Cyber Security in Medical Field

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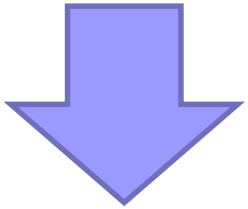
Vice President of Japan Association for Medical Informatics

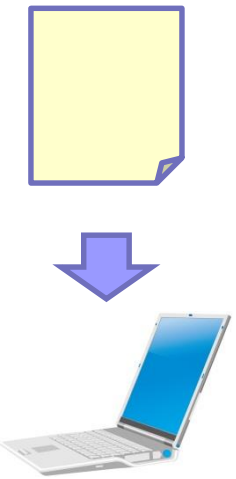
Topics Today

- Growing Motivation to Use Medical Information
- Rapid Progress of Digitalization in Medical Field
- Rapid Growth of Informational Risks by Digitalization



- Importance of Cyber Security for Medical Business
- Cyber Security Framework in Kyushu Univ. Hospital

Rapid Progress of Digitalization in Medical Field in Japan

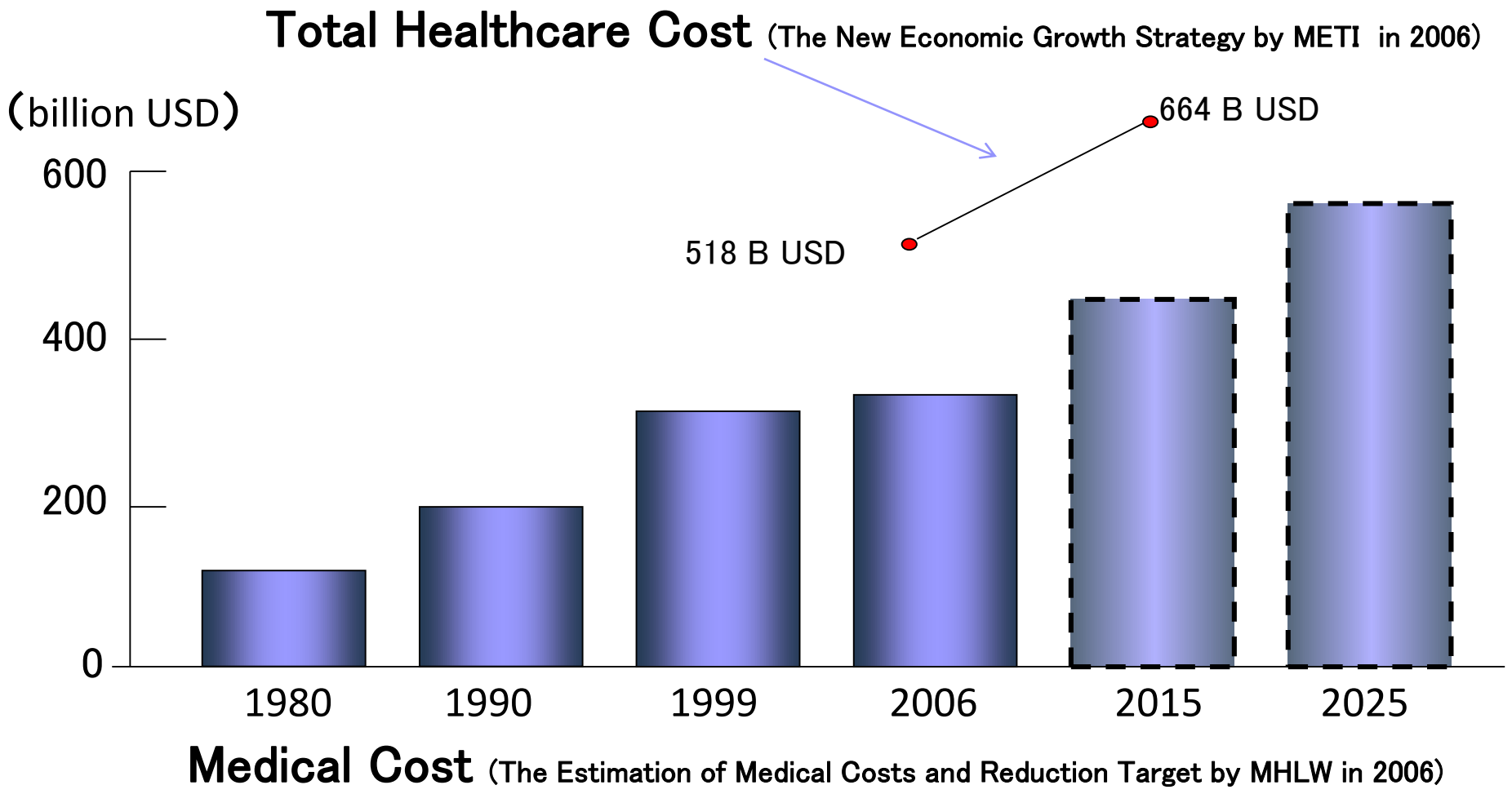


	2000	2015	2030
Reimbursement system with insurers	0%	～100%	100%
Medical records in hospital and clinics	0%	～40%	100%
Medical images (X-ray, CT, MRI etc)	0%	～40%	100%
Information sharing system among hospital and clinics	0%	～5%	100%
Information sharing among healthcare or welfare fields	0%	0%	80%～
Telemedicine, home medicine	0%	～0%	30%～
Communication with patients	0%	～0%	30%～

Growing motivation why we want to use medical Information

- To improve
  - Medical Quality
  - Medical Safety Management
  - Customer Satisfaction
  - Stress of Medical Staffs
- To create or grow
  - New medicine and medical device
  - New Industry around medical service
- To acquire
  - New knowledge in medical science

Expanding medical / healthcare cost in Japan



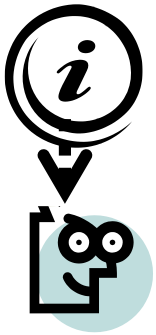
Analysis and quality management are most important issues
to control medical / healthcare cost in Japan

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)



Info-medicine concept was proposed by Prof. H Tatsumi in Sapporo Medical University

Image of Real Time Recommendations with the Info-Medicine Program

During the dinner･･･

Oh, I forgot to take medicine,

When you are jogging･･･

Oh, It may be too fast. I should be careful, because I have a heart disease.

Smart Phone

You are eating dinner. Did you take medicine?

Heart rate is too high, slow down !

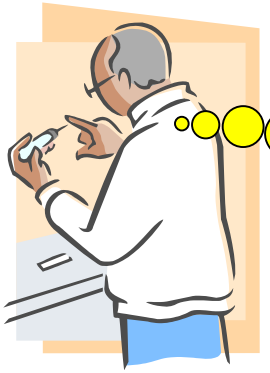
You've got on the train? How about walking home from the next station?

Your blood sugar is too high. Did you use insulin?

In the train･･･

Hmm, OK, I will try

When monitoring the blood sugar



Oh my God, I forgot to inject insulin. I should do it now!

Cases of information troubles in medical field

Case 1. ”Under anonymity” is truly possible ?

- Researcher:
  - Don’t worry because nobody can recombine anonymous data with privacy data in the original DB!
- Patient (research subject):
  - Really?

Case 1. "Under anonymity" is truly possible ?

- Data base A:Clinical Research DB (with privacy data by patient agreement)
  - ID, name, etc
  - No diagnosis
  - Blood test on 16th July 2009
    - AST/ALT/LDH/γGTP/t-chol/HDL-chol/LDLchol/TG =26/33/288/43/221/56/116/67
- Data base B: "Perfect" ano…
  - no ID, no name, no birthday, no…
  - Diagnosis : Gastric cancer
  - Blood test on 16th July 2009
    - AST/ALT/LDH/γGTP/t-chol/HDL-chol/LDLchol/TG =26/33/288/43/221/56/116/67

Results of blood test can be unique ID!

Case 2. Is it possible to make medical Image anonymous?

We usually present patient face with a blinker for case presentation.

But nothing on chest X-ray image‥‥.

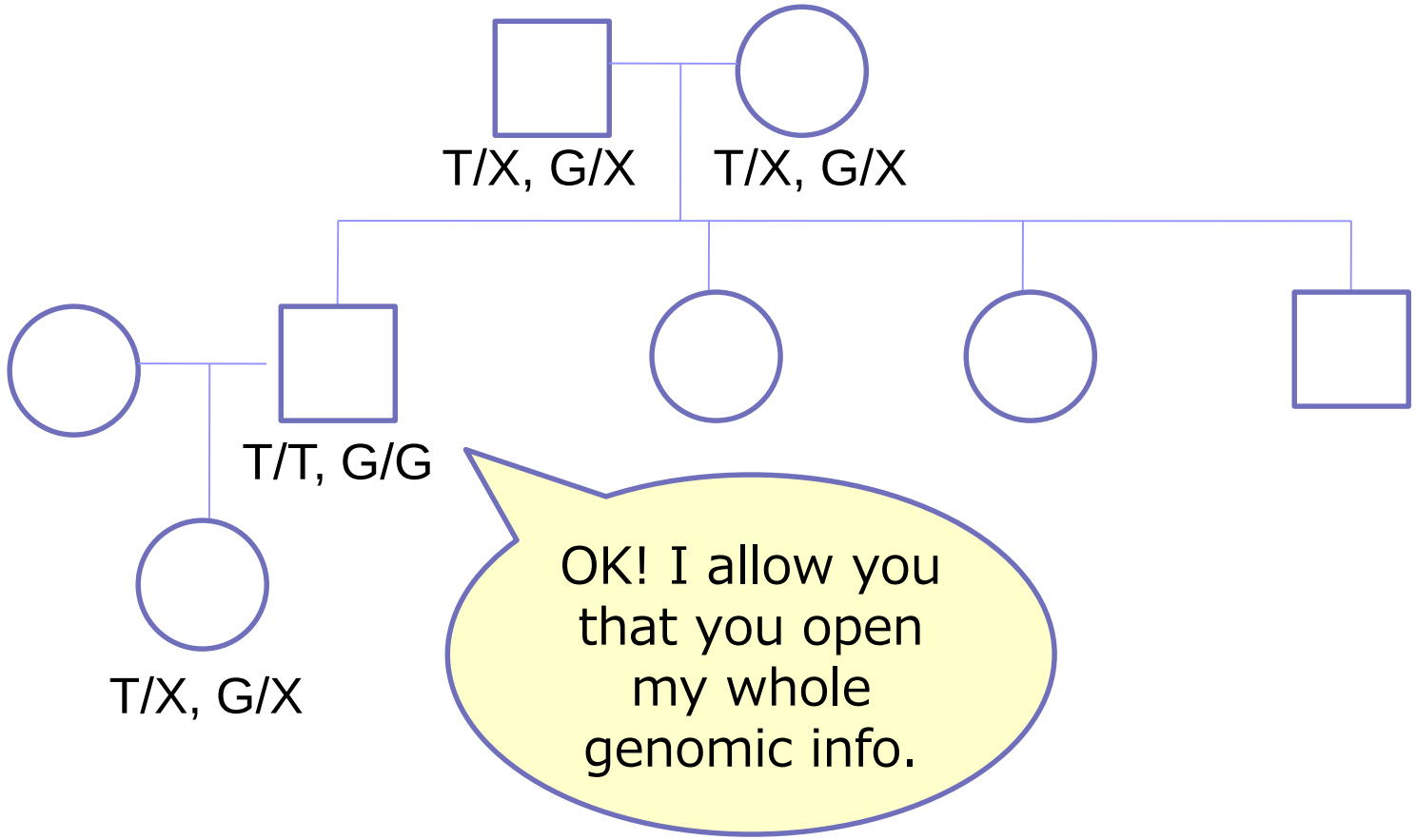
Case 2. Is it possible to make medical Image anonymous?

A simple pattern recognition technology easily identify a person from thousands of images!

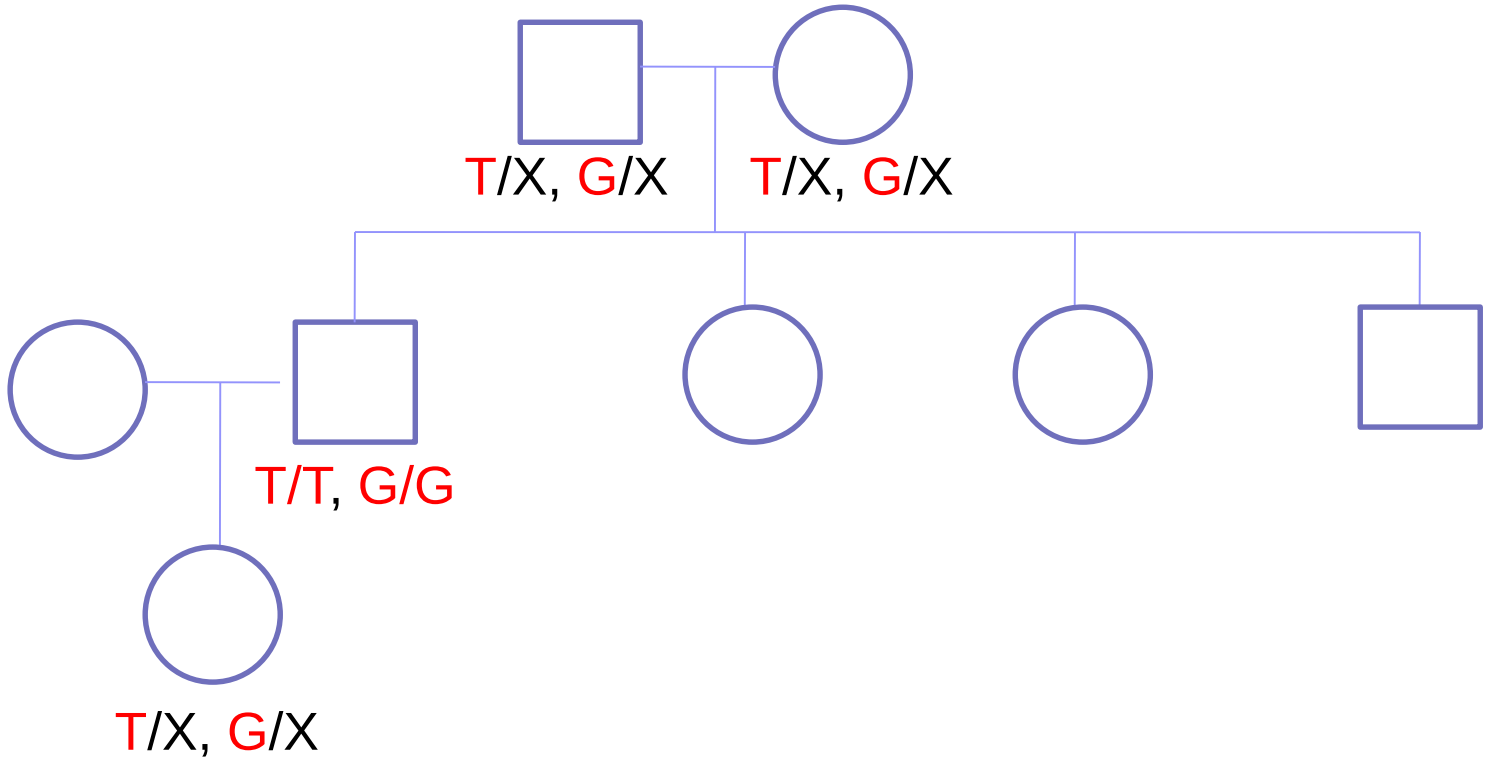
Same to face recognition!

Your pattern is unique in the world!

Case 3. Is Genome information a simple privacy information?



Case 3. Is Genome information a simple privacy information?

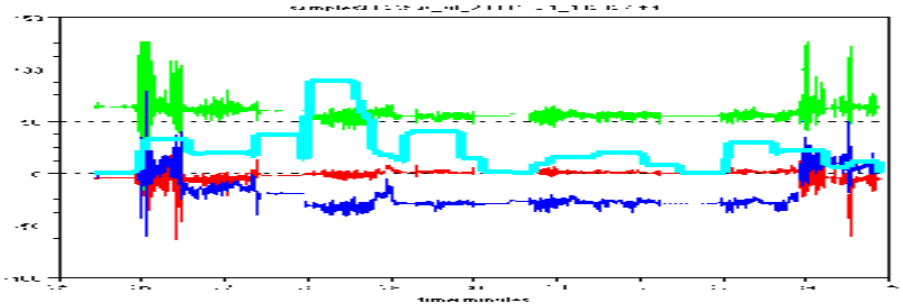


1. Genomic information should be more sensitive than a simple privacy information (it is family line information).
2. Never change during his life.

Case 4.　Is security of sensor information OK?

- Information from EMR
  - Diagnosis：　Lung cancer, type C hepatitis etc…
  - Prescription: Aspirin, Insulin, etc
  - Results of blood test: Blood sugar, HbA1c, etc…

- Sensor information in medical process
  - Wave data, Numerical data etc.



Data of 3 axis accelerater during rehabilitation

Case 4. Is security of sensor information OK?

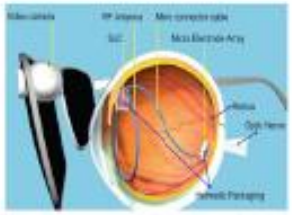
Wireless + Internet Can Improve Healthcare

But not without fully understanding security and privacy

Insulin pump

Artificial pancreas

Neurostimulators



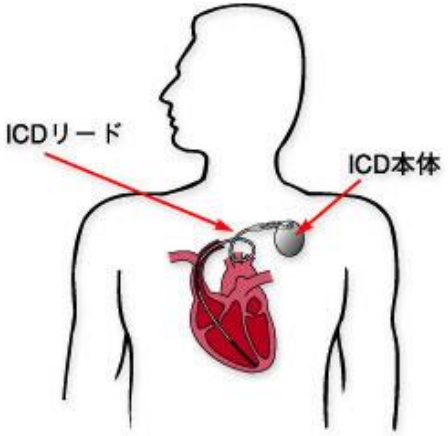
Artificial vision

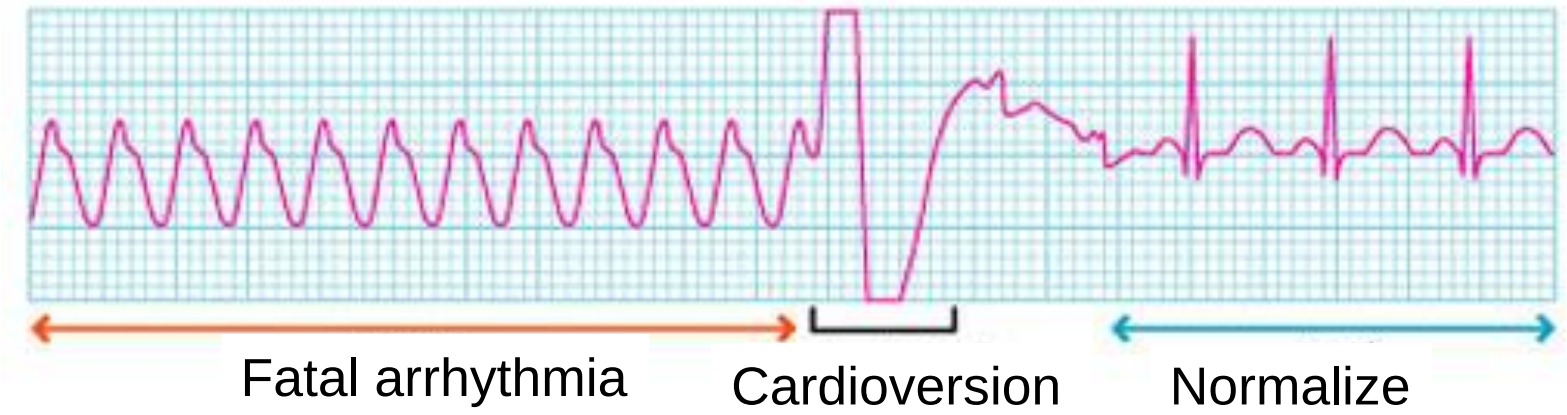
Obesity control

Programmable Vasectomy

Case 4.　Is security of sensor information OK?

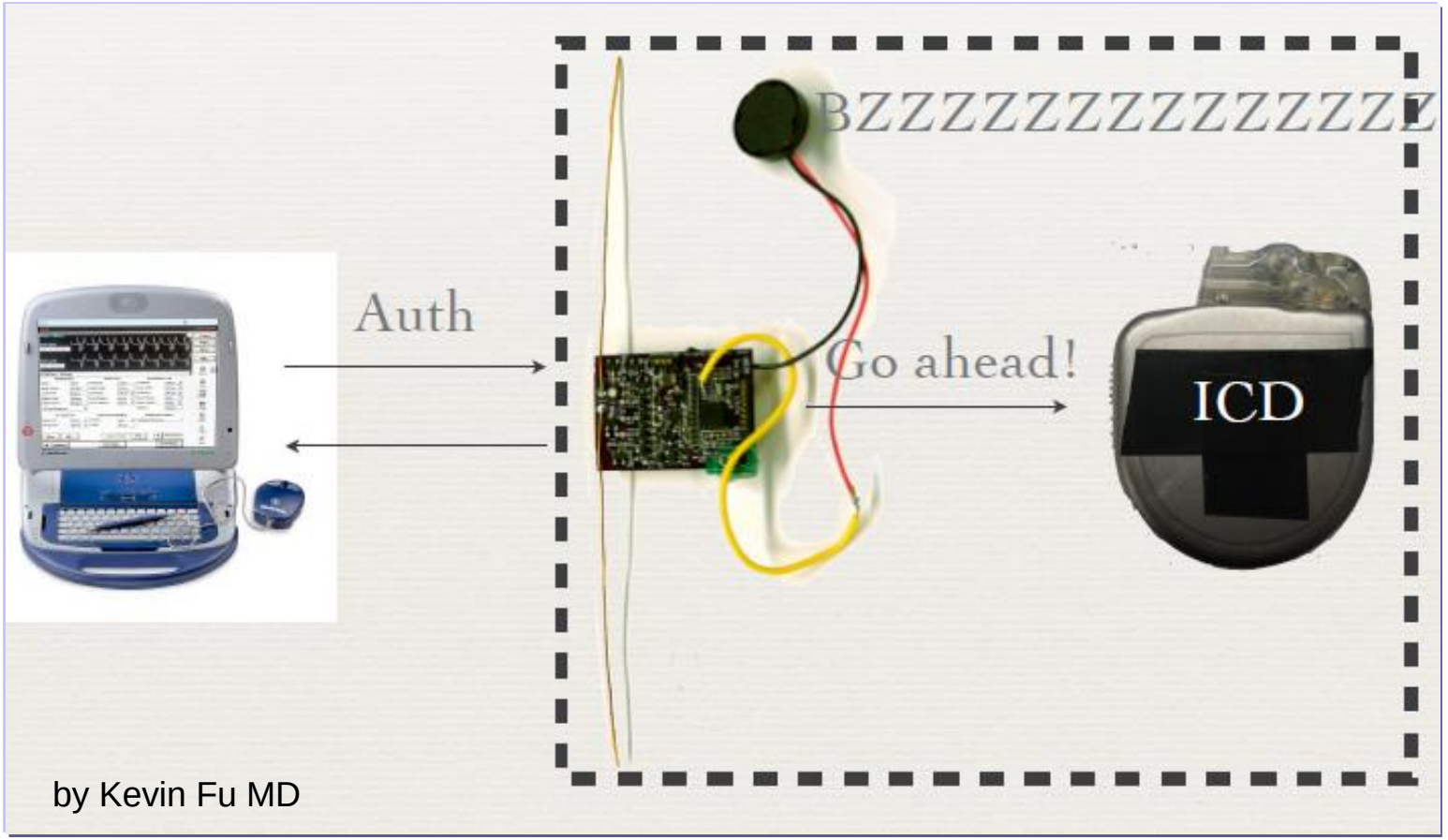
- Pace maker
- Implantable Cardioverter Difibrillator（ICD)





Case 4. Is security of sensor information OK?

- ICD
  - Remote monitoring of defibrillation, activation of re-defibrillation, prevention of ICD malfunction



Case 4.　Is security of sensor information OK?

- 2008年3月12日

HOME / NEWS / LOCAL / MASS.

Heart devices vulnerable to hack attack

The Boston Globe

Researchers urge action, downplay current risks

Email | Print | Single Page | Text size

By Carey Goldberg
Globe Staff / March 12, 2008

Warning: Not only computers are vulnerable to hack attacks. Our bodies may be, as well.

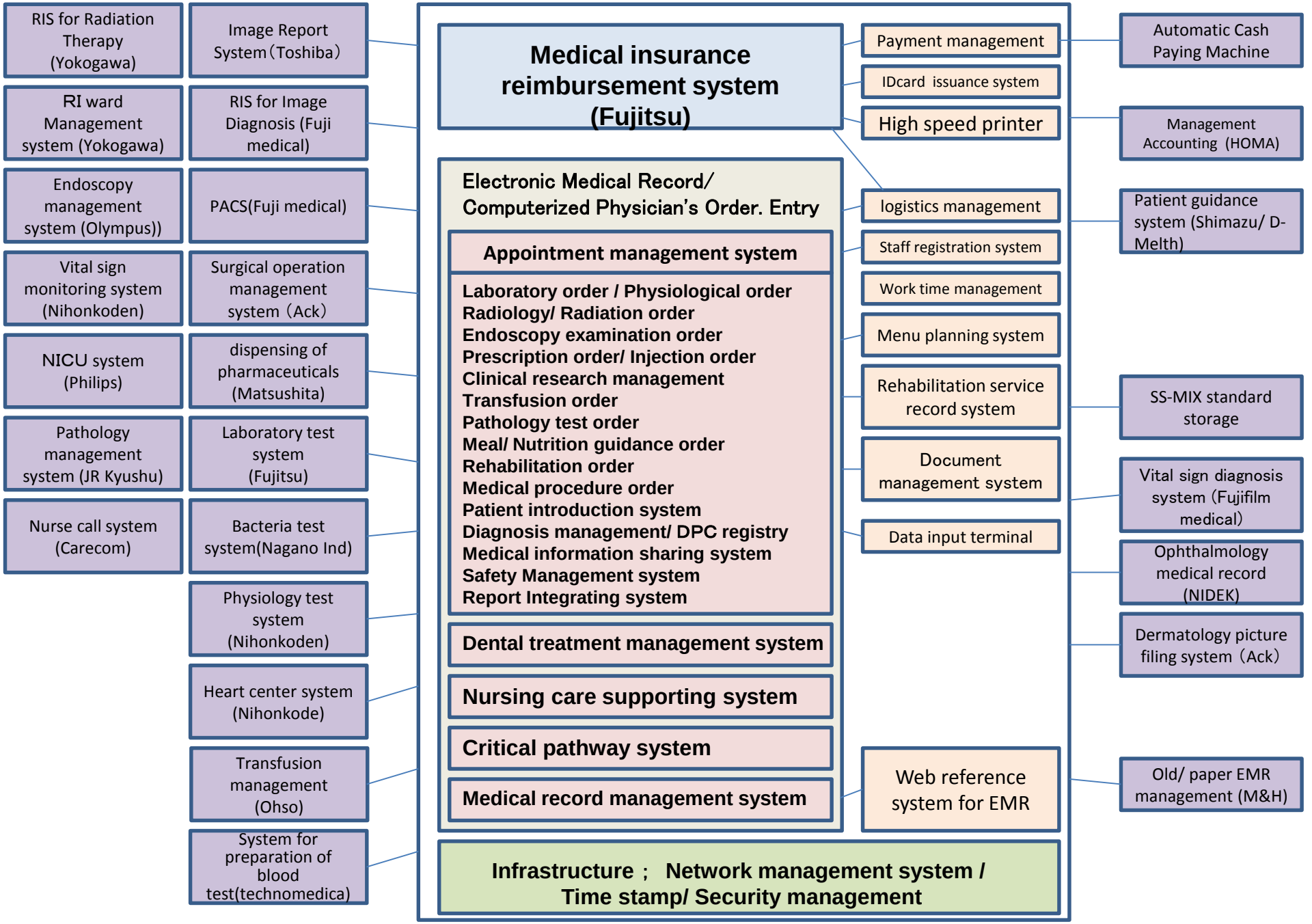
A new study demonstrates a large gap in the security of implanted devices that help regulate heartbeats and use wireless technology, researchers from Beth Israel Deaconess Medical Center, the University of Massachusetts, and

http://www.boston.com/bostonglobe/

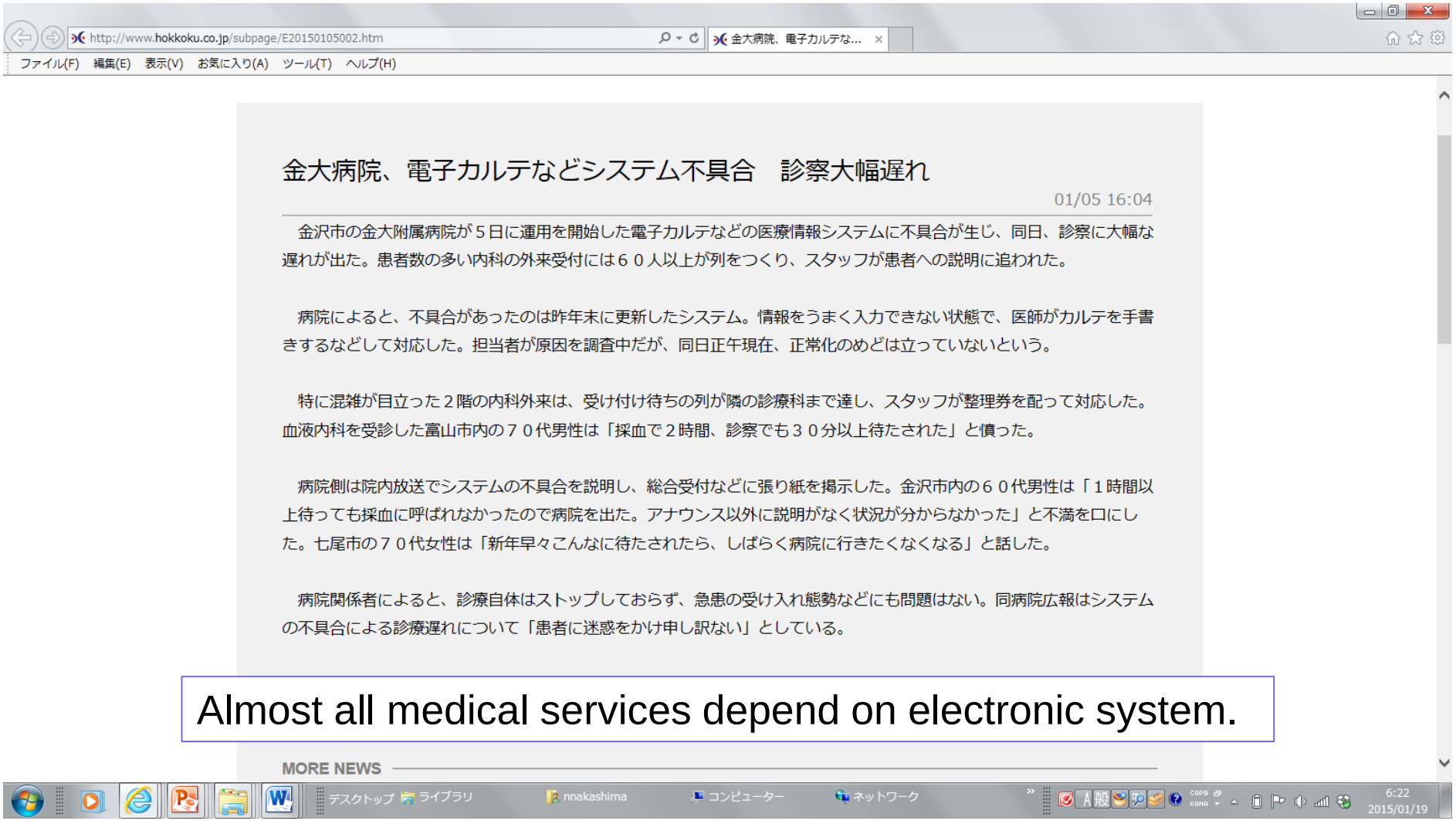
Finally computer virus kills human····

Case 5. The bigger, the better?

Hospital Information System (HIS) in Kyushu University Hospital



A bug of EMR system stopped medical service in Kanazawa university hospital (05/Jan/2015)



Almost all medical services depend on electronic system.

Numbers of students, staffs, and patients in Kyushu Univ.

- Students; undergraduates 11,780

  postgraduates 6,942

  research students 644

- Faculties and stuffs

  Faculties 2,099

  stuffs (non-faculty) 5,617

- Patients with active ID for 5ys ～300,000

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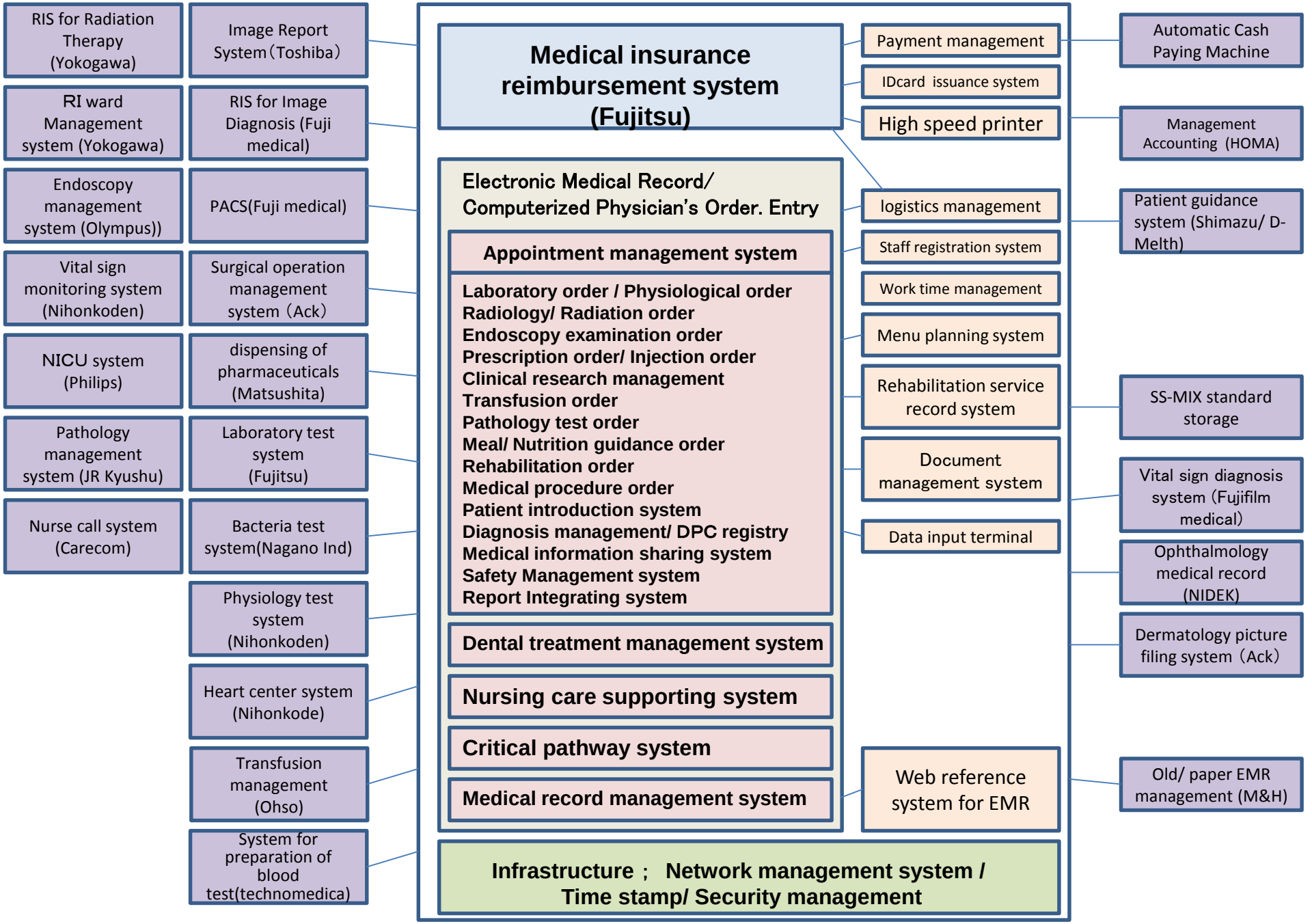
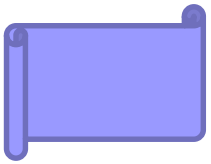
Each patient has wide-ranging and detail medical data in HIS DB



National Guidelines for medical information security



- Safety Management Guidelines for Medical Record Information (ver. 4.2)
  (Ministry of Health, Labour and Welfare)

- Information Security Measures Guidelines on medical information for ASP/SaaS (ver. 1.1)
  (Ministry of Internal Affairs and Communications)

- Guidelines for Information Processing Business Providers that Contract to Control Medical Information (ver. 2)
  (Ministry of Economy, Trade and Industry)

Strategy of Kyushu U hospital against security risks of information

- Hospital Information system (HIS) is disconnected from Internet in principle
- (1) authenticity, (2)visual readability, and (3) storage property are ensured
- Vein authentication (Number of user IDs is 4,555)
- Data output from HIS automatically set up anonymity and encryption
- Backup server of HIS has been established in remote area for BCP purpose after “311”
- Information security policy of KU Hospital has been established in addition to the entire KU policy

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Data output rules from HIS

Before 2013

Users just asked MIC

Application form

Output by MIC staffs

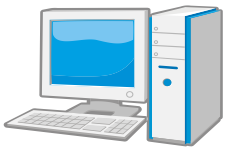
Users get data with anonymity and encryption from MIC

＊MIC provides this service to promote data utilization and security

In addition to the service above,

After 2014

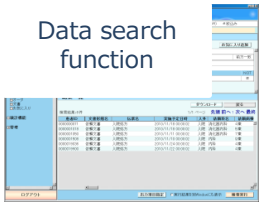
Users can search DB and extract data



HIS terminal

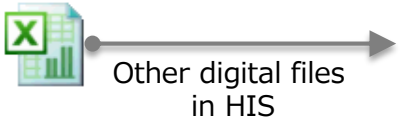
All HIS terminal are available

Data search function



Only licensed users Can use the function

Automatic anonymous function



Other digital files in HIS

HIS terminal with data output function (Only 50 terminals)

Data output function

All users can use limited terminals

Automatic encryption function
Automatic copy file

Specified USB memory can be used

Each department has one each

A female MD in Kyushu University Hospital was snatched a USB memory with privacy information of 183 patients without anonymity and encryption (7th Jan 2015)

w.sankei.com/region/news/150107/rgn1501070008-n1.html 九大病院、患者情報のメ...

表示(V) お気に入り(A) ツール(T) ヘルプ(H)

産経ニュース 東京 11℃

ホーム スポーツ エンタメ

北海道・東北 関東

福岡 大分 佐賀 長崎

Enlightenment and education are important!

４６歳、ミドリムシで勝ち組！？湧き出すパワーが…！ [PR]

全国の移住に役立つ情報満載 ＪＯＩＮ移住・交流ナビ [PR]

2015.1.7 07:08

文字の大きさ 小 中 大

九大病院、患者情報のメモリー紛失 医師がひったくりに遭う

ツイート 8 おすすめ 0 +1 0

九州大は６日、九州大病院に勤める４０代の女性医師がバッグをひったくられ、中に入っていた患者９１人の個人情報が記録されたＵＳＢメモリー１個を紛失したと発表した。氏名や年齢などの情報が悪用された報告はないという。メモリーの持ち出し許可は得ていたが、データを第三者が見られないようパスワードを設定していなかった。

Summary

- We need primary/secondary use of medical information more
  - To make medical service better
  - To create next generation medical service
- Risks of Medical information
  - “Information explosion”
  - Sensitive privacy information, and confidential information
- Security Management of Medical Information is one of the essential matters in Kyushu Univ. Hospital