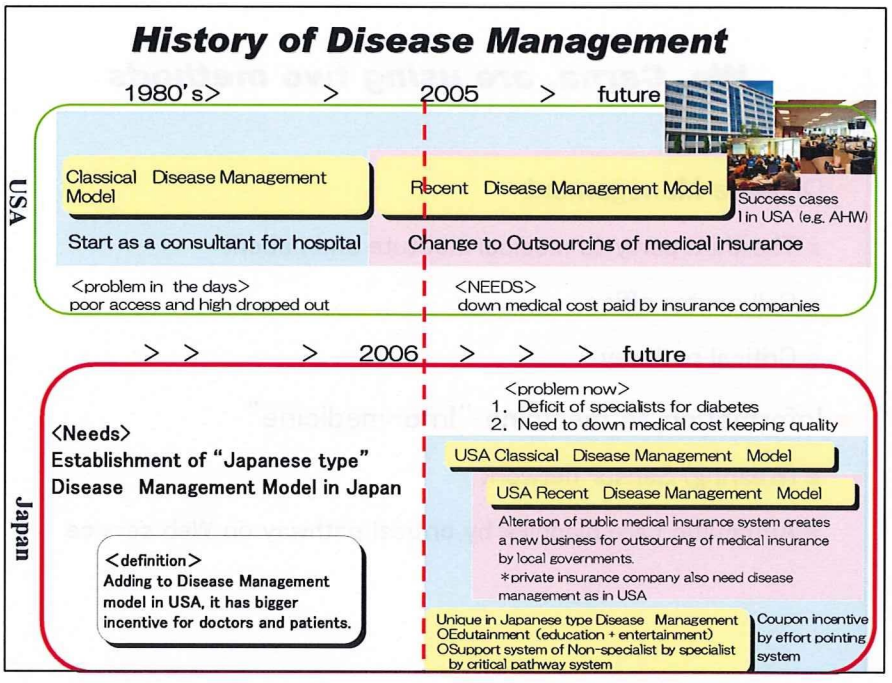
Fukuoka City Medical Association

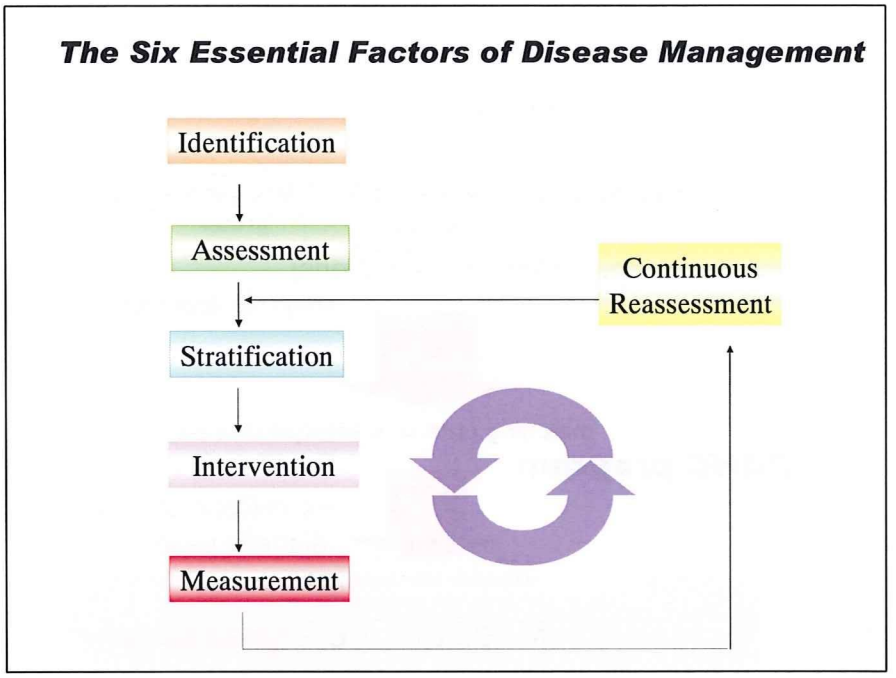
Funded by

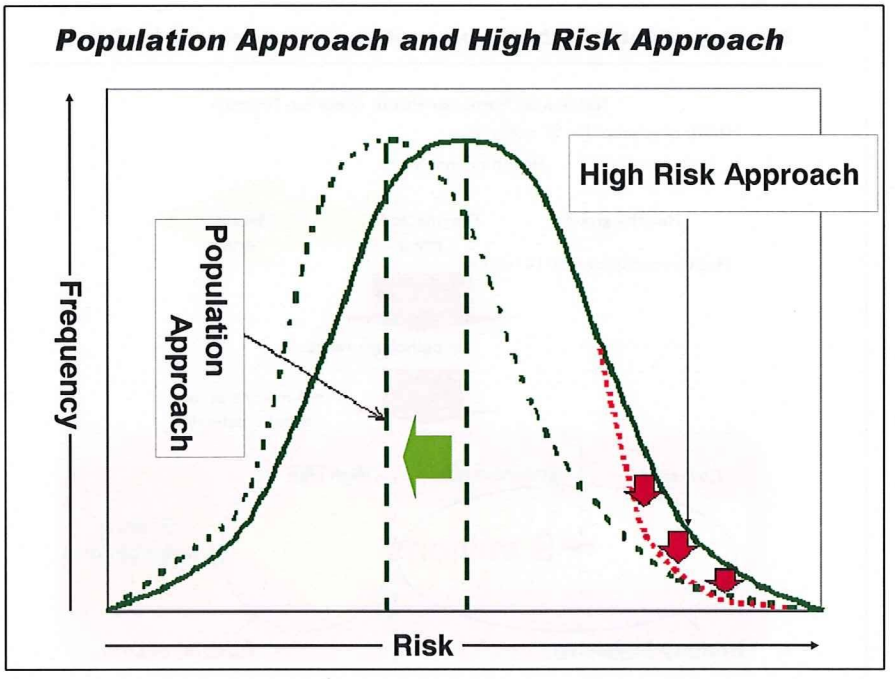
2003-05 Japan Science and Technology Agency
2005 Ministry of Economy, Trade and Industry
2006 Ministry of Economy, Trade and Industry
2008-09 Ministry of Economy, Trade and Industry
2008 Japan Science and Technology Agency
2008- 09 Ministry of Health, Labour and Welfare
2008- 10 Ministry of Education, Culture, Sports, Science and Technology

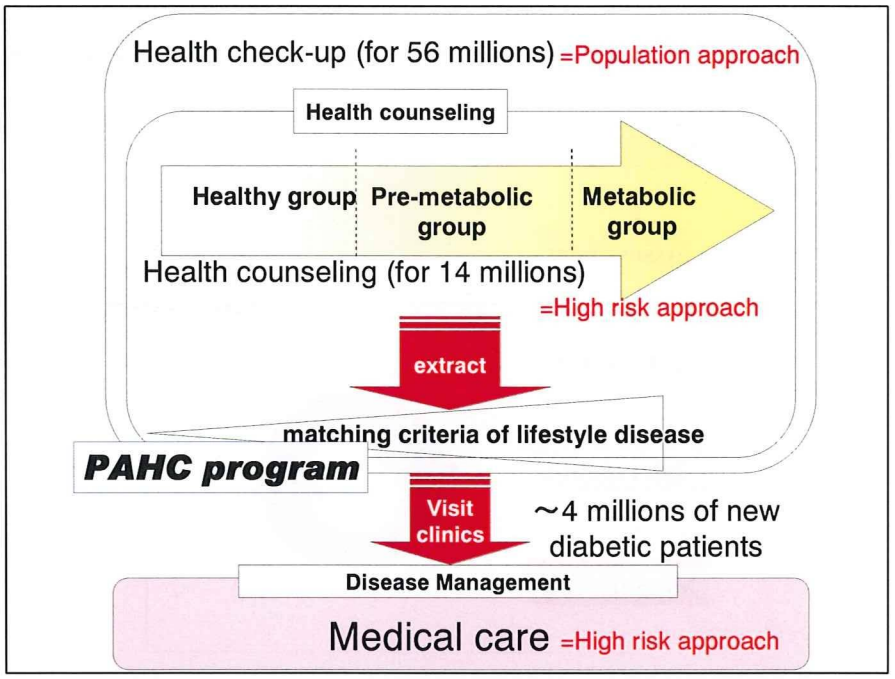
National Research Fund of total 700million JPY per 5years (7 million USD)

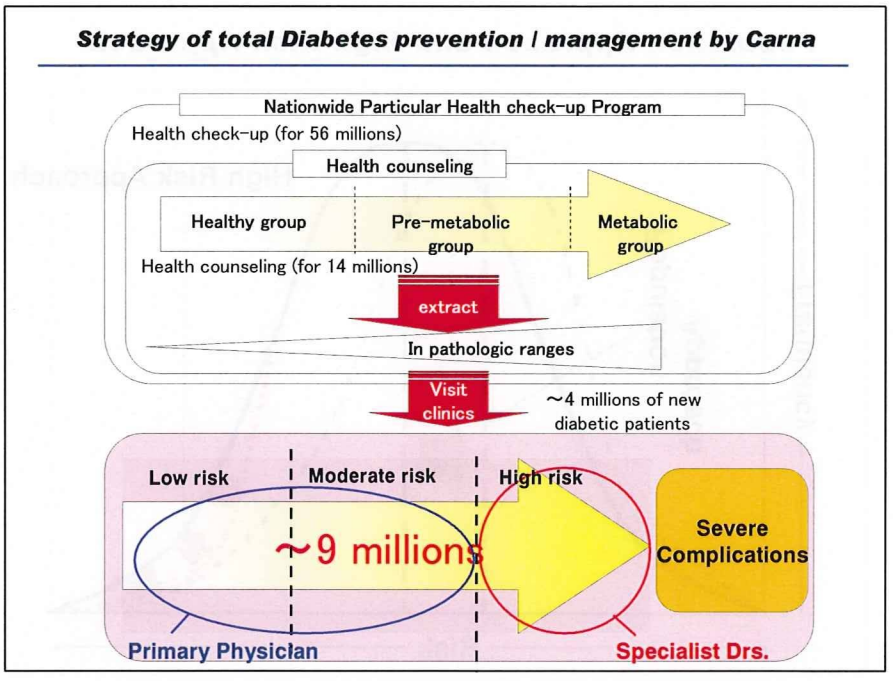
History of Disease Management

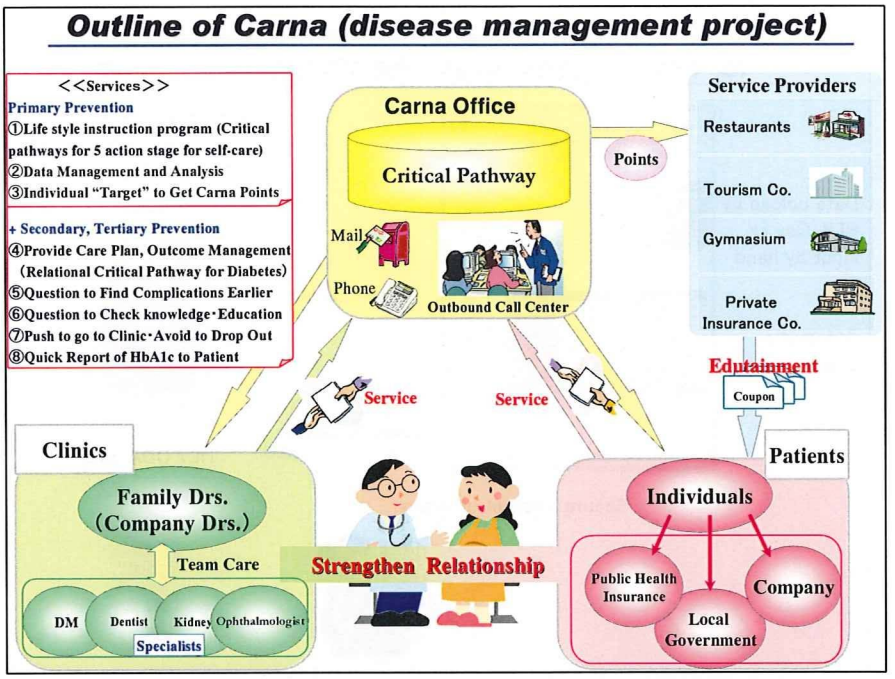


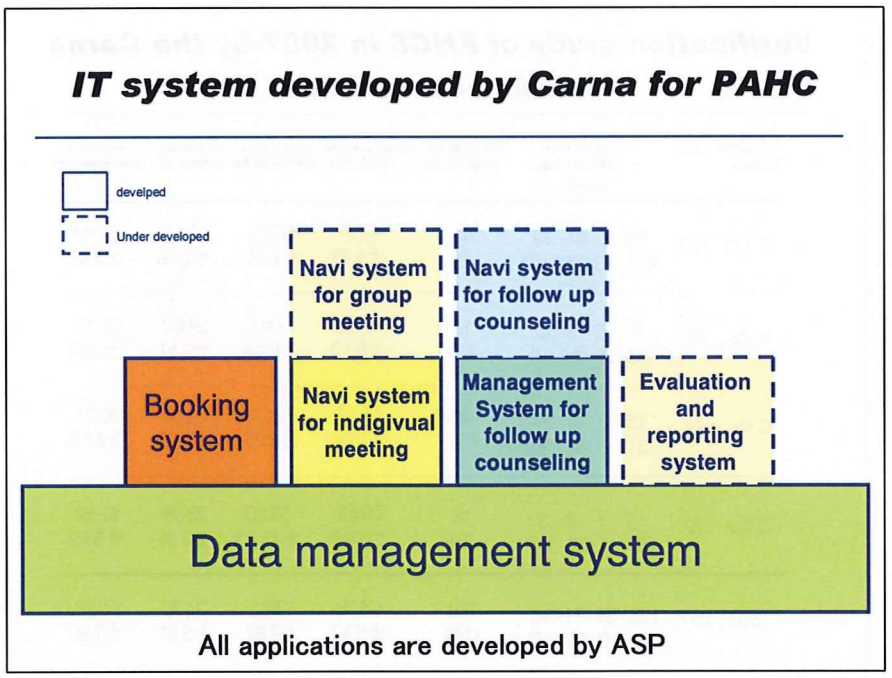

The Six Essential Factors of Disease Management
Identification
Assessment
Stratification
Intervention
Measurement
Continuous
Reassessment


Population Approach and High Risk Approach
Frequency
Population
Approach
High Risk Approach
Risk

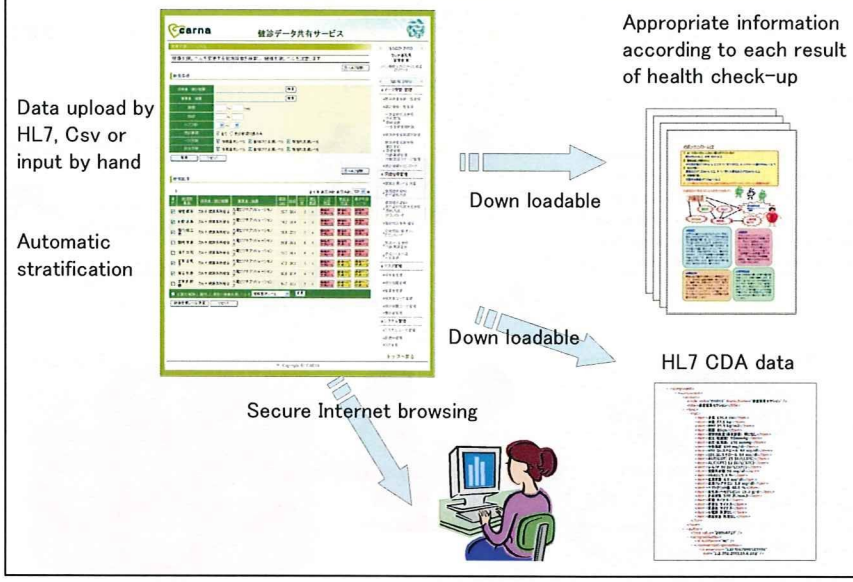

Health check-up (for 56 millions) =Population approach
Health counseling
Healthy group
Pre-metabolic group
Metabolic group
Health counseling (for 14 millions)
=High risk approach
extract
matching criteria of lifestyle disease
PAHC program
Visit clinics
~4 millions of new diabetic patients
Disease Management
Medical care =High risk approach


Strategy of total Diabetes prevention / management by Carna
Nationwide Particular Health check-up Program
Health check-up (for 56 millions)
Health counseling
Healthy group
Pre-metabolic group
Metabolic group
Health counseling (for 14 millions)
extract
In pathologic ranges
Visit clinics
~4 millions of new diabetic patients
Low risk
Moderate risk
High risk
~9 millions
Severe Complications
Primary Physician
Specialist Drs.


Outline of Carna (disease management project)
<<Services>>
Primary Prevention
①Life style instruction program (Critical pathways for 5 action stage for self-care)
②Data Management and Analysis
③Individual "Target" to Get Carna Points
+ Secondary, Tertiary Prevention
④Provide Care Plan, Outcome Management (Relational Critical Pathway for Diabetes)
⑤Question to Find Complications Earlier
⑥Question to Check knowledge･Education
⑦Push to go to Clinic･Avoid to Drop Out
⑧Quick Report of HbA1c to Patient
Carna Office
Critical Pathway
Mail
Phone
Outbound Call Center
Points
Service Providers
Restaurants
Tourism Co.
Gymnasium
Private Insurance Co.
Edutainment
Coupon
Service
Service
Clinics
Family Drs. (Company Drs.)
Team Care
DM
Dentist
Kidney
Ophthalmologist
Specialists
Strengthen Relationship
Patients
Individuals
Public Health Insurance
Company
Local Government


IT system developed by Carna for PAHC
develped
Under developed
Navi system for group meeting
Navi system for follow up counseling
Booking system
Navi system for indigivual meeting
Management System for follow up counseling
Evaluation and reporting system
Data management system
All applications are developed by ASP

ICT system for data management system for health check-up and healthcare counseling



Verification study of PHCS in 2007 by the Carna

(results of stratification)

Company insurers	(n)	Stratification L M H Med (n(%))	Life style dis.(n) (Diabetic(n))	Age at health check(y-o)	Weight before intervention (kg)	BMI before intervention	Waist before intervention (cm)
A Co.	157	81 16 41 19 (52 10 26 12)	93 (9)	47.21 ±4.76	68.02 ±9.25	23.64 ±2.78	84.89 ±7.42
B Co.	22	10 5 5 2 (46 23 23 9)	15 (0)	45.32 ±8.10	71.67 ±8.55	24.82 ±2.51	87.17 ±6.36
C Co.	49	15 3 17 14 (31 6 35 29)	40 (7)	51.12 ±5.08	70.21 ±8.96	24.00 ±2.72	86.51 ±5.60
D Co.	29	17 1 8 3 (57 3 27 10)	16 (2)	50.62 ±9.40	64.28 ±13.71	23.36 ±3.26	83.82 ±8.69
Total	257	123 25 71 38 (49 10 28 15)	164 (18)	48.18 ±6.12	68.33 ±9.87	23.78 ±2.81	85.28 ±7.20

Effects of Intervention in verification study in 2007

Body Weight

Groups	n	Loss of weight±SE (kg)	p value
All	190	0.88±0.24	0.0004
High risk	50	2.50±0.63	0.0002

Waist

Groups	n	Loss of waist ±SE (cm)	p value
All	159	1.35±0.39	0.0006
High risk	42	2.39±0.68	0.0012

Effects of Intervention in verification study in 2007

all group	n	Change±SE	p value
Blood Sugar	175	+0.24 ± 1.0	0.812
HbA1c	144	−0.03 ± 0.28	0.231
Triglyceride	144	−15.2 ± 7.16	0.036
HDL-Cholesterol	175	+2.71 ± 0.72	<0.001
LDL-Cholesterol	155	+2.27 ± 1.80	0.209
GOT	144	−1.41 ± 1.04	0.176
GPT	144	−3.12 ± 1.17	0.009
γGTP	175	−13.0 ± 4.32	0.003
High risk group	**n**	**Change±SE**	**p value**
Blood Sugar	46	− 1.2 ± 1.31	0.350
HbA1c	38	−0.14 ± 0.05	0.004
Tryglyceride	38	−32.8 ± 20.8	0.124
HDL-Cholesterol	46	+0.90 ± 1.73	0.606
LDL-Cholesterol	40	+2.15 ± 4.39	0.627
GOT	38	−3.95 ± 3.61	0.281
GPT	38	−9.90 ± 3.22	0.004
γGTP	46	−25.6 ± 11.6	0.032

e-CARNA project *(part of The Information Grand Voyage Project)*

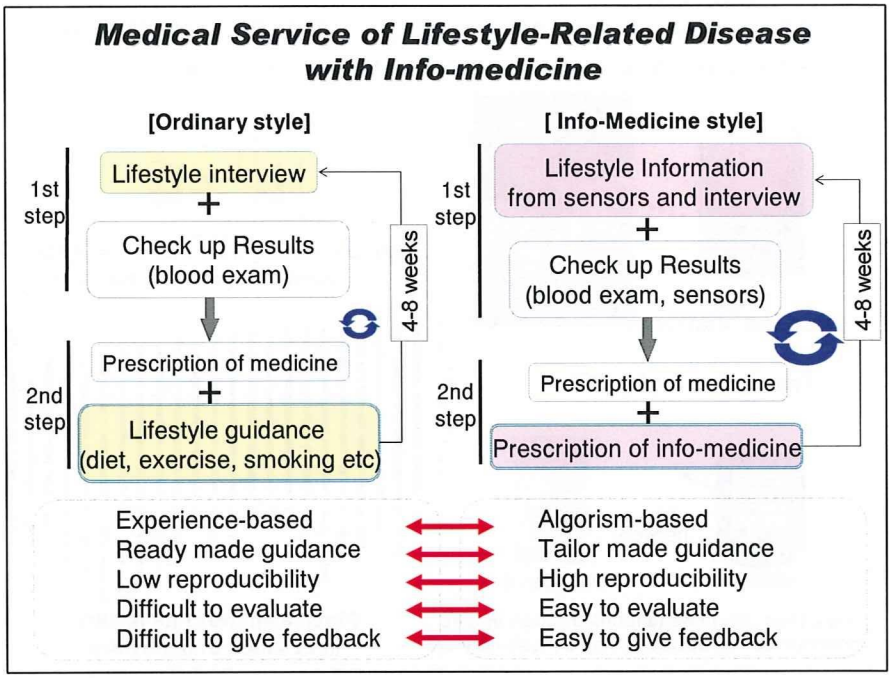
- "Carna" is the Roman female god of health.
- Correct and Appropriate Recommendations in Network Application in the disease management program
- "Wearing Sensor" Network
  - To collect objective, continuous, real time daily behavior data
  - To assess the effect of info-medicine
  - To visualize daily behavior and change of attitude
  - To prevent complication from info-medicine (inappropriate exercise and diet)
- "Critical pathway" in the medical field
  - Core technology to produce info-medicine
  - To support evidence-based guidelines provided by the call center for patients and clinics

The concept of Information as medicine

Information can be medicine!

If the information is provided in a timely & appropriate manner

Ordinary medicine (Tablet)	Information as medicine (Info-Medicine)
Appropriate dose provided	Appropriate information provided
Function through blood concentration	Function through change of attitude and daily behavior
Assayable and stable effect	Assayable by IT, but need to be more stable
Side effects	Side effects (too much diet or exercise)

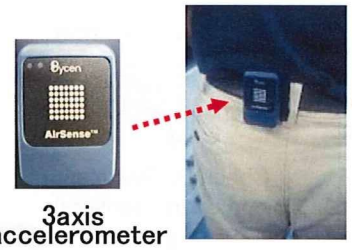


To create Info-Medicines

- **We should know how to change the patients' attitude and daily behavior**
  (Which information? What kind of timing? How to inform?)
  - **Collection of daily behavior Information**
  - **Accumulation of large amounts of data and analysis**
  - **Assurance of Medical Safety**
- **We also consider assessment of outcome and cost effectiveness**
- **To promote this info-medicine, we have conducted the *e-CARNA project*, funded by a national project, *Information Grand Voyage* project using highly qualified health information technology.**

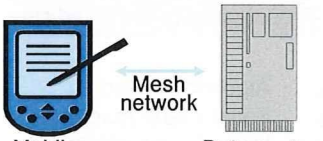
How to assay the effect of info-medicine

Now we can automatically detect daily behaviors on time through IT !

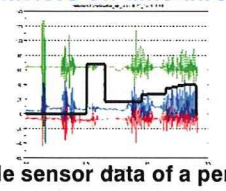


3axis accelerometer

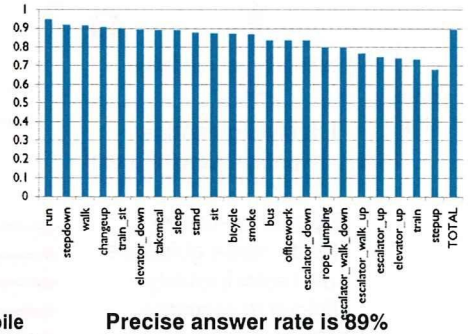
Transmission by 20Hz



Real time recommendations through mobile communication devices using a mesh-network



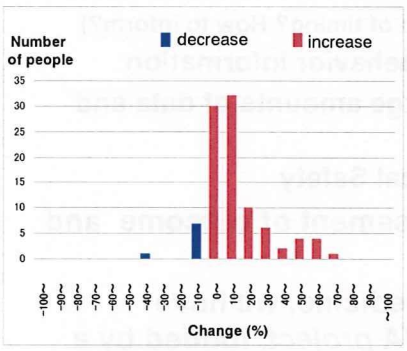
Sample sensor data of a person standin position in a rising elevator



Precise answer rate is 89% in 22 kinds of behaviors

A Result of Info-Medicine Experiment

Increase/decrease of exercise amount after a health guidance, calculated by behavior basis



N=83, Ave. 9.55 ± 18.8 % increase

Methods;
We asked the monitors to use sensors for 5 days before and after a health guidance.

Results;
90% of monitors increased exercise amounts after a health guidance (Fig). "Standing" and "walking" were increased, and "using elevator" are apparently decreased as daily behaviors.

Conclusion;
Now, we can recognize which kinds of behavior were increased or decreased in personal basis. This sensors can be used to assess the info-medicine effect.